FINAL Supplemental Environmental Impact Statement

Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey

U. S. Army Corps of Engineers

New York District

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Final Supplemental Environmental Impact Statement
Use of Sub-Aqueous Borrow Pits for the Disposal Of Dredged Material from the Port of New York-New Jersey

The Responsible lead agency is U.S.Army District New York.

Abstract: The New York District (NYD) is responsible for regulating disposal of dredged material into waters of the United States. Part of this responsibility entails assessing and limiting the impact of such disposal on the aquatic environment. To determine the potential a given material may have for degrading the environment, the Corps and the U.S. Environmental Protection Agency (EPA) have developed testing criteria for ocean disposal. Dredged material is deemed suitable for unrestricted ocean disposal if it exhibits negligible levels of mortality and bioaccumulation in test organisms (compared to organisms exposed to reference sediments). Non-toxic dredge material that exhibits a potential for degrading the environment is evaluated on a case-by-case basis to determine if it is suitable for restricted ocean disposal. If so, it is capped with a layer of clean material to isolate it from the water column and biota. Any dredge material that exceeds a predetermined level of mortality in test organisms, or demonstrates a potential for bioaccumulation of contaminants is not allowed to be disposed of in the ocean. The NYD has investigated alternatives to ocean disposal, four of which may also provide for safe long-term containment of the latter two categories of dredge material. After comparing impacts and benefits of disposal from use of the current capping procedure, sub-aqueous borrow pits, containment structures, and upland sites, the preferred environmental alternative was determined to be use of sub-aqueous borrow pits; specifically to fill an existing pit while digging a new one. Screening criteria were developed to identifying existing pits and areas for new pit construction that would result in the least adverse impacts to aquatic resources. Management procedures were developed to maximize pit capacity without jeopardizing its security. A physical and biological monitoring program will be undertaken to ensure there is minimal loss of contaminants during a disposal event, between projects, and after the site is closed. If the monitoring results indicate the site's use should not be continued then the new pit will not be filled, thereby providing a replacement of the habitat lost when the existing pit was filled; the filled pit would then replace the shoal habitat lost when the new pit was dug. A final 404(b)(1) evaluation has been prepared for the use of a subaqueous borrow pit disposal site, and is included as Appendix B of this FSEIS; it determined that the action does not represent a significant threat of degradation to the aquatic environment, and is in compliance with 404 (b) (1) guidelines.

Send comments to the District Engineer by: 25 February 1991

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Executive Summary

S.1 Major Conclusions and Findings

a. This document reviews the major findings of the 1983 Final Environmental Impact Statement (FEIS) regarding disposal of dredged material from the Port of New York - New Jersey (NYD, 1983). Specifically, alternatives identified as feasible for handling potentially contaminated dredged material were examined, especially that document's conclusion that the use of sub-aqueous borrow pits for the disposal of material not suited for unrestricted ocean disposal was the environmentally preferred alternative. This supplement (SEIS) to the 1983 FEIS utilizes the results of recent physical and biological studies to update the alternatives that the FEIS considered for disposing of large volumes (350,000cys/year or 4 million cys/10 yr) of potentially contaminated sediments. In addition to sub-aqueous borrow pits, the FEIS concluded that shallow ocean disposal with capping, containment facilities, and upland disposal, are currently feasible alternatives for the disposal of contaminated dredged material. These alternatives, as well as the no action alternative, are compared in this FSEIS (in light of new information), which concludes that the use of sub-aqueous borrow pits is still the environmentally preferred alternative. This conclusion was based on its long-term ability to isolate contaminants from the water column, minimal impacts to aquatic resources and human health, and its immediate availability and high probability of success.

b. The alternatives of using an existing pit or digging a new pit were then examined in detail (2.3.1 and 2.3.2). Existing pits were identified (2.3.1.1; see also Figure 1), and four found to meet minimum size requirements (2.3.1.2) and environmental concerns (2.3.1.3). The four were then evaluated based on physical (2.3.1.4) and biological (2.3.1.4) criteria, and ranked according to preferred order of use (least physical and biological constraints). The large East Bank pit in Lower New York Bay was ranked preferable, but by a small margin over the others; environmentally there is very little, if any, difference among the four preferred pits. The Lower Bay complex was screened in terms of usable sand reserves (2.3.2.1) and biological resources (2.3.2.2). Two areas having large amounts of sand and relatively low biological use were identified as the best sites for digging new pits (2.3.2.3; see also Figure 32). The East Bank, and a portion of the shoal habitat in the northeast corner of Raritan bay, were considered about equal in preference, with the former having a slight advantage because of somewhat lower fish and benthic populations and a larger size. After comparing the use of new and existing pits, the FSEIS concluded that digging new pits for use might represent a slightly lesser overall (long-term) impact, but would necessitate a delay of several years in implementation. Consequently, the FSEIS recommends using an existing pit for immediate containment of potentially contaminated dredged material, while constructing a new pit for future use (2.3.5). The existing pit should be monitored to ensure it is adequately containing the contaminants of concern.

c. In order to minimize environmental impacts and maximize site capacity, a number of operational and management procedures were developed for using the site (2.3.3 and 2.3.4). Any category III sediment (now unsuitable for any ocean disposal; see 2.1) deposited into the pit would be capped with category I material (now suitable for unrestricted ocean disposal; see 2.1) within 2-4 weeks of initial disposal. Any category II material (now suitable for ocean disposal only if capped; see 2.1) deposited into the pit would only be covered if it were disposed of during periods of rapid benthic repopulation (spring and fall), or if the Steering Committee (SC) determined that extenuating circumstances warranted such added protection. The above interim capping procedures would be waived only if an applicant could demonstrate (to the satisfaction of the SC) that another disposal event would cover the applicant's sediment within 2-4 weeks (2.3.3.1). Bathymetric surveys and special testing requirements (porosity, shear strength, permeability) will be used to determine disposal volume and site capacity (2.3.4.2.1). When the pit is filled (to a level of three feet of adjacent sea bottom (or if monitoring shows material beginning to leave the pit in substantial quantities) all disposal will cease, and a sand cap of at least three foot thickness will be used to cover the entire site. The site will thus be returned to both its former depth and sediment type. The adjacent benthic community will be monitored during site use and after its closure, to ensure they are not being subjected to increased contaminant uptake from the site. If such uptake is discovered during pit use, disposal will be suspended pending review by the SC, and implementation of corrective measures. If no corrective measures are possible the use of the site will be terminated and a closing cap installed expeditiously.

S.2 Areas of Controversy

a. The environmental impacts associated with each alternative are discussed in section 4.0. Perhaps the greatest public concern arises from controversy concerning potential effects on water quality, and the consequent exposure of the biota to contaminant uptake. With regards to sub-aqueous borrow pits, the most often raised issues revolve around the possible loss of contaminants during and after disposal. It has been alleged that sediments (and their associated contaminants) could be resuspended and lost during disposal, and then dispersed throughout the ecosystem by currents. In addition, there have been considerable fears raised that sediments could be lost from the site itself through physical erosion and bioturbation, further increasing the levels of contaminants released to the marine system overall, and more specifically the benthic community on and adjacent to the site. Studies on capped disposal mounds in Long Island Sound and the New York Bight have, instead, continued to demonstrate that there is no measurable loss of the cap or the contained dredged material from any of these sites. Since a borrow pit is in a depositional environment (unlike the mounds that are directly exposed to erosional forces) there is every reason to assume they will suffer even less loss of material, if any. The five year experience at the shallow pit site in Seattle bears out this conclusion so far. However, this assumption has not been extensively field tested for long-term borrow pit disposal, as it is a relatively new procedure; it therefore remains an area of controversy. However, all our experience, as well as our knowledge of the physical and chemical nature of the estuary supports its likelihood of success. The physical and biological monitoring programs described in section 2.3.4.2 are intended to document the validity of this assumption. These programs also provide a means of minimizing adverse impacts if the assumption is wrong, by providing warning of problems early enough to halt the continued use of a site.

b. A second controversy arises from the role a pit habitat plays in the overall fishery of the Lower Bay complex. The extensive fish survey conducted by the Marine Science Research Center of the State University of New York at Stony Brook, clearly demonstrated that borrow pits and other artificial depressions such as channels, contain substantially higher numbers of fish than the surrounding natural shoals. As a result of these findings, claims have been made that losing such habitat (by filling with dredged material) would significantly affect the fishery resources. Feeding studies have failed to demonstrate that the fish found in pits are using food resources there as a preferred part of their diet; fish apparently feed opportunistically on whatever is available (inside or outside a pit), with no noticeable effect on their growth rate. Further, the benthic populations within pits are far less stable (and therefore more unreliable) than those in the surrounding shoals. It would thus appear that the fish's use of a pit does not provide it with a feeding advantage. Since the pits are not serving as spawning areas, nor are they attracting a unique community of their own, it is difficult to establish a clear benefit from the presence of pit habitat. Consequently, it is unlikely that the loss of such habitat (especially only one pit) would substantially affect the system-wide fishery resource. Further, since the filled pit would be returned to its former shoal condition, the habitat loss would only be short-term.

c. Pits now rapidly accumulate fine-grained sediments, thereby serving as potential sinks for contaminants that are most often associated with the fine-grained sediments. Thus, under a no action alternative the pits would would be filled in the long-term anyway, while increasing the potential exposure of their inhabitants to contaminants in the interim. Moreover, NMFS has pointed out that there could be a potentially adverse impact to fish attracted to such an artificial habitat as a borrow pit, aside from the increased potential exposure to contaminants. Such fish could be subjected to hypoxic conditions not normally encountered in the shoals, or delayed in their migration long enough to risk exposure to stress conditions (such as sudden cold spells) that they might have otherwise avoided by swifter movement through the area. Finally, filling the pit would return that portion of the bay bottom to its natural state, thereby likely spreading the fish out into a pattern more closely resembling their distribution before the bay was ever dredged. Though it would thus appear reasonable to conclude the loss of pit habitat would not have an adverse impact on the fishery, the controversy still persists. However, the risks inherent with implementation of using a borrow pit are considered minimal, especially with regard to the potential long-term advantages of contaminant reduction to the ecosystem (including the fisheries).

d. Some controversy exists in selecting between the two borrow pit alternatives: use of an existing pit or construction of a new one. On the one side are claims that filling an existing pit would result in the loss of a heavily-used fish habitat. On the other side are claims that advise against disrupting the remaining undisturbed bay habitat (shallows) and their more stable benthic communities. In its conclusions (2.3.5), the FSEIS recognizes that digging a new pit might be conceived as the least risk, in that it would be a short-term disruption that would return the habitat to its initial condition when completed, whereas using an existing pit would be a permanent loss of that habitat type. However, that option also delays implementing the prime project goal (stopping ocean disposal of potentially contaminated material) to protect a habitat that is neither natural nor of any demonstrative uniqueness or critical value (and indeed may even be a detriment). The alternative also allows for the continued exposure of fish populations to potentially harmful conditions in the pits, which rapidly accumulate contaminant-prone fine-grained sediments. Therefore the FSEIS recommends pursuing both alternatives. This approach would provide timely removal of contaminated sediment from the marine system (by immediately using an existing pit), and provides for creation of a new artificial pit habitat. Should the monitoring results indicate that either the disposal site is not functioning according to the assumptions made, or that the pit played a greater role in the fishery (both unlikely), then the new pit could be left unfilled to serve as a replacement for the old pit filled. The filled old pit would then replace the shoal habitat lost when the new pit was dug; no net long-term habitat loss would occur. On the other hand, if the monitoring demonstrates that the assumptions regarding the safety of a pit disposal site were valid, then there would be no adverse impact to the fisheries, and a second disposal site would be available for use free of concerns of adversely impacting the water quality and biota of the marine ecosystem. By employing a screening criteria (2.3.1 and 2.3.2) to identify existing pits and new pit sites of lowest resource value, the impact of any habitat loss is even further minimized. Neither of these screening procedures have been subject to extensive criticisms. Rather, the controversy still centers on the overall impacts/merits associated with either alternative, and whether one or the other should be attempted at all.

e. Some difference of opinion exists regarding management of the disposal site, irrespective of which alternative is preferred. The concerns range from how (or if) to employ interim caps, whether to leave a depression over the final cap, and how to ensure the site is properly used by applicants. The FSEIS develops a set of recommended procedures for cap configuration and site use (2.3.3) as well as procedures for monitoring the site for maximum safe use (2.3.4.2). The conclusions are based on reasonable assumptions derived from existing studies and model projections. However, there remains some reluctance on the part of a some people to accept these conclusions. Instead, some chose to call for the absolute safest procedures, even when the need for such restrictive practices is unlikely since the risks are very small. This philosophy of maximum protection versus reasonable controls greatly sacrifices the site capacity, thus accelerating the need for additional sites in a shorter time frame. The monitoring program (2.3.4) is designed to provide the safeguards on which a more reasonable management program can be implemented with sufficient feedback to adjust the procedure if worst-case fears materialize, or real world conditions warrant revisions. The monitoring program has been revised somewhat from that presented in the DSEIS to refect concerns raised by review of that document. The plan presented here has been presented to and reviewed by the SC without any adverse comments being received.

S.3 Unresolved Issues

The remaining unresolved issues center around the security of the borrow pit containment site. Based on existing information, studies of capped disposal mounds, models, and demonstration projects, the use of sub-aqueous borrow pits to contain contaminated dredged material is both a viable and environmentally preferable disposal alternative. Though this procedure is based on reasonable assumptions and projections that have been field tested separately in other environments, it has yet to be verified in a full-scale operation within the Lower Bay complex. Thus the issue of its actual ability to avoid adverse impacts to the fishery, while also containing contaminants in the face of biological and physical erosional processes, must await the implementation of the project and completion of the related monitoring studies, before it can be finally resolved.

S.4 Previous NEPA Documents and Environmental Requirements

a. This document is a supplement to the Final EIS on the disposal of dredged material from the Port of New York and New Jersey (NYD, 1983). It updates that document by incorporating new information from a small-scale demonstration project, more recent area-wide surveys of the fish and benthic communities, and new surveys of the current ocean disposal site. The goal of the project is to evaluate methods for the timely implementation of long-term disposal of dredged material that does not meet the criteria for unrestricted ocean disposal. Therefore, only those alternatives identified in the FEIS as feasible and able to meet this goal were considered in detail. This FSEIS concluded that the environmentally preferred alternative for meeting the stated goal was to use sub-aqueous borrow pits, the same conclusion arrived at by the FEIS.

b. The recommended borrow pit alternative has been evaluated with reference to its compliance with environmental protection statutes and other environmental requirements. Results of the evaluation are presented in Table S.1. The plan's impacts on significant national environmental resources is highlighted in Table S.2. In order to implement the requirements of Section 404(b)(1) of the Clean Water Act, an evaluation of potential impacts arising from the discharge of dredged material into one of the preferred borrow pit disposal sites has been undertaken (see Appendix B). This analysis concluded that the siting and use of a borrow pit within the Lower NY Bay Complex did not represent a significant threat of degradation to the aquatic environment, and was in compliance with the 404(b)(1) guidelines. As a result, individual applicants will not have to perform separate 404(b)(1) evaluations for use of the approved borrow pit disposal site for their given project, providing they follow all prescribed management procedures and the dredged material falls into category II or III (as defined in section 2.1 of this FSEIS). Each dredging project would still have to obtain a permit under Section 10 of the Rivers and Harbors Act of 1899, and most would also have to perform a separate 404(b)(1) evaluation on the barge overflow. Each project would thus be reviewed and approved on its own merit, but once approved category II and III material would be disposed of at the designated borrow pit site without further consideration of alternative sites (which is the purpose of this FSEIS).

c. With regard to the proposed action's compliance with approved Coastal Zone Policies of New York and New Jersey, a consistency determination has been prepared by the Corps for applicable policies of the NY and NJ management plans (see Appendix E). The use of a sub-aqueous borrow pit (new or existing) for disposal of contaminated dredged material was concluded to be consistent with the applicable CZM policies of both states.

Table S.1 Current Status Regarding Compliance of the Proposed Borrow Pit Project with Applicable Environmental Public Laws, Executive Orders, and Federal Policies.

	Status of Project
1. <u>Public Laws</u>	
a. Archeological and Historic Preservation Act PL 93-291; 16 USC 469; et seq.	in compliance
b. Clean Air Act, PL 91-604; 42 USC 1857h-7, et seq.	in compliance
c. Clean Water Act, PL 92-500; 33 USC 1251, et seq.	in compliance
d. Coastal Zone Management Act, PL 92-583; 16 USC 1451, et seq.	in compliance
e. Endangered Species Act, PL 93-205; 16 USC 1531 et seq.	in compliance
f. Federal Water Project Recreation Act, PL 89-72; 16 USC 460-1(12), et seq	in compliance
g. Fish and Wildlife Coordination Act, PL 85-624; 16 USC 661, et seq.	in compliance
h. Historic Sites Act, PL 74-292; 16 USC 461, et seq	in compliance
i. Marine Protection, Research, and Sanctuaries Act, PL 92-532; 33 USC 1401, et seq.	in compliance
j. National Environmental Policy Act, PL 91-190; 42 USC 4321, et seq.	in compliance
k. National Historic Preservation Act, PL 89-655; 16 USC 470a, et seq.	in compliance
l. Estuary Protection Act, PL 90-454; 16 USC 1221, et seq.	in compliance
2. <u>Executive Orders</u>	
a. Protection and Enhancement of the Cultural Environment, EO 11593, 5/12/79 (36 FR 8921)	in compliance
b. Protection of Wetlands, EO 11990, 5/24/77 (42 FR 26961).	in compliance

3. <u>Federal Policies</u> no environmental Federal policies applicable to this project.

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Table S.2 Comparative Impacts of Feasible Disposal Alternatives.

Resource	Base Condition	No Action	Borrow Pits	Ocean Disposal	Containment Facility	Upland Disposal
Benthos	Generally comparable to other regional estuaries, with good abundances and diversity in shoals and distinct areas of greater productivity and marked seasonality. Borrow pits with less stable populations.	No impacts to present community levels, though populations in pit and undredged berthing areas/ channels continue being exposed to more contaminated sediments	Replace pit w/stable less contaminated habitat. Short-term loss of small part of less-used shoal by new pit. Minor overall impacts from either action.	No impact from use of mud dump. Potential loss of stable community if new site used (site-specific).	Permanent loss of small portion of shoal habitat (minimized by selecting area of less use). No overall impact	No Impacts by
Fishery	Heavily used nursery area and migratory pathway. Shoals generally less used than channels/pits, with less than uniform distribution as well. Marked seasonality.	No Impact, except that fish will continue to be exposed to fine-grained, potentially contaminated sediements that naturally accumulate in pits.	Replace well used pit w/less used but less contaminated shoal w/ potential enhancement (reef). Short-term loss of shoal by new pit. Minor overall impacts from either.	Minimal at mud dump. Uncertain if new site used (site-specific).	Permanent loss of small portion of less used shaol habitat; minimized by selecting low use part of shoals; No overall impact.	No impacts
Wildlife	No breeding, overwintering, or special feeding areas for birds. No special wildlife value at terrestrial sites.	No Impact.	No Impacts	No Impacts	No Impacts	No Impacts from use of selected sites.
Water Quality	Generally acceptable for primary contact recreation, but not shellfishing.	No impact, but continued exposure of undredged sediments to water column.	Decrease exposure of contaminated sediments to water column.	No impacts at mud dump. Some increased loss at deeper site.	Decrease exposure of contaminated sediments to water column	Decrease exposure to water column; increase exp. of groundwater.
Endangered species	No critical/unique habitat. Any occurence incidental and transitory	No Impact	No Impacts	No Impacts	No Impacts	No Impacts
Cultural & Historical	Potential historic shipwrecks and other marine artifacts; most likely around Ambrose C.	No Impacts	No impacts (potential sites avoided)	No impacts at mud dump, need survey for others	unknown (need survey).	Unknown (need survey).
recreational	Heavily used for fishing and boating. Bathing beaches along shores.	No Impacts	Possible decline in fishing at one pit, with potential for; improvement (reef). Short-term fishing decline at new pit	No impacts at mud dump (new site impacts depend on location).	Permanent loss of small part shoal habitat; minimized by select low use area and creating reef habitat (dike)	No Impacts
Air Quality	Assumed acceptable (no survey)	No Impacts	Some increased emissions from tugs dumping in area.	No Impacts	Short-term emission increase during construction and minor long-term tug emission increase from dumping in area	Short-term increase from construction. Minor long-term rise in truck exhaust
Economics	Major shipping route, heavy commercial traffic (including barges towed to mud dump outside of bay complex).	No Impacts	Possible reduction in transport cost; little/no delay in dredging berths and channels.	No impacts for mud dump, 2-3X increased costs if new site is further to sea	Possible reduction in transport cost; little/no delay in dredging berths and channels. Higher construction cost.	Added cost to dewater and double handle.

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1.0 Purpose and Need

1.1 Introduction

Keeping New York Harbor open to navigation is the responsibility of the New York District Corps of Engineers (NYD). This is accomplished through the construction of Congressionally-authorized navigation channels, and their continued maintenance. The harbor is situated in an estuarine environment, where sedimentation is common. Many areas are naturally less than 20 feet deep, far too shallow to accommodate modern deep-draft vessels generally requiring as much as 45 feet of water for safe, fully-loaded operation. Though channels have been constructed through these areas, they remain places of active sediment transport. To maintain the channel's viability, accumulated sediments must be removed through a process called dredging. The dredged material must then be disposed. The same is true of sediments that accumulate in private berthing areas and channels that are connected to the Federal navigation channels. The disposal of materials from both sources is regulated nationwide by the Army Corps of Engineers (CE), and in the NY Harbor by the NYD, specifically. The total amount of such material requiring disposal varies from nearly 20,000,000 cubic yards (cys) to no less than 2,300,000 cys (Table 1 and 2. The U.S. Environmental Protection Agency (USEPA, 1982) projected an average future volume of 8-12 million cys; major navigation improvements (such as the ongoing deepening of Kill Van Kull and Newark Bay Federal channels) could increase this.

1.2 Regulatory Authority

a. The Rivers and Harbors Act of 1899 was enacted to control the discharge of refuse into navigable waters by requiring issuance of a permit. Section 10 of that Act delegates to the CE authority to control and review any obstruction or alteration of any navigable waters of the United States. This has served as the historical basis by which the CE regulated the disposal of dredged material.

b. The Clean Water Act of 1972 (CWA), and more specifically its amendments of 1977, established a permit program and evaluation guidelines (Section 404 (b)(1)) by which the CE regulates the discharge of dredged (or fill) material at specific disposal sites within the waters of the U.S. The Act further stipulates the criteria to be used in determining the degree of degradation to waters of the United States that will result from a given action. Issuance of a permit depends on determining that the action does not cause a significant degradation on the aquatic environment and is in compliance with 404(b)(1) guidelines. Economic impacts to navigation and anchorage must also be considered (Section 404(b)(2)).

c. The Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 regulates the transport of materials for the purpose of disposal in ocean waters. Section 103 of the Act authorizes the CE to issue permits for ocean disposal of dredged material, using criteria developed by EPA (in consultation with the Secretary of the Army). These regulations (finalized in 1977) establish application procedures for ocean disposal permits, environmental review parameters to evaluate applications, and designation and management procedures for ocean disposal sites. The act seeks "...to prevent or strictly limit the dumping into ocean waters of any material which would adversely affect human health, welfare, or amenities on the marine environment..."

1.3 Project Background and Need

a. Between 80 and 90% of all dredged material from NY Harbor (private and Federal) was historically disposed into the ocean (NYD, 1983; O'Connor, 1989). The legislation described above gives the CE responsibility for regulating such disposal activity and places restrictions on continued use of the ocean for such disposal. These new regulations have resulted in the NYD undertaking a systematic investigation into alternative disposal techniques to ocean dumping. This undertaking began with a dredged material workshop at NYD in 1977. The findings of that workshop resulted in identifying a number of potential disposal alternatives. The feasibility of each alternative was evaluated in a two volume report (Mitre Corp 1979; 1980). In 1980 the NYD initiated a Dredged Material Disposal Management Plan (DMP) to actively pursue those alternatives the Mitre Report determined to be feasible. The plan is administered by NYD, in consultation with an Interagency Steering Committee (SC) that consists of EPA, U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), New York State Department of Environmental Conservation (DEC), New Jersey Department of Environmental Protection (DEP), and the Coastal Zone Management programs (CZM) for NY and NJ. The activities of the SC are reviewed by a Public Involvement Coordination Group (PICG).

b. In June 1980, the NYD was mandated by consent decree of the U.S. District Court (Southern District of New York) to prepare a comprehensive Environmental Impact Statement (EIS) regarding ocean disposal of dredged material as well as disposal alternatives. The final EIS (NYD, 1983) on ocean dumping identified two basic types of dredged material whose handling and disposal concerns could be markedly different. Material that did not pass the ocean disposal testing criteria (including material that passed only after being subjected to some restrictions in its deployment, such as capping) was the subject of greatest concern. This material was conceived as having a potential for contaminating the marine system because of its demonstrated potential for increasing levels of contaminants in the tissues of animals as they pass through the food chain (biomagnification). Methods of disposing of this type of material would thus differ from those used to dispose of sediment that passed the testing criteria. More precautions would be recommended for isolating potentially contaminated sediments from the environment, and the biota that might accumulate such contaminants. Of all the disposal alternatives discussed in the EIS, the use of sub-aqueous borrow pits (artificially dug holes in the bay floor resulting from sand mining activities) was deemed the technically preferred option for all types of material, including those sediments whose contaminant levels were high enough to be perceived as a threat to the marine system.

c. Because of its potential value for disposing contaminated dredged sediment, the borrow pit disposal alternative was examined in greater detail under the NYD's DMP. A demonstration project was developed, and approved by the SC. A water quality certification (WQC) was granted by New York State's Department of Environmental Conservation (DEC) in November, 1981, for a demonstration project that included the construction of a berm across a portion of the CAC pit (number 6 in Figure 1), followed by the disposal of dredged material into the isolated portion of the pit created by the berm. The demonstration project was designed to answer a series of questions regarding operational aspects of borrow pit use and contaminant release during and after filling/capping. Construction of the berm was successfully completed as planned in early 1982, but phase two, initiation of disposal behind the berm, was never begun due to a court order by NY State Supreme Court (Staten Island) against DEC's issuance of the water quality certification. The basis of the suit (brought against DEC by the Natural Resources Protective Association of Staten Island (NRPA) was an alleged impact the project could have on recreational fishing and commercial lobstering. While not finding for the plaintiff, the court concluded that impacts to the fishery were not adequately addressed, and that additional information may be necessary to address those concerns. DEC then revoked the water quality certification for the disposal phase of the demonstration project in October 1983, claiming that fishery studies in the pits indicated the presence of an "...abundant and diverse sport fishery" that could be significantly impacted by the demonstration project. Consideration for reissuing the water quality certificate would have required preparation of a New York State EIS (by NYD, as the applicant), that fully addressed fishery concerns as part of the DEC review process.

d. After extensively reviewing fisheries and other environmental data collected in and around existing borrow pits and the Lower New York Bay complex (see section 4.3), including studies conducted since the demonstration project, the NYD believed that a properly located and operated borrow pit disposal site would not add to the degradation of that aquatic system, nor substantially impact the fishery resources of the Lower Bay Complex. In fact, by containing the sediments of potentially greater risk in these areas, the overall impact to the regional fishery is likely to be less than currently occurs through ocean disposal at the Mud Dump site, and possibly even less than might occur by leaving contaminated material in place. The NYD thus withdrew its application for the demonstration project, and, in cooperation with NMFS, EPA, NJDEP, and NYCZM prepared a draft Supplemental Environmental Impact Statement

(SEIS; NYD,1988) for implementing the borrow pit alternative as an operational means of routinely disposing of materials not suitable for "unrestricted" ocean disposal (materials that are currently dumped at the Mud Dump and then capped, as well as those not likely to be allowed in the ocean even with capping). Sediment classified as hazardous would not be placed into these pits. This goal has been endorsed by the SC (including NMFS, DEP, DEC, and NYCZM) as a reasonable and preferable alternative to current practice. Consequently, the NYD is undertaking the finalization of this SEIS pursuant toward eventual application for water quality certification (WQC) from New Jersey, as well as New York, for a fully operational regional disposal site.

e. The project need stems from maintaining sufficient depths in berthing areas and channels for their continued use by commercial vessels. Over the past eight years, private maintenance dredging in the Kill Van Kull, Arthur Kill, and Newark Bay waterways all required that the dredged material removed be capped (Table 2) soon after disposal at the current Mud Dump site (Figure 2). Such restrictions resulted from the sediments from these areas not passing test criteria for unrestricted ocean disposal (see section 2.1 for further details on testing requirements). Commercial activity within these waterways accounts for the large majority of the $50 billion worth of cargo annually handled by the port, which directly employs 200,000 people and generates direct economic benefits of $14 billion a year, including $4 billion in wages/salaries and $ 1/2 billion in taxes (O'Connor, 1989) in addition, some berthing areas in the Hudson and East rivers also contain contaminant levels in sediments sufficiently high enough to warrant requiring them to be capped (Table 2). Finally, dredging of Federal channels in Newtown Creek, Gowanus canal, and (most recently) Newark Bay, also will likely require their sediments be capped after disposal at the Mud Dump.

f. Failure to dredge these areas will eventually result in their inaccessibility to the vessels that currently utilize their shore facilities. As the above areas account for the vast majority of the port's commercial activity, the end result of their loss would be a catastrophic economic blow to the region. Further, current (and planned) operations to deepen channels in Kill Van Kull, Newark Bay, and Arthur Kill (thereby maintaining the port's competitiveness) also include the possible capping of the sediments removed. The current Mud Dump site is scheduled to reach capacity in the 1990's. A replacement site could be closed to the types of sediments that now are capped. The borrow pit is thus being viewed as a reasonable alternative for disposal of material now capped, and one that offers a safe and feasible means of containing the contaminated sediments under consideration in this SEIS (see section 2.1 for more specifics on sediment composition). As such, it represents an environmentally acceptable disposal alternative that would allow for maintaining the future viability of the port.

g. In addition to economic need however, there are also potentially harmful environmental consequences that could result from not dredging the above areas that contain the sediments under consideration here. These areas accumulate some of the most contaminated sediments in the harbor. These sediments would be subject to continual resuspension and exposure to water column release of their contaminants, and their subsequent distribution into the larger ecosystem, where they would become available for uptake by the biota. The agents of resuspension would be natural hydrological regimes and storm events, as well as continued navigational traffic in these progressively shallower areas (until finally too shallow to be used). The removal of these sediments into a contained disposal site would reduce that immediate source of contamination, and could represent a positive long-term impact for the estuary if the ultimate source of contaminant is removed (as has occurred in many instances by new regulatory control measures and/or abandonment of the source).

1.4 Project Goals

a. In line with the needs discussed above (1.3) the specific purpose of this project is to obtain all necessary Federal and State approvals required for the implementation of the borrow pit disposal alternative. The end result of this action will be the designation of an authorized borrow pit disposal site, including a protocol for site use and monitoring. Also included would be a delineation of the kinds of dredged material that will be allowed to be disposed at such a site (see 2.1). The approval would authorize the NYD to use and manage the site only for disposal of such material. Each applicant would thus not have to undergo separate review for use of a borrow pit site. Once the individual dredging project itself is approved by DEC or DEP, granted a Corps permit (subject to the same agency review that each application now undergoes), and meets criteria for placement into a borrow pit (see 2.1), the dredged material could be disposed of in the approved site, following approved procedures, without further review.

b. The role of this Supplemental Environmental Impact Statement (SEIS) in the overall process is to evaluate alternative sites for new and existing pits, and to determine which feasible sites are environmentally acceptable, in term of impacts (both positive and negative). The evaluation of alternatives to ocean dumping was accomplished by the 1983 FEIS, which recommended the sub-aqueous borrow pit alternative as environmentally preferable. The acceptable borrow pit sites (new and existing) will then be prioritized, to the extent practicable, to determine which (if any) are preferable, and to what degree. After reviewing comments to the draft (DSEIS) and final (FSEIS) SEIS, the NYD will then select one or more of the sites identified in the FSEIS, and document that selection in a Record of Decision (ROD). The NYD would then apply for a water quality certification (WQC), as required under section 401 of the CWA, from the states of NY and/or NJ (depending on site location), for the immediate use of the identified site(s). As part of the environmental review process for designating the disposal site, NYD will concurrently seek CZM consistency determination for use of the selected new and/or existing pits. The site ultimately used would thus be approved under both WQC and CZM reviews. The NYD will also coordinate with NYOGS and NJDEP with regards to licenses/fees required of private firms that may seek to dig a new pit at their expense, although if the work is undertaken as a Federal Project no such royalties would apply.

c. Part of the eventual approval would be an inclusion of a proposed management and monitoring strategy for site use. This procedure would be adhered to by all users of the site, and enforced by the NYD. Rather than develop a finely-detailed program (which is not its role), this SEIS will discuss basic goals and approaches for such a program, providing as much detail as is possible regarding methods to be employed. Appendix D contains the outline for a management plan, and includes a decision making rationale for incorporating the findings of the monitoring program. Once the NEPA SEIS review process is completed, and sites are finally selected to apply for WQC and CZM approval, more specific details for site monitoring/management will be finalized in conjunction with input from the SC, and presented as a package (along with the final selected sites) to the states for their regulatory review, as part of a disposal site application. Further modifications may then be made to either or both plans, as field results come in and can be analyzed.

1.5 Objectives of the Supplemental Environmental Impact Statement

a. The purpose of this DSEIS is to examine the environmental impacts that might reasonably be expected to arise from use of borrow pits for disposal of dredged material that is either unsuitable for ocean disposal or requires specific modifications (such as capping) to disposal practices to render its contaminants rapidly harmless to the environment. Material that can pass the ocean disposal criteria without special management techniques being employed (unrestricted ocean disposal) is not being considered for placement into the secure disposal environment provided by a borrow pit. This document is a supplement to the final 1983 generic EIS (NYD, 1983) that discussed and compared all dredged material disposal alternatives. This SEIS will consider alternative methods of implementing the borrow pit disposal alternative, including the construction of a new, specially-designed pit. It will address other disposal alternatives only as they pertain to the goals of the project under the CWA and MPRSA restrictions, and then only to update same from their 1983 status (as none are sufficiently developed for immediate use). In this respect, it will serve to concentrate on the disposal alternative deemed most preferable by the 1983 court-ordered EIS and, by comparison to the updated assessment of the other alternatives, determine if the conclusion of the 1983 FEIS (NYD, 1983) regarding the preference of borrow pit disposal, is still applicable. Borrow pits have been the subject of considerable studies since that document was finalized. The result has been a greatly improved insight into their potential impacts and operation. There now exists sufficient data to evaluate this option fully, and this SEIS serves to focus this knowledge so as to identify an environmentally-preferred location and method of operation. It is the first feasible alternative for disposing of contaminated dredged material that has been developed from the DMP. Further, as a potential means for reducing any adverse impacts to the marine system that may result from disposal of dredged material considered unsuitable for unrestricted ocean disposal, warrants immediate attention, in compliance with existing environmental laws. As its development arises out of the 1983 FEIS' comparisons of a multitude of potential disposal alternatives, it is most properly a supplement that builds on a single aspect of that generic document.

b. The SEIS will accomplish its goal by first identifying the type of dredged material that is being considered for borrow pit disposal, and the alternatives that could reasonably be expected to meet long-term disposal needs (minimum 10-20 years) for such sediments (Section 2.1). Besides identifying and updating the feasible disposal alternatives discussed in detail in the original FEIS (NYD, 1983), their impacts will also be summarized and compared to determine the validity of that document's conclusion regarding borrow pits as the environmentally preferred alternative (Section 2.2). Also, in section 2 there will be a detailed analysis of the alternatives for employing the borrow pit option, including a screening process that compares and identifies the best overall existing pit to use (Section 2.3.1) and the best overall locations for digging a new pit (Section 2.3.2). The section ends with a discussion of how best to manage the use of a pit (Section 2.3.3) and what to monitor to ensure the operation meets the objectives stated above (Section 2.3.4). The remainder of the SEIS will identify existing resources, concentrating on these that could be impacted by implementing any of the feasible alternatives (Section 3), as well as a detailed analysis of those impacts (Section 4). Finally, a listing of persons helping in preparation of the document (Section 5) and a summary of past and current public involvement and history of the project will be presented along with responses to written comments (Section 6).

2.0 Alternatives

2.1 Sediment Testing

2.1.1 Current Practice

a. As stated in section 1.4, the objective of this action is to comply with CWA and MPRSA restrictions on reducing or eliminating ocean disposal of materials that may adversely impact the marine system. To determine the type of sediments that have a potential for such impacts, dredged material must undergo physical and (most likely) biological testing. The testing is conducted in accordance with the EPA/CE implementation manual (USEPA/USACE, 1977), supplemented by a regional guidance manual (1984). All dredged material (private and federal) must be tested for its effect on selected organisms, except for the following categories of material:

-"Dredged material composed predominantly of sand, gravel, rock or any other naturally occurring bottom material with particle sizes larger than silt, and material found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels; or

-Dredged material to be utilized for beach nourishment or restoration, and is composed predominantly of sand, gravel or shell with particle sizes compatible with material on the receiving beaches; or

-Material proposed for dumping which is substantially the same as the substrate at the proposed disposal site and which is far removed from existing and historical sources of pollution, thereby providing reasonable assurance that such material has not been contaminated by pollution."

b. Most sediments in NY Harbor are assumed to contain some level of contaminants of concern. Therefore all applicants (private or government agency) whose dredged material does not meet the exclusionary criteria above must be tested for potential biological impacts at the dredging and disposal sites. The tests require representative sampling of the project sediments (to project depth plus two feet more for allowable overdredging) so as to accurately assess the impacts from the entire project. Once the NYD approves the sampling plan, the applicant must obtain sediment samples at each sampling location and conduct the required physical, chemical, and biological tests.

c. Each sediment sample is tested for grain size, Copper (Cu), Zinc (Zn), Nickel (Ni), total organic carbon (TOC), and percent moisture. In addition, the site water and sediment elutriate are chemically tested to assess the potential of contaminant release at the dredge site. The elutriate test is conducted on a composite sample consisting of a mixture of sediment samples from all the sample locations. The sediment is mixed with water from the proposed dredging site and vigorously agitated for 30 minutes, followed by a one hour settling period. The liquid phase remaining after settling is called the elutriate, and is tested for mercury (Hg), cadmium (Cd), polychlorinated biphenyls (PCB), and petroleum hydrocarbons (PHC). Depending on the levels of contaminants (relative to their ambient levels at the dredge site) the dredging operation may be modified to meet existing water quality criteria.

d. Bioassays are conducted in accordance with EPA's Ocean Dumping Regulations (published in the January 11, 1977 Federal Register). These regulations require that bioassay tests be conducted on the proposed dredged material. The assay is a standard method for estimating the concentration of a substance by its effect on the mortality of a suitable plant or animal under controlled conditions. The three-phase bioassay used to assess dredge material is actually a series of tests. Sediment samples from several sites within the proposed dredging area (identified in the approved sampling plan) are mixed to form a composite sample. Three different test phases are then prepared from the composite. A liquid phase (LP) is prepared by mixing seawater from the proposed dredging site with part of the sediment composite and then filtering the mixture. A suspended particulate phase (SPP) is made of a similar mixture but not filtered. Another similar mixture is allowed to stand, with the portion that settles out to the bottom being designated the solid phase (SP).

e. Designated animal species are then subjected to the LP and SPP forms of the dredge material. The level at which 50% of the animals die is called the Lethal Concentration (LC50). Similarly, designated phytoplankton species are subjected to the LP. The level at which 50% of the phytoplankton slow down in growth is called the effective concentration (EC50). Based on these test values, the Limiting Permissible Concentration (LPC) is determined by applying a safety factor of 100 (LC50/100). The material can be considered for disposal only if the concentration of the material's LP and SPP is diluted to below the LPC after four hours of initial mixing. The potential for dilution is computed from a mixing coefficient that most closely describes the physical conditions at the proposed dredge site.

f. For the SP, the results are evaluated for statistically significant differences in mortality between test organisms subjected to sediment from the proposed dredging site, and test organisms exposed to the reference sediment. LPC is considered exceeded when the difference in mortality is both statistically significant and greater than 10%. The USEPA/USACE (1977) manual states that difference between test and reference animals can be evaluated either individually by species, or on a pooled community basis.

g. All Federal projects must have a suspended particulate and solid phase bioassay conducted on their sediments, as well as a liquid phase bioassay. Private applicants must conduct a solid phase bioassay, and, based on a case-by-case determination, possibly suspended particulate or liquid phase tests as well. On occasion, an applicant may be allowed to "piggy-back" on the test results from other sediments in close proximity to the area they wish to dredge, instead of actually testing the sediments from their proposed dredging area. This is only allowed in select cases, where there is no source of pollution that may adversely affect the piggy-back sediments, and where it is clearly demonstrated (by grain size and bulk sediment and water analyses) that the two sediments are similar. Because of the potentially contaminated nature of the sediments being considered in this SEIS, and because test results could affect management decisions on appropriate site use, sediments being considered for placement into borrow pits (see g and h below) will not be piggy-backed; all borrow pit candidate sediments must be tested separately, as discussed below (d-f). h. The second biological test consists of measuring the amount of tissue accumulation of contaminants in those organisms that survived ten days exposure to the solid phase bioassay test. Contaminants tested for are Hg, Cd, PCB, PHC, and (in some cases) DDT, as well as any other contaminant that has been identified as a particular problem in the specific dredging area. The goal of this bioaccumulation test is thus to determine the less-direct, longer-term, more insidious impact (chronic) of a sediment on a separate group of indicator organisms chosen because of their demonstrated tendency to build up levels of contaminants in their tissues that exceed the normal levels in the sediments and water around them (ambient levels). A finding of a statistical difference in the tissue levels of those substances between the test and reference organisms indicates a potential for impacts. If the difference is greater than levels of the substance that would be expected to naturally occur in animals living in the NY Bight, then the dredged material is expeditiously capped to isolate it and thus minimize exposure (and uptake) of organisms at the disposal site. Expeditious capping is taken to mean the applicant must provide sufficient volume of clean material to begin capping within two weeks of completion of their proposed dredging. This capping source, along with an alternative source of clean material, must be approved by the NYD before the disposal can begin. To determine what a naturally occurring level of the various test parameters would be, the NYD has developed an interpretive guidance matrix that identifies ambient levels of these substances for each of the test organisms.

i. Based on the above biological testing, sediments can be placed into three broad categories:

(1) Sediments which do not cause unacceptable toxicity or bioaccumulation in either test are considered suitable for ocean disposal without any further protective action or, in other terms, acceptable for "unrestricted" ocean disposal. These sediments (category I) would not be considered for possible borrow pit disposal, as they offer no potential short-term (acute) or long-term (chronic) impacts to the marine system, and therefore would require no special precautionary measures during disposal (beyond observing standard disposal practises at the Mud Dump). Such clean sediments might be suitable candidates for interim or final borrow pit caps (see 2.3.3.1 below). Appendix A contains examples of specific project sediments, and their test results, that are typical of this category of dredged material

(2) At the other end of the spectrum are those sediments (category III) which fail to meet the LPC for the solid phase bioassay. These sediments are unlikely to be permitted to be disposed of in the ocean as their threat of acute (short-term) toxicity would make it difficult to rapidly render them harmless, even with management strategies like capping. Such material would be a prime candidate for borrow pit disposal, as the best feasible alternative to the Mud Dump. Appendix A also contains an example of a specific sediment test that would fall into this category.

(3) In between are sediments (category II) that can meet criteria for ocean disposal only because their test results indicate a potential for chronic (long-term) and not acute toxicity. These sediments show statistically significant toxicity and/or bioaccumulation, but are also capable of meeting the existing Federal standard for being rapidly rendered harmless. Use of selected management practises, such as capping, serve to isolate these materials from organisms that could otherwise accumulate contaminants from sediments left exposed. Such specific practises allow these sediments to be disposed of in the ocean, or, in other terms, making them suitable for "restricted" ocean disposal.

j. Present practice allows class II sediments to be reviewed on a case-by-case basis by the NYD, in consultation with EPA, NMFS, and FWS, who will recommend if a given project can be expeditiously isolated from the marine environment by a clean overlying cap, before they can be ocean dumped. This environmentally-conservative approach would (on extension) make category II sediments candidates for disposal in borrow pits, instead of at the Mud Dump. Appendix A contains two examples of category II sediments: IIA would be sediment almost clean enough for unrestricted ocean dumping (having only one test constituent with a statistically significant difference in only one test organism), while IIB sediments would probably be the worst material that would be allowed in the ocean with capping (two or more test constituents showing a statistically significant difference in one test organism each, or one constituent with a statistically significant difference in all three test organisms).

k. It should be noted that a matrix for petroleum hydrocarbons has not yet been developed, and so each case of sediments showing a statistically significant level of uptake (compared to reference standard) must be evaluated on a case-by-case basis. In addition, as warranted by new information, other contaminants may be included in future testing requirements, or matrix levels altered; dioxin is a contaminant currently under study for inclusion into test matrices. Adding test contaminants or tightening matrix levels could increase the amount of sediments that are classified as category II or III, thereby increasing future volumes of dredged material that would be candidates for borrow pit disposal.

l. Since the formal capping and testing program began in 1980, some 7% of all dredged material disposed of at the Mud Dump during that time, have required capping. Table 2 lists ocean disposal projects since 1980, and identifies which required capping. This amounted to nearly 4,200,000 cys of dredged material capped between 1980 and 1990. Adding to this another 175,000 cys of sediment that was not allowed to be ocean dumped (category III) results in a total of nearly 4,330,000 cys over dredged material that has required capping over a seven year period. The average yearly volume of capped material (including Newtown Creek's category III sediments), comes to just about 390,000 cys of material that would be considered suitable for future borrow pit disposal. This would mean a suitable pit disposal site would probably have to be large enough to contain at least 4 million cys of dredged material over the next ten years in order to result in any long term positive impact on the marine system. Considering the need for a final (and possibly interim) cap, and the possibility of increased volumes from civil works projects (such as the present Kill Van Kull/Newark Bay deepening) and more stringent testing criteria, the pit capacity should be even greater. Consequently, it is this order of magnitude of dredged material disposal capacity that will be a primary basis for comparing alternative disposal methods, and determining their feasibility for further consideration as disposal sites for sediments not meeting criteria for unrestricted ocean disposal.

2.1.2 Proposed Revisions to Testing

a. In the March 7, 1990 Federal Register EPA and the Corps announced the availability of a draft revised testing manual (USEPA/USACE, 1990). This manual reflects the experience gained by both agencies in testing dredged material for environmental effects, and includes new tests which are more reliable and provide better environmental protection. The draft manual sets up a tiered approach to testing a given sediment's acceptability for ocean disposal. The proposed procedure is highly reliant on toxicity and bioaccumulation bioassays that are similar to those in the 1977 manual (USEPA/USACE, 1977) but use different and more sensitive organisms. A mathematical model to assist in determining initial mixing of dumped material in the water column is also included.

b. Until the draft is reviewed, based on field testing and comments received, the old manual remains in effect. However, it is anticipated that a new testing manual will be in place before the end of this year, and measures taken to implement its protocol will follow shortly there after. It is thus likely that material to be disposed of in the borrow pit site will be determined based on this new protocol. While the three categories of dredged material would probably remain, the proportions of sediment falling in each might be altered. Until the new procedures have become an integral part of the testing program at the NYD, it not possible to determine the volume of dredged material in each category.

c. Since the changes include both more sensitive organisms and longer exposure periods, one could anticipate that there will be an increase in the volume of category II and/or III materials. If some sediments considered suitable for unrestricted ocean disposal (I) are now placed into category II, then the volume of dredged material to be disposed of in a borrow pit would increase, and the expected life of any given site would correspondingly diminish. If, however, the new testing serves to move sediments from category II to category III, then the life span of a given site will remain the same or even increase (since category III material could be excluded from pit disposal on the basis of a case-by-case analysis and extenuating circumstances).

d. It would be prudent to assume some increase in the volume of material unsuitable for unrestricted ocean disposal. Consequently, maximizing either the number or size of any alternative (such as a borrow pit) should be a major objective of any screening.

2.2 Disposal Alternatives

This section will serve as a comparison and summary of environmental impact, economics, and other factors that will serve to determine what is the preferable means of disposing of sediments of concern in accordance with goals outlined in section 1. A detailed discussion, including specific references, of the impacts is contained in section 4. Numerous alternatives could be used to meet the project goals, but many are not feasible. Only those deemed feasible are considered in section 4. The following sub-section (2.2.1) provides the rationale for considering other reasonable alternatives infeasible for use as a long-term disposal procedure for dredged material not meeting criteria for unrestricted ocean disposal. Sub-section 2.2.2 then provides the comparison of those remaining alternatives deemed feasible for such use. These latter alternatives are then assessed in greater detail in terms of potential impacts in section 4. It should noted that the NYD has recently completed a summary report of disposal alternatives that updates many costs, constraints, and impacts for the alternatives discussed below (NYD, 1990).

2.2.1 Infeasible Alternatives

Alternative dredged material disposal procedures for the NYD were first discussed and underwent preliminary conceptualization during a 1977 workshop. A total of 21 alternatives were identified and screened for potential usefulness (Mitre, 1979). Table 3 depicts the results of the screening, which yielded eleven alternatives deemed reasonable for further consideration. These alternatives were analyzed in a 1983 final EIS (NYD, 1983) that compared each in terms of environmental and socioeconomic consequences and benefits (NYD, 1983). Table 4 summarized the comparisons of the feasible alternatives discussed in that final EIS. Of the eleven, wetlands stabilization and artificial reefs are too small to provide a long-term solution for disposal needs, while placement into a sanitary landfill has too many conflicts from competing waste material disposal to be a practical alternative. (though use as a landfill cover is a viable option for some material - See 2.2.1.4 below). This leaves seven alternatives (as well as no action) that are currently under investigation by the NYD as practical disposal alternatives. However, not all are suitable for the special case of providing a long-term solution to the safe disposal of contaminated sediments (category II and III, as identified in section 2.1e above). Each of the infeasible alternatives is briefly discussed below, while the remaining alternatives feasible for disposal of contaminated sediments are summarized and compared in the next section (2.2.2.).

2.2.1.1 Wetlands Creation

This option, widely used in other Corps districts, involves placement of dredged material in aquatic areas now too deep to support marsh vegetation. By building the elevation high enough to accept rooted plants, and providing initial protection from wave/current erosion, a wetland can be created from shallow water habitat. FWS conducted a screening of the harbor for potentially suitable sites, based on areas of least present biological productivity (USFWS, 1982). Based on this preliminary study, and criteria developed by the SC, the Corps' waterways Experiment Station (WES) identified eleven specific sites (Allen, 1983). Four of these were determined by the SC to warrant more detailed consideration. These sites, which were the same four sites also under consideration for containment areas (See 2.2.2.3 and Figure 3), were subjected to a detailed analysis by WES (1985). The Newark Bay site was eliminated, leaving only one other (Raritan Bay) with sufficient capacity to meet minimum long-term disposal goals of 4 million cubic yards (See 2.1 f). However, besides being an expensive site to develop ($11.80/cys - see Table 5), the contaminated nature of the sediments concerned within this EIS (See 2.1.e) make their use for productive habitat creation undesirable. One of the SC criteria for wetlands is the use of clean sediment, free from potential avenues of bioaccumulation and plant uptake (NYD, 1986a). Therefore, though still a feasible disposal alternative, wetland creation is not considered suitable for the type of dredged material requiring more secure and isolated treatment.

2.2.1.2. Beach Nourishment

This option consists of placement of dredged material onto dunes and beaches. It is a common practice, used throughout the NYD to restore beaches destroyed by storms or eroded by adjacent jetty/groin fields. It has been estimated that up to two million cubic yards of dredged material could be disposed of this way, at a more competitive cost of some $8.50/cys (Table 5). This cost could likely be reduced by cost-sharing with a local sponsor. However, as the majority of sediments in categories II and III are silty (2.1f), they would be unacceptable for placement onto beaches, as such material should be as coarse or coarser than the sands now present. In addition, as the beaches so nourished would serve as wildlife habitat and (more commonly) recreational areas, the sediment used must be clean, relegating the type of sediments characteristic of category II and III (2.1e) as unsuitable. Finally, because the alternative does not provide for containment of contaminated sediment, the goal of reducing a potential source of Bight degradation is also not met, as the sediments would be exposed to erosion, bioaccumulation, and possibly even leaching. Consequently, this alternative, though again feasible, would also not be suitable for disposal of dredged material that does not meet criteria for unrestricted ocean disposal.

2.2.1.3 Uncontained Upland Disposal

This consists of spreading dredged material onto inactive or barren sites, including strip mines, quarries, or gravel pits. The end result would be improvement or restoration of the land as wildlife habitat, agricultural, or recreational areas (NYD, 1983). Though still a feasible option, conflicting uses (quarries and pits are being sought especially for the projected larger volumes of coal ash from utilities), the greater distances involved in reaching these areas (all inland), the general difficulty in finding unused land parcels, double handling of material (with associated cost and risk increases), and social/legal problems all combine to make such an alternative available only for limited volumes of dredged material, and on a project specific basis (NYD, 1983). In addition, for the type of sediment being discussed in this SEIS, this alternative would not be preferable because its level of contaminants warrant containment during transport/handling, as well as at the final disposal site; ground water contamination would also be a major concern. Because of the constraints on its use and the limited nature of its application, the NYD (with concurrence of the SC) has not pursued this alternative further. Even if it did, its lack of applicability to dredged material not meeting criteria for unrestricted ocean disposal would still negate its value as a viable alternative for disposal of such sediments, just as the preceding alternatives of wetlands creation and beach nourishment were similarly rejected.

2.2.1.4 Sanitary Landfill Cover

a. Instead of disposing of dredged material inside a landfill intended for other wastes, this option would use the dewatered dredged material as daily and/or final cover for a landfill. As the material would be within a confined, monitored site, not intended for recreational and/or wildlife use, the two major detriments to the previously described alternatives are not real constraints to implementing this alternative. The NYD has studied this alternative in detail, and the results have recently been published in a three volume draft report prepared by Malcolm Pirnie Inc (MPI, 1986). The report concluded the alternative is a feasible one (especially for daily cover), but expensive (exceeding conventional disposal at Mud Dump by at least six times, and use of a new ocean disposal site by at least three times - see Table 5). In addition, institutional arrangements are still undeveloped. Before it can be used for landfill cover, the dredged material must be dewatered, as state regulations prohibit application of liquid cover. The only really feasible means of handling the volumes of dredged material under consideration would be through a regional dewatering site. Four such upland sites were evaluated, but only those at Port Elizabeth (N-37) and Belford (N-61) are considered viable (Figure 4). Of these, only Port Elizabeth would have a large enough capacity (8.5 million cys) to provide a long-term solution for the ten year disposal volumes projected in section 2.1g. However, the annual capacity of the site (338,000 cys) is smaller than the average annual volume of dredged material determined to be unsuitable for unrestricted ocean disposal. In addition, it would be quite insufficient to deal with yearly peaks that could greatly exceed this average (See 2.1f and Table 2). Taken in conjunction with high cost and uncertainty of land acquisition, the volume limitation results in an alternative that is unable (by itself) to provide a reliable and efficient means of providing a consistent, long-term solution to the disposal of the type of dredged material being considered here, on a regional basis.

b. Sanitary landfill cover is still a viable disposal option, and one the NYD is actively pursuing. A pilot program is now being conducted by the New York City Department of Sanitation at their landfill in Fresh Kills, Staten Island. Preliminary results indicate that dredged material can be successfully dewatered and serve as intermediate cover at a cost comparable with their current disposal costs ($27/cys). Unfortunately, the site available for dewatering has hampered the operation, making it difficult to conduct crust management and mixing operations, which might further reduce costs to make them competitive at landfills that do not have dredged material disposal costs (NYD, 1990). Tests of effluent from the dredged material (Waffenschmidt, in press) show that water quality criteria for chemical contaminants and suspended solids were only occasionally exceeded, and these could very likely be adequately controlled at a full-scale, permanent site designed with the pilot project experience in mind. However, some Category II contaminants may be mobilized and oxidized when dry (MPI, 1987). In addition, the city's current dewatering site is too small to handle the projected yearly average disposal volume, and may only be suitable for disposal of dredged material from their own berthing areas. Even the largest potential dewatering site (Port Elizabeth) cannot handle all the average annual volume of dredged material that must now be capped, nor could it accommodate increased volumes, such as may occur from future new civil works projects or more stringent testing criteria. Such limitations, as well as the possibility that some dredged material may not be suitable for use as landfill cover, make this alternative not dependable as a management tool for long-term disposal needs. However, if the pilot project proves it to be a practical alternative, its use could decrease the volume of sediments that are being considered for placement into the feasible alternatives discussed in 2.2.2 below. Such an action would increase the life of the selected feasible long-term alternative. This is especially important in view of the possibility of greater volumes arising from the revised testing criteria.

2.2.1.5 No Action

a. This alternative involves not disposing of the sediments in question, and consequently not dredging the areas containing them. At first glance this may seem to be of greatest benefit in avoiding the adverse impacts of the other disposal alternatives. On closer examination the no action alternative would not remove the existing contaminants from the estuarine system. Instead, those sediments can be expected to be resuspended and then have their associated contaminants released and/or bioaccumulated faster than they would be lost from protected and contained disposal sites. Assuming no further discharge of contaminants is allowed, those contaminated sediments already in place would still be subjected to episodic disturbances by storms, ship traffic, and other natural factors that affect shallow, near-shore waters. Such events would likely continue to suspend such sediments into the water column, probably at somewhat increasing rates as the ships disrupt more bottom sediment the shallower the areas become. Once suspended, these sediments would become exposed to the water column where they may lose some portion of the their contaminants, which would then be distributed throughout the system by the natural estuarine transport processes. Bioturbation of these sediments by the benthic community (now likely to increase because of reduced dredging) would also occur, and bioaccumulation of contaminants by the local community could become an estuary-wide problem when they are fed on by mobile predators. Even, in the unlikely event that all contaminant discharges into waterways were eliminated, it would still take a decade to a century for the contaminated sediments to be sufficiently covered by natural deposition to be isolated from further uptake and distribution (Bokuniewicz, personal communication, also see 2.3.3.1e). On the other hand, dredging and careful containment of these sediments would remove the problem from the berthing areas and channels, and confine it to a more controlled and monitored environment, while offering an opportunity to return previously disturbed areas of the bay (borrow pits) to their original depth and sediment type.

b. As the majority of fish populations tend to be mobile, no action would not likely result in any noticeable decline in their exposure to, or uptake of, these substances. However, a given dredging site might contain some local conditions that could serve to both increase site-specific contaminant levels and attract fish to these areas of potentially greater uptake. These areas would thus become habitats with a high potential for local degradation. Such an area might be one of the numerous interpier basins and cross channels that frequent the main stem of the Hudson and East rivers, as well as the Upper Bay. Such habitats (including those still actively being used by maritime commerce) are known to contain relatively large seasonal numbers of adult and juvenile migrant fish (NYD, 1983), as well as a degraded benthic population. No action could represent an adverse impact, in that it would not allow for the removal of these sources and attractants for potential degradation of the biota.

c. Though the contaminant levels in the water column at the Mud Dump do not exceed that of the Bight in general, its sediment does contain greater levels of these substances (NYD, 1983). The no action alternative would stop future increases, by not allowing contaminated materials to be disposed at the Mud Dump. This could result in some reduction in contaminant uptake by benthic organisms at that site. However, such accumulation is likely minimal to begin with, because of current capping practices, as well as "de facto" capping of older sediments by the more recently disposed material. Disposal of clean material (not considered in this SEIS as potential sediments for contained disposal) would continue. Thus the ocean disposal site would still be subject to physical disruption, burial of benthic populations and changes in sediment type; the benthic community would remain in a continual flux. However, confining impacts to the Mud Dump site (or any disposal site) does provide a means of restricting losses to a given area, where they can be minimized and monitored. The resource is essentially "written off" within the boundary of the site, which, at least for new sites, is chosen to minimize such impacts. While no action would likely avoid some disruptions to undisturbed habitats, as could occur if containment areas or new borrow pits are used, and to areas with high fish presence, as might occur if existing pits are used, it is hoped that conscientious choices of the alternative disposal site locations will greatly minimize these impacts.

d. The major detriment of this alternative would be the potential adverse economic impact to the Port of New York and New Jersey, and the Metropolitan region as a whole. Failure to dredge areas now containing category II and III sediments could reduce maintenance of many berthing areas and auxiliary channels. Such areas could then become unusable by both deep-draft vessels as well as shallower barges and tugs that now use areas with controlling depths under 45 feet. The Port would then become less competitive against other east coast ports, and the region would suffer economic losses that could go into the billions of dollars. Further, new works projects intended to allow the port to maintain its competitiveness may also be jeopardized, thereby threatening the port's long-term economic role in the metropolitan region. The present deepening of the Kill Van Kull and Newark Bay Federal channels requires the large volume of new dredged material produced to be "de-facto" capped after its disposal at the Mud Dump. If the ocean disposal option no longer available then the project's continuation would be in doubt. Such blows to the economy of any large urban area is unacceptable, making the no action alternative infeasible.

2.2.2 Feasible Alternatives

2.2.2.1 Shallow Ocean Disposal with Capping

2.2.2.1.1 Mud Dump Site

a. This is the presently utilized method of disposing of category II sediments that can only meet EPA/Corp criteria for ocean disposal through use of selected management practises that would rapidly render the material harmless. At the NYD, such practise is limited to expeditious capping to prevent biota from being exposed to contaminants long enough for their accumulation in the tissues of susceptible organisms. In addition, sediments that, though passing the ocean disposal criteria, contain contaminant levels high enough to warrant precautionary handling are also capped. The procedure consists of barging the sediment to the EPA-authorized Mud Dump site located 12 miles south of Rockaway Beach, NY and 6 miles east of Long Branch, NJ (figure 2). The material is point-dumped at a designated buoy, and then expeditiously covered ("capped") with a layer of clean sediment. The cap is intended to isolate the contaminated sediment from the water column, thereby reducing or preventing its accumulation in the waters and biota of the estuary and avoiding long-term (chronic) impacts that might occur if the material were disposed of without restrictions. The resulting disposal site is a mound of material above the ambient ocean floor. Over the past 80 or so years this procedure of disposing dredged material at a site along the ocean floor has produced a mound of various sediments covering over 2.2 sq. miles, with a maximum height of about 45 feet above the ocean floor (leaving about 35 feet of water above the top of the mound).

b. Impacts arising from disposal at the Mud Dump are discussed in detail in Section 4(4.1.2; 4.2.1a-d; 4.2.2a,d; 4.2.3.a; 4.3.1; 4.5.1; 4.7b). The most noticeable change is the temporary increase in turbidity caused by suspension of dredged sediments lost during disposal. This occurrence has recently been reviewed by WES (1986). Suspended solids levels generated from the compact disposal plume are low, with generally under 5% of the total volume of disposed sediment dispersed, mostly near the bottom (WES, 1986: see also Figure 5). Organisms most effected are early life history stages (eggs, larvae, juvenile) and filter-feeding benthic organisms. Impacts from burial of sessile forms include the nearly total elimination of those organisms covered by any substantial disposal event (more than several cm of sediment), but is minimized because of the disturbed nature of the community and its fairly rapid potential for recovery. Long-term impacts are centered around potential uptake/accumulation of contaminants within the sediments, as well as their release to the water column. Of the two, the forme[illegible] represents the greatest concern, as the sediments themselves [illegible] (especially in the chemically reduced state typical of buried m[illegible] tend to adsorb and bind most contaminants, keeping them out of [illegible] water column. However, some heavy metals (iron, manganese, zinc [illegible] more susceptible to release, though not at levels shown to be ha[illegible] In addition, benthic organisms ingest contaminated sediments, and [illegible] natural forces work to resuspend sediments. Consequently, some re[illegible]se of contaminants from the exposed disposal mound is likely, necessitating actions (like capping) to further isolate sediments with an identified potential for chronic impacts.

c. The effectiveness of capping can be

indirectly demonstrated through the absence of significant differences in contaminant levels (both in the water column and the biota) between the Mud Dump area and other parts of the Bight (NYD, 1983). This is thought to be the result of past unplanned capping (disposing of one sediment on top of another) as well as the more recent regulatory requirements. The ability of a capped deposit to effectively contain contaminants during and after the kind of long-term use of a site under consideration in this SEIS (2.1g) has not been directly tested in the field because no capping operation has occurred for that long, let alone an operation that would have completed post-capping studies. However, a small operation in the Duwamish waterway (Seattle) was field monitored 5 years after a cap was placed over 1100 cys of contaminated material (Sumeri, 1988). Sediment chemistry profiles for PCB and lead showed a continued sharp interface between the cap and the contaminated sediments. The rate of diffusion into the cap is thus negligible, and no physical or biological degradation is evident. At the Mud Dump tests have shown a similar sharp interface between cap and disposal sediment levels of the heavy metals copper, lead, zinc (O'Connor and Moese, 1985). Experiments in the lab have shown capping does reduce biological uptake (Brannon et al., 1985). Field studies have shown that capped mounds can survive (if properly placed) through seasonal and storm events, and they do result in reduced contaminant levels in the surrounding system (Morton and Miller, 1980; Hosokawa and Horie, 1981; O'Connor, 1982; O'Connor and O'Connor, 1983; Parker and Valente, 1988). Finally, at any selected site monitoring would be undertaken to confirm the site's effectiveness, and to initiate corrective action if necessary.

d. An above surface mound does place the deposit in an increased erosional environment without the added overall stability that a specially constructed artificial site (or depositional environment) would have. In addition, because of its increased exposure to the water column, the deposit mound could be more subject to invasion by benthic organisms and contaminant loss through leachate, than if it were a more contained (diked) or buried (pit) site. However, even given these factors, the Mud Dump still had lost no more than 2-3% of its total volume over a five year period of uncontrolled capping (Dayal et al., 1981) that preceded the present regulated capping program. Specific capping requirements now in place are very likely to have increased the stability of the Mud Dump since the pre-1980's survey. Results from the latest study at the Mud Dump show no significant erosion of the sand cap has occurred (Parker and Valente, 1988)

e. Continued use of the Mud Dump would have no added impact to the sport or commercial fishing interests, nor would it result in a reduction of contaminant levels in the organisms sought. Health impacts would similarly remain unaltered and no cultural resources would be at risk. No impacts to the physical environment can be envisioned beyond continuation of the current impacts of dredged material on the Bight. Water quality would thus not likely be improved or degraded, while alteration to the bathymetry through continued elevation of the sea floor would continue. Costs would remain essentially the same (roughly $5/cys, comparable to the cost for using existing borrow pits - see Table 5). However, use of the Mud Dump for category II continues to require large volumes of clean capping sand (cap ratio of 3-5:1) that might be put to more beneficial use (beach nourishment, berm/wetland construction). This added sand diminishes the capacity of the Mud Dump without providing disposal of category III material, now prohibited from any ocean disposal. Finally, category II material itself may be excluded from any future ocean disposal, based on an interpretation of what constitutes "acceptable material" for ocean disposal (see 2.2.2.1.2 below). Consequently, the use of this alternative for the long-term disposal of the volumes of category II and III projected over the next ten years is at best uncertain. In addition to offering no environmental advantages over any of the other feasible alternatives, it may represent a less stable environment than some of those alternatives discussed below.

2.2.2.1.2 Alternative Ocean Disposal Sites

a. Based on current EPA limitations, the Mud Dump site will reach its designated capacity some time in the 1990's, necessitating the designation of a replacement site. In addition, as set forth in Section 211 of the Water Resources Development Act of 1986 (WRDA), only "acceptable" material would be considered for disposal at the mud dump, all other dredged material to be disposed of at an alternate site to be designated by EPA, and located at least 20 miles from the mainland. A joint Corps-EPA process is now underway to find new replacement and alternate site(s). Dredged material to be disposed of at either site would still have to meet the Ocean Dumping Criteria for ocean disposal.

b. With regards to the sediments under consideration in this FSEIS, placement into an alternate site 20 or miles offshore may provide a greater potential for adverse impact to the Bight. This might result both from a disruption of a previously undisturbed habitat, as well as a greater likelihood of increased sediment loss during the longer descent of material to the bottom of the seafloor (assuming it is a deeper water site). The former impact would be the same regardless of the nature of the sediment (though contaminated material could cause chronic impacts to the community due to long-term exposure). The latter concern is especially pertinent to contaminated dredged material, where any increase of sediment loss would add to the volume of contaminants entering the aquatic system. Use of an alternate site would increase costs, perhaps as high as $15/cys, because of the greatly increased transport distances (Table 5). Thus, even if category II were determined to be "unacceptable" for continued disposal at the mud dump, its placement at a more distant alternate site would still be less preferable than disposal at the Mud Dump or other feasible alternatives discussed below.

2.2.2.2 Subaqueous Borrow Pits

2.2.2.2.1 Existing Pits

a. In this alternative, dredged material would be disposed into one of the existing pits dug into the seafloor for past sand mining operations (Figure 1), and then covered with a clean layer of sand. The operation would thus contain the sediments of concern within the walls of the pit, while returning the seafloor, in which these artificially created holes exist, to its former natural depth, sediment type, and bathymetry. Effects of this alternative are discussed in detail in section 4 (4.1.1; 4.2.1e; 4.2.2b,e; 4.2.3a,; 4.3.2a-f; 4.5.1; 4.6; 4.7b-d) and summarized below.

b. Impacts to the benthic community within a pit would be similar to those arising from ocean disposal; both alternatives essentially destroy a community currently less stable than benthic communities outside the site. Filling a borrow pit, however, will eventually lead to creation of the type of habitat that now contains the stable benthic communities of those adjacent areas. Fish densities in pits appears to exceed that of surrounding areas (Woodhead and McCafferty, 1986), unlike the Mud Dump. Loss of pit habitat could thus be construed as being of greater negative impact. However, fish presence within pits reflects their overall occurrence within the Lower Bay, and the habitats are not being used for special activities (spawning, nursery, etc; Woodhead and McCafferty, 1986). Consequently the habitat loss is expected to disperse the fish rather than lead to substantial mortalities or community disruption (see 4.3.2 for more detailed analysis). Further, the fine-grain sediments within some of the pits are known to have become anaerobic during the summer (Turano, 1968; Swartz and Brinkhuis, 1978), thereby creating seasonally degraded habitats and adding to the overall oxygen demand placed on the Lower Bay. In addition, these naturally accumulating pit sediments are most prone to contamination, thereby increasing the potential for exposure and accumulation of the contaminants by fish. This would then pose a threat to both the fish and those that consume them.

c. The major advantage of a borrow pit over the ocean disposal practice would be the pit's ability to provide a more stable long-term containment site. A pit is a net natural depositional area, and one that accumulates fine-grained material at a relatively fast rate (up to 4 cm/year for some pits; Bokuniewicz et al., 1987). Consequently, sediments deposited within the pit are not likely to leave them. Further, its location beneath the Bay floor provides added protection against storms resuspending deposits. These walls also offer an added barrier against any lateral leaching of contaminants into the water column. Pit disposal is not an untried technique in this area (municipalities have used such a procedure on Long Island), nor to the Corps. Though the local operations were never monitored, the Corps project on the Duwamish river in Washington has shown excellent placement and containment of buried contaminated sediments though the first year (Truitt, 1986), with no loss of tested contaminants into or through the cap in five years (Sumeri, 1988). Laboratory simulations have also shown that caps are very beneficial in keeping benthic organisms from reaching the contaminated sediments below. Though long-term studies on the physical stability of borrow pit deposits are not available, their depositional nature, as well as the encouraging results from monitoring of surface disposal mounds, can reasonably be used to predict even greater stability for below bay floor disposal. Further, while the descending disposal "slug" takes about as long to reach the bottom of the pit as to reach the ocean disposal mound, part of that descent would now occur within the pit's walls, providing a potential to reduce turbidity through decreased loss of suspended solids from that more-confined part of the disposal plume (Figure 5). Finally, limiting the dredge plant to a "clam shell" and prohibiting disposal during dispersing seas ensures maximum compaction of sediments and minimal loss during disposal; less than 4% of the total volume for a worst-case (Tavolaro, 19822. The potential impacts of a borrow pit disposal on water quality have been assessed in a preliminary evaluation of the criteria outlined in section 404(b)(1) of the Clean Water Act (Appendix B), which concluded that such an action will not result in a degradation of the aquatic environment.

d. Sport fishing could be impacted by this alternative, as the pits contain a higher density of fish than the surrounding shoals, making harvesting somewhat easier. Spreading the fish out would not affect productivity unless there was some advantage to being in the pit (food, shelter, etc.) that would increase mortality rates if it was no longer available. Neither NMFS nor NJDEP believe the pits serve any such unique or critical role. In any case, as only one pit at a time is likely to be used, the portion of fishery impacted would be small, when compared to all pits, and minimal when compared to the entire estuary. This loss can be even further minimized by selecting for a pit with lower densities and/or area of habitat. This impact may be short-term if artificial fishing reefs can be built on top of, or around, filled pits. Partially filling the pit to leave some depression may also reduce any adverse impact, providing the shallower pit did not markedly reduce site capacity. However, both approaches depend on the ability of the reef or shallow pit being able to duplicate the original pit's attraction for the fish, and the desirability of attracting any organism to a disposal site, irregardless of how safe it is.

e. Some impact to commercial fishing might also occur, as lobsters and crabs seem to prefer deeper holes. The value of pit habitat to the development of these species is unknown, though their populations in the channels are even greater than the pits. Both these habitats are, however, artificial, and the existing pits themselves are less than thirty years old, being very recent additions to a well established ecosystem. The presence of both these crustaceans in pits is definitely seasonal (Woodhead and McCafferty, 1986), with catches lower during the summer, when hypoxic conditions are more prevalent in pits (Turano, 1968; Swartz and Brinkhuis, 1978). Given that the loss of lobster and blueclaw habitat (whatever its role) would be restricted to one pit, and in view of their even greater occurrence in channels, the long-term impact from filling one pit is not anticipated to have a detectable impact on the resource. Commercial catches from some areas could suffer or require a greater effort to break even, if the species that would have used the filled pit redistribute evenly within the system. On the other hand, it could conceivably make it easier to catch fish in the other pits, their numbers having increased through "displacement" from the filled pit. The bulk of this commercial activity occurs outside the Bay complex, so the industry itself should not be adversely effected. Because of their small size and irregular topography and walls, seineing for finfish is inefficient so no impact to that fishery is expected. Any cultural resources would have already been destroyed when the pit was originally dug, so filling would have no further impact.

f. Given the potential for greater on-site retention of contaminants (and even less loss of suspended solids) the alternative offers potential for improved water quality and health impacts, while returning a disturbed habitat and bathymetry to its former condition. This overall benefit may make up for any direct loss of fishery habitat that might occur by reducing the exposure of the fishery to contaminants. However, filling could alter wave energy and tidal ranges slightly, and thereby minimally increase shore erosion along some parts of Staten Island, while reducing it in other shore areas to the northeast and south (Wong and Wilson, 1979; Kinsman et al., 1979). The screening criteria described in section 2.3.1 below are designed to select pits with the least overall adverse impacts discussed above. Any changes in erosion rates would be slight, and would represent a return to the pre-pit conditions prevalent in the first half of the twentieth century. Because of reduced travel time for barges there is the potential for some cost savings over current disposal at the Mud Dump (now at $5/cys - See Table 5). This cost savings could increase two or threefold if a new ocean disposal site is designated beyond the 20 mile limit. However, the likely need for extensive monitoring and management of the site (2.3.3 and 2.3.4) could result in the need for imposing site use fees that might reduce or eliminate any such savings. Given the public's concern with regards to disposal of contaminated material, it is reasonable to assume that any alternative used will result in substantial monitoring and management costs, thereby representing no real savings over present practise.

2.2.2.2.2 Creation of New Pits

a. This option of using the borrow pit alternative would be to construct a pit specifically designed for use as a disposal site, instead of using an existing pit that was dug for different reasons. As for existing pits, the impacts for this variation are discussed in detail in Section 4.0 (4.1.1; 4.2.1e; 4.2.2b,d; 4.2.3b; 4.3g-i; 4.5.2; 4.6; 4.7b). In comparison to using existing pits, a new pit would have an greater initial effect on the benthos and a lesser direct effect on fish abundance.

b. A new pit would be dug in shoal areas, thus disturbing a previously unimpacted habitat that contains the more stable and diverse benthic populations within the Bay. Once the pit was filled, that habitat would be replaced and, given the rapid potential for recolonization, soon returned to its former level of use. However, as the pit is intended to be a long-term disposal site, the recovery of the habitat disturbed would be many years (10-25) after start of construction. Thus a portion of likely greater overall productivity would be lost, potentially having a negative affect on fish that utilize (directly and indirectly) the benthos as a food base. Selection of relatively lower areas of benthic (and fish) use would minimize the loss (Cerrato et al, 1989; Woodhead and McCafferty, 1986) as would limiting the area of impact by digging a smaller but deeper hole.

c. As less fish appear to use the shoals than the existing pits and channels (Woodhead and McCafferty, 1986), the direct (short-term) impact to the fishery might be reduced by digging a new pit rather than using existing pits. Though the fish directly effected by this option will be less than the numbers impacted by using an existing pit, the overall advantage of a new pit is really not that great. This would be especially true if the new pits attracted fish during the time between disposal events, which could be extensive. Even if this use is minimal, the difference between fishery impacts from use of new or old pits are not that evident. Neither shoal nor pit habitat provides any discernible special/critical needs relative to each other, nor is a relatively large overall portion of either habitat potentially impacted over the long-term by either alternative. Loss of an existing pit would tend to disperse fish from a habitat that now attracts them. This might negatively effect fishing efforts, but would represent a less obvious detriment to the fish populations themselves, especially in light of the potential benefits from better water quality and reduced exposure to contaminants. Construction of an artificial fish reef over the filled pit could act as an attractant to further increase the level of fish abundances above those now found in the shoals. Leaving some depression might similarly attract more fish to the site after it was closed, by mimicing conditions at existing pits. Concerns regarding how this might affect surrounding fish communities, whether the reef itself could disrupt the cap, or if it could become a hazard to navigation, would have to be addressed before such a mitigation measure could be seriously proposed.

d. A new pit specifically designed for disposal does have the advantage of providing the longest life of all underground sites, and one that (by minimizing the diameter of bottom effected) holds the greatest amount of sediment with the least amount of capping. This would maximize the goal of the project in reducing Bight degradation. Such a pit may also provide some physical advantage over an existing pit in that it could be located and constructed to maximize the depositional advantages of pits while offering least exposure to currents/storms, reduced shoreline impacts, and minimal dispersion of the disposal plume leaving the barge. Such advantages are not expected to be vital to the selection process as existing pits are already in depositional areas and even the worst shoreline impacts from filling existing pits are still minimal (4.2.2). In dealing with contaminated sediments it may be that any advantage could be desirable. However, a disadvantage might be the time needed before actual disposal could start.

e. Delay in removal of contaminants from the estuary is not in keeping with the overall goal outlined in section 1.4, and does not help improve the water quality conditions, in keeping with Federal and State goals. A matter of months is not likely to have a substantial impact, but a delay of several years could. As no Federal or State funds are authorized (or even proposed) for new site construction, reliance on government action would likely mean an unacceptable delay. By requesting private sector assistance, cost and time could be substantially reduced. In return for dredging the prescribed pit, the company would be allowed to sell the sand it mined. This method does limit the location of new sites to areas were construction-grade sands are located at depths deep enough to gain the advantages outlined above (and detailed in Section 4). It also depends on a combination of sufficient market need and/or storage capacity to make it worth the contractor's dredging cost. Fortunately, the demand for sand is usually high (especially now), and its occurrence is widespread enough to avoid selection of environmentally sensitive areas of the Bay. Choosing this option does assume a continued market in sand and the willingness of a contractor to work under the specific design criteria that would be prescribed for the dredging. Preliminary surveys of private contractors tend to indicate a willingness, and a recent reconnaissance report by the Bureau of Mines (BOM, 1987) predicts a 15 - 20% increase in demand for this resource in the next few years. Whether the risk of this willingness being transferred to action is acceptable depends on the extent of advantages a new site has over an old one. Those advantages are no greater overall, and possibly less, than use of an existing pit. Therefore, to allow continued long-term disposal of contaminated dredged material at the Mud Dump or new ocean disposal site, while waiting for a new pit to be constructed (if it is constructed) is not preferable. However, selecting an existing site for immediate disposal while pursuing a new site for long-term containment offers a promising mix of alternatives.

f. In summary, a new pit site, in disturbing a previously untouched area, might impact historical resources such as shipwrecks. Such impacts could be substantially reduced by surveying the preferred areas before setting the actual boundaries (see 2.3.2.4). Impacts to sport and commercial interests would be less as the current shoal areas do not seem to concentrate fish or crustaceans as much as the old pits do. By not filling the old pits, their harvestable resources wouldn't be dispersed, and fishing success would remain at its current level. By offering some potential for further reducing physical loss of sediments, water quality impacts could be lessened. However, as stated above, this advantage is not likely to be much, and the overall benefit negligible, especially since filling an old pit provides an immediate opportunity to isolate fine-grained sediments already accumulated, thereby reducing exposure to their contaminants and lowering oxygen demand. A positive economic benefit could be obtained by providing for a construction need in an environmentally acceptable manner; the selected area would represent a minimization of impacts while providing a positive long-term benefit (secure disposal of contaminants) and a return of the original habitat at the project's conclusion. Overall costs are likely to be similar to use of existing pits, at least to the disposal applicants ($5/cys -See Table 5), assuming a private contractor bears the initial construction costs and royalty fees (which would be recovered by selling the sand).

2.2.2.3 Aquatic Containment Facilities (Islands and Areas)

a. This alternative consists of constructing a dike, within which the sediment would be disposed. When the dike is anchored to a land mass the end result is an extension of that land mass and the facility is called a containment area. When the facility is located within a body of water, unconnected to land, it is called a containment island. In both cases the dike isolates the dredged material from the surrounding water column, and its fish and benthic communities. Impacts from this alternative are discussed in detail in section 4 (4.1.2, 4.2.1f, 4.2.2f, 4.2.3b, 4.3.3, 4.7). Based on previous surveys, four area (Figure 3) and two island sites (Figure 6) are considered potentially viable locations (NYD, 1986a; Cerrato and Bokuniewicz, 1986). Though the siting process has not been completed, institutional and financial constraints, as well as potentially greater capacities, suggest the island alternative would be more viable than a containment area (Table 5) for disposal of the large volume of the type of dredged material being considered in this SEIS. A preliminary analysis of the island alternative has been prepared for New York Harbor (Stark, 1989)

b. A containment island would result in the destruction and permanent loss of 500 acres of bay bottom representing an estimated less than 1% of the total bay floor. The benthic community under and within this small portion of diked area would be destroyed and permanently lost; the Bay floor in essence being replaced by dry land. Some benthic organisms would likely reestablish along the outside of the dikes, but the community structure is not likely to be the same as the population previously inhabiting the undisturbed bottom. The nature of the recolonization, and its success will depend largely on the type of dike used; the largest capacity for any given site requires sheet-pile dikes (Stark, 1989) that are less conducive to benthic success. The magnitude of benthic loss can be minimized by screening to identify lower use areas (Cerrato et al., 1989). Fish impacts would be from direct loss of habitat (bottom and water column) and indirect from loss of food habitat. Part of the selection process designed to minimize benthic loses has been extended to identify areas of low fish use (Woodhead and McCafferty, 1986). Results from these benthic and fish surveys indicate that areas of least use closely coincide with areas identified by a FWS review of past historical data (USFWS, 1982). The total portion of habitat loss (500 acres) is also a very small portion of the range of the dominant species that use shoals, and some use of the dike habitat can be expected. Depending on the nature of the dike, it may even serve as an artificial reef, and thereby attract additional species not now commonly found (or at least concentrated) on the shoals. The island itself could also serve as valuable migratory bird habitat or nesting sites for endangered shore birds.

c. Because the disposal will be confined to inside the dikes, turbidity and sediment loss to the Bight will be minimal. The initial dike construction will generate short-term turbidity, but this material would be clean, producing only a very localized physical impact. As the actual deposit rests above the Bay floor, it will be more exposed to the water column and biota of the area. Such a site will require liners to reduce lateral loss of contaminants that may be leached from the sediments by percolating rainwater or dewatering. Such measures would also limit benthic invasion of the site, and their subsequent uptake of contaminated sediments. The costs for constructing containment islands range from $10.90-$36.10/cys (Table 5), including liners and water treatment. Other control measures may be required to meet site-specific conditions or more restrictive discharge limits in the future. These measures could substantially increase overall costs above the estimate in Table 5. By moving sediments to the oxidizing environment of dry land, their ability to bind and hold contaminants is reduced, and mobilization of contaminants is likely to be greater than would occur from a buried underwater site. This too can be minimized by control measures, but at an even greater increase in cost. It is the cost factor, both for construction and long-term management, that are the greatest unknowns with respect to the implementation of this alternative. There are no Federal funds yet available, and this uncertainly makes it less desirable in terms of providing a timely of and long-term end to ocean disposal. The time needed to build the pit would also add to the delay in finding an alternate site to the Mud Dump for contaminated sediments. With respect to the other alternatives, a containment facility is likely to provide a more secure (from erosion/storms) repository than the unprotected ocean disposal mound. However, neither of these above surface alternatives could match the security provided by a sub-bottom depositional site like a borrow pit.

d. As with new borrow pits, containment facilities could impact any existing cultural resources; not so much by destroying them, but by making them inaccessible by burying them further under sediment which should not be disturbed after its deposition. A cultural survey such as described in section 2.3.2.4 would suffice to locate an island site with minimal cultural impact, or identify appropriate mitigation measures that such a site might require to document resources potentially lost. Impacts to sport and commercial fisheries would be similar to using new pits. Though the lost Bay bottom would not be replaced, the use of such a habitat was not as high as deeper water pits and channels, and the new community attracted to the dikes (providing they are not straight sheet pile) could provide adequate compensation for the non-specific fishing grounds lost, while not noticeably affecting the overall Bay productivity of those species now using the site. On the other side, the type of dike most likely to yield best fishery results would result in a smaller capacity. In addition to its potential for reduced fishery losses, part of the higher cost/cys of an island option could be countered by the value of the new land created. The resultant island could be used to expand port facilities or to create residential or recreational areas. Though containment islands do compare favorably with borrow pits, their long lead time and funding uncertainty, coupled with the better containment environment afforded by a pit, make islands less preferable for disposal of contaminanted dredged material.

2.2.2.4 Upland Disposal

a. As with the other alternatives discussed above, upland disposal impacts are analyzed in detail in Section 4(4.1.4; 4.2.1g; 4.2.2c; 4.2.3b; 4.3.4; 4.3.4b; 4.5; 4.6; 4.7b,c) and summarized below. Based on a survey of available land, only two (Figure 4) sites are feasible for use, though N-61 (Belford) is too small to fully meet yearly or long-term disposal goals (See 2.1g). It should be pointed out that the more likely site (N-37) is also under active consideration as a regional dewatering site for sanitary landfill cover. Other uses for the Port of Elizabeth site have also been proposed, and may remove it from further consideration.

b. Use of an upland disposal site would eliminate all aquatic impacts associated with the three aquatic alternatives discussed above, and avoid all aquatic habitat loss (whether short-term or permanent). On the other hand it does not offer an opportunity to replace former aquatic habitat lost (shoals) or create new ones (reefs). Wildlife habitat on either of the two sites is minimal, since all have been previously disturbed. As with containment facilities, contaminant loss is likely to be greater because of a more strongly oxidizing environment. Fortunately, neither N-37 nor N-61 drains into local groundwater supplies, thereby not threatening drinking water. Control measures such as liners could be used to avoid chemical migration into ground water, and stabilizers could be added to maintain proper oxidation levels. Though proven technology for minimizing leaching, liners and other control features add significantly to costs, escalating them to an estimated $13.20/cys (Table 5). Because it is an exposed structure, it would be subjected to rain and run-off. Such a condition could threaten the integrity of the cap or accelerate leaching by percolating into the buried deposit. This can be controlled by drains, settling basins, and other measures whose costs are already included into the overall estimate in Table 5. Such actions would also require long-term maintenance commitments and soil stabilization by vegetation.

c. With proper landscaping an upland site could stand as a great improvement over its existing condition. In addition, by raising the grade of a parcel of land, dredged material, providing it is dewatered, could increase its potential for productive use (such as for added port facilities). However, depending on the nature of the sediments, the site may not be conducive to future development, at least not without a substantial cap of clean material (thereby reducing the overall site capacity for the sediment of concern). In essence, that parcel of land (and appropriate buffers zones) would be precluded from productive use, at least until the dredged material dries (in excess of 25 years). An upland site may be perceived as a "contaminated waste disposal site" with resulting adverse effect on use and value of nearby lands. Just such concerns have already been raised about the Belford site in response to the draft SEIS (see letters in section 6.4), though no such concerns with respect to the Port Elizabeth site were identified. All this leads to very serious concerns regarding the real availability of any site; at the very least the approval process can reasonably be envisioned as a lengthy one. Further, because of the added cost of upland disposal (nearly three times use of the Mud Dump) some form of cost-sharing or other institutional arrangement would likely be needed for implementation (NYDa, 1986). This alternative could be environmentally equal to the containment alternatives discussed previously, with the advantage of eliminating aquatic disposal of category II and III materials, and their ensuing impacts to the marine system. However, there is still considerable uncertainty regarding implementation to make it an unreliable long-term solution for the immediate future.

2.2.3 Preferred Alternative

Keeping in mind the primary goal of disposing of material that is not suitable for "unrestricted" ocean disposal, the environmentally preferred alternative remains use of sub-aqueous disposal sites, as originally concluded by the generic, disposal EIS that evaluated some 18 potentially feasible disposal alternatives (NYD 1983). All additional information to date still confirms that preference. The main concern in selecting an alternative was to isolate any contaminants on site, so as to preclude its becoming a long-term source of contamination to the resident and migrating organisms of the N.Y. Bight and adjacent waters. The preferred alternative also had to minimize impacts to human health and habitat loss. Finally, it had to be ready for use now, with a reasonable availability and probability of success. Borrow pits (especially those already existing) comply with all these criteria. Other alternatives may offer a potential advantage for a given concern, but none provide the overall benefits, nor minimize the overall risks, to the degree that a borrow pit can. In addition, none possess the ability to enhance aquatic habitat (or at least hold their effects to a temporary loss) that using an existing or new pit offers (at least not without sacrificing capacity). Finally, because they compare favorably in costs and site availability, selection of the borrow pit option provides the most reasonable means of timely compliance with legal mandates to minimize disposal impacts.

2.3 Alternatives for Implementing the use of Sub-Aqueous Borrow Pits

2.3.1 Use of Existing Borrow Pits

2.3.1.1 Location

Known pits in the NY Harbor area are located in Figure 1. The selection of pits preferable for use as disposal sites will involve a three-fold screening process. First, criteria for minimum operational needs for a suitable pit will be discussed, and those pits unable to meet the needs for a disposal site will be eliminated from further consideration. The remaining potentially feasible pits will then be assessed for their physical and biological constraints. Sites with potentially adverse impacts or incompatible uses will be excluded from further active consideration if there is no obvious off-setting advantage to their use. Those remaining sites will be ranked through comparative, qualitative evaluation, and, when possible, assigned a numerical value from most to least preferable. Their biological and physical assessments will then be combined to rank those sites, with the lowest combination of physical limitations and biological impacts as most preferable. It should be noted that ranking is a comparative process, and reflects how the sites compare to each other for each trait; it is not an attempt to quantify the degree by which one site might be preferred to another.

2.3.1.2 Minimum Needs for a Disposal Site

a. The major concern in determining a pit's suitability for use as a disposal site for the type of dredged material being considered here is its ability to retain the material placed within it. A number of the pits identified in Figure 1 possess unacceptable risks with regards to confining the disposal material. Because of their size, shape, depth and slope these pits could have some portion of the contaminated dredged material disposed into them escape, most likely by moving up and over the pit wall during disposal. The background for setting this criteria is detailed in Appendix C. The criteria establishes a 250 yard radius as the minimum allowable pit size. This is based on a minimum radius of 123 yards from the furthest edge of a barge (distance mud flow will stop at a pit depth of five feet without topping the sides), the overall size of the barge, and the actual center point of the marker buoy (plus a safety margin for navigational error and/or rough seas causing the barge not to maintain close contact with the marker buoy).

b. Added to the above is a need for a minimum water depth of 18 feet (mlw) above the highest part of the mud disposed of into the pit, to prevent its erosion by wave action. As a cap of up to three feet may be placed over the filled pit deposit, the minimum depth of that disposal deposit may have to be 21 feet, to allow for the cap and still maintain clearances for an 18 foot barge over the filled and capped pit. These two criteria serve to eliminate all but pits 2,3,4,6,7,14,15,19 and 20. Two of those pits (19 and 20) off Rockaway are then discounted because they are historical sites for removal of sand to nourish nearby beaches. Their potential for reuse in future beach nourishment makes that an undesirable area to locate a site requiring minimum future disturbances. Little actual dredging has been done there lately, and the dynamic nature of the surf in that area has likely filled in all or most of any pits that may have been dug.

2.3.1.3 Screening for Potentially Adverse Impacts

a. Of the seven remaining pits, three (2,14, and 15) were identified in comments to the DSEIS as possessing serious concerns with respect to their use (see comment letters and responses in section 6.4). Pits 14 and 15 are in Jamaica Bay, a basically shallow water body with extensive wetland and mudflat areas. Within the Bay, in the heart of the most populated region in the country, is situated a substantial wildlife refugee that protects a major rest stop for waterfowl migrating along the Atlantic Flyway. Portions of Gateway National Recreation Area constitute a major part of the Bay as well. Placement of a disposal site of any kind, even for clean category I dredged material, would have all the appearances of imposing a conflicting use on a system that has (and is) primarily managed, under Federal guidance, for wildlife and recreation. Even such a secure disposal facility as a capped borrow pit could potentially be disruptive to both goals. Daily operational use of the pits, located immediately adjacent to the wildlife refuge, risks potentially adverse impacts to the many species of waterfowl that rest and/or breed there. To schedule operations to avoid such disruptions would effectively shut down the site for over half the year. Increased barge traffic (including after dark) among the narrow channels now heavily utilized by recreational boaters and fishermen would greatly increase the probability of accidents. Given the nature of the sediment being carried by those barges, the impacts of such accidents extend into the realm of environmental damage, in addition to the threat to life and property.

b. Besides the potential conflict with existing uses, the two Jamaica Bay pits raise other serious logistical and environmental concerns. Neither pit can be reached by conventional barge, and their use would require considerable dredging of access channels, and probably raising and/or rehabilitation of several bridges. Two primary substantive worries were raised regarding the use of these pits, the obvious one of compounding the overall disposal problem through added dredging. Deeper channels may alter circulation patterns in the bay, and potentially changing habitats, tidal regimes and salinity, eroding existing wetland/mudflat habitats, and adversely effecting overall water quality (already stressed by heavy sewage treatment and runoff loads). The second concern regarded the nature of the sediment, which was considered fine-grained, highly organic, and potentially contaminated from sewage and industrial discharges and extensive highway/airport runoff. Reviewers identified potentially adverse impacts from increased turbidity, anoxia, and even pollutant release, that could become a far longer-term problem in the confined space of Jamaica Bay than it would in the dynamic Lower Bay, where the other four pits are located. To thoroughly investigate these concerns would necessitate extensive hydrological modeling and sediment testing. Both such studies would add substantially to costs and time before the subaqueous borrow pit (environmentally preferred) alternative to ocean disposal (for category II and III dredged material) could be implemented. Modification/replacement of bridges would also add to time and cost, as well as risking considerable impacts in terms of traffic and air pollution. Though not as great a concern as pits 14 and 15, use of the Hoffman-Swinburn pit (2) would also exasperate the disposal problem and require added sediment testing and impact assessment of access channels needed to utilize it as a disposal site.

c. These are considered legitimate concerns surrounding use of pits 2, 14, and 15 therefore making their use questionable. Some of these concerns could be addressed with additional studies, at greatly increased cost and time. Even if such studies were to show the concerns not to be valid, there would still be the very large increase in dredged material to dispose, a major portion of which is likely to category II, thereby reducing the pits capacity for handleing the harbor dredging it is being considered for. In addition, the problems of bridge/traffic disruptions and incompatibility with wildlife protection and recreational goals all compile to provide a formidable rationale for suspending further consideration of the use of these sites. Therefore, rather than spending the added funds and incurring substantial delay in utilizing this environmentally preferred ocean disposal alternative, these three pits will be dropped from further active consideration, even though they meet the physical criteria set in 2.3.1.2 above.

d. This action will expedite achievement of the recognized primary goal of the project, as best stated by section 103 of the Marine Protection, Research, and Sanctuaries Act; "...limit the dumping into ocean waters of any material which would adversely effect human health, welfare, or amenities on the marine environment...". The four other technically feasible candidate pits (3, 4, 6, 7) offer viable alternatives that are not incompatible with current Federal management goals and do not posses the potential for adverse impacts identified with the three sites dropped from consideration. In addition, the remaining four sites can be assessed immediately, without the need for further study. Consequently, the removal of these three pits as viable alternatives does not effectively hamper identification of an environmentally preferable subaqueous borrow pit alternative.

2.3.1.4 Non-Biological Constraints on Using Existing Pits

a. The four pits that survive the second screening level are numbers 3,4,6,and 7 (Figure 1). These were then assessed as to their limitations regarding special areas of concern that impact directly on their use. These factors are discussed in more detail in appendix C, and the results of comparisons among the existing pits are summarized in Table 6. Additional consideration of impacts arising from these factors are discussed in Section 4.2.

(1) Size of the pit dictates the volume of material it can accommodate. Here one would be seeking the maximum volume so as to confine impacts to one pit, and contain the greatest

amount of potentially contaminated material, thereby best minimizing impacts to the estuarine community. Overall pit depth and surface area both act to determine this factor. Volume priority starts with 6 (largest) descending through 7 and 3 to the smallest at 4.

(2) Erosion potential is essentially a function of a given pit's exposure to wave and current action. This depends in part on the seclusion of a pit from the main current stream (e.g., within an embayment or backwater), and from long wind fetches. Added protection is also afforded by adjacent protective features (shoals, mudflats, dunes). The degree of protection here varies slightly from 6,3,4 to the most exposed, 7.

(3) Water quality impacts are centered on short-term dispersion of suspended material lost during disposal, usually less than 5% of its total volume (NYD, 1983). Predictions of the magnitude of loss are based on comparisons to disposal operations of similar sediments in similar environments (WES, 1986). In the study area the fate of the lost material can be estimated from projections of plume movement during sand mining (Brinkhuis, 1980 -see also Figure 7). Since sand mining continually suspends material throughout the water column (from dredging and barge overflow), the plume created would likely be much larger than one caused only by periodic discharging into a pit. Consequently, the area of influence outlined in Figure 7 would likely be greater than what might occur from strictly a disposal operation (though the orientation of the plume should be similar) . Also taken into consideration would be a given pit's exposure to currents that would aid in dispersing, and therefore diluting, this material. Here the most exposed pit (7) is best, because the dredging plume would be more widely dispersed. There are then increasing negative impacts for 4 to 6 to the least dispersion would occur at 3.

(4) Pit depth provides several advantages. The deeper the pit the more material can be contained without exposing the disposed mud to potential erosion by wave action. As 18 feet is the extent of wave effects along the bottom, the deeper the pit beyond that level, the more material can be contained. In addition, deep, narrow pits expose less of their surface area to the water column, thereby reducing potential loss of contaminants. Such pits would also require less capping material to cover, and offer less of a surface for erosion. With these in mind, the best pit would be the deep, large East Bank pit (6) followed by 4,7 and 3.

(5) A final factor to consider is conflict with planned uses. This would apply to pit 6, and to a somewhat lesser degree, 7. Both of these are within areas that N.Y. State Office of General Services (OGS) has utilized for past sand mining operations. Filling pits here, especially the large East Bank pit (6) risks future disturbances of these containment sediments by sand mining contractors. Selection of either, especially the one closest to the channel (6), would also restrict future widening of Ambrose Channel. Even if care is taken to avoid such a problem, the establishment of a safe buffer zone around each pit would substantially reduce the area available to mining.

b. Each of the above factors were ranked numerically, with 1 representing the most desirable and 4 the least. When two or more pits were considered equal in a given category they were both given the same rank, that being an average of all the rankings that would have been encompassed by the pits in question. In this manner the total score for all the categories is equal, giving none greater weight. It should also be pointed out that characteristics that might make a given pit preferable under one criteria could also rank it far lower under a different criteria. This would be true for all the pits, as the system was designed to balance favorable and unfavorable traits. Final scores are displayed in Table 6. Based on this exercise, the most preferable pit, considering physical constraints, was the large East Bank pit (6) by a considerable margin, followed by 4, 7, 3 in close order.

2.3.1.5 Biological Constraints in Selecting an Existing Pit

a. Biological surveys have included three of the four feasible borrow pits identified above, though not always concurrently. Though not sampled, the small East Bank pit (7) is similar and adjacent to its larger neighbor (3) to reasonably project similarities in conditions, though smaller populations. A rather complete set of benthic and fish samples are available for the CAC pit (4). Scattered data are also available on benthic organisms and/or fish from the Large West Bank (3), and East bank (6) pits. In addition, numerous benthic and fish sampling have occurred along the surrounding undisturbed bottoms of Romer Shoal, Old Orchard Shoal, Flynns Knoll and the East and West banks, as well as within the channels that bisect the area (Figure 8). All of this data, as well as other studies described here, are discussed in detail (with specific references) in section 3.4; impacts are discussed in 4.3.

b. Brinkhuis (1980) considered the all the West Bank pits as basically similar to each other in community structure and physical make-up, but termed the large East Bank pit (6) as being "better" (see Table 7,8). He attributed this difference to a greater accumulation of unsuitable muds and lower oxygen levels in the West Bank pits, a condition that is still true (Cerrato and Bokuniewicz, 1986). Dean's (1975) pre-dredging survey of an area that included two future West Bank pits (likely 3 and 4) found significantly greater populations than were found in the dredged pits years after their construction (Brinkhuis, 1980). Woodward-Clyde Inc (1975) reports a similar negative dredging impact on East Bank benthos. This has most recently been confirmed for West Bank CAC pit (4), whose benthic communities are still considered stressed by Cerrato and Scheier (1983). Even though recolonization of the West Bank CAC pit (4) was found to have been rapid after a brief disposal event (Cerrato and Scheier, 1983), the species richness and abundance in the Large East Bank pit (6) still exceeded it (Cerrato et al., 1989 -see Figure 9,10). Based on these most recent findings, the East Bank pits (6,7) should be considered as preferable benthic habitats. This is based on their being more likely to contain higher benthic abundances and more different species because of their more markedly different physical/chemical parameters (more desirable sediment composition and more favorable circulatory patterns). Between the two, the larger pit (6) has more habitat, and therefore represents a greater loss and more adverse impact. Applying the same rationale to the West Bank yields an overall preliminary benthic ranking of 4, 3, 7, 6.

c. The most recently completed Bay-wide survey of Cerrato et al. (1989) did find a somewhat surprising relatively abundant and diverse benthic population within the larger West Bank pit (3, see station 38 in Figure 11, also Table 9 and Figure 12 & 13), in striking contrast to the populations within the other large West Bank pit (4; station 10 in Table 9 and Figures 12 & 13). This may be the result of that pit's (3) larger size and somewhat shallower depth, which could then result in less stratification of the water column within the pit (and a correspondingly lower potential for anoxia), as well as reduced sedimentation. This negative effect of size and/or depth can be seen to some extent when comparing the larger CAC (4) pit (station 10) to the shallower Hoffman-Swinburn (2) pit (station 37); the smaller pit (2) has much lower abundances and diversity (Figure 12 & 13). Only during the spring is this reversed, and this is most likely because of heavy recruitment of <u>Asabellides</u> <u>oculata</u> the previous fall. This is an opportunistic organism that likely finds the low population levels in a pit conducive to rapid invasion, only to succumb to high mortality rates because of the physical stresses of that pit habitat. Similar periods of spring and fall recruitment of other opportunistic forms were also found during the 1983 survey (Cerrato and Scheir, 1983). These too were followed by large summer die-offs that then resulted in reestablishing the conditions (low use) that would trigger the next population surge the following spring or fall (depending on a given species primary recruitment season). In this manner populations in the pits remain cyclic, and relatively unstable. Potential circulatory problems are even more evident when looking at the sand mining area along the East Bank (see Table 10 and Figure 14 & 15). Those stations more closely resembling the depth of the adjacent shallows (C-1, C-6, C-7) have much greater average abundances (11,955 organisms/m2) and diversity (21.9 species/grab) than the remaining deeper stations (C-2, 3, 4, 5, 8, 9, 10; averaging 3,669 org/m2 and 16.7 species/grab).

d. Woodhead and McCafferty (1986) analyzed their catches of the commercially-valuable lobster and blueclaw crab (see Figure 16 & 17), and found that the large East Bank pit (6) yielded very high numbers of both these crustaceans, when compared to other stations along the East Bank. Though the lobster catch in 6 was not as great as that in the West Bank CAC pit (4 -see Figure 16) its catches were much greater in comparison to the shoals in its immediate vicinity. Those in the CAC pit were much more in line with catches along the West Bank shoal areas and Raritan Bay (Figure 16). This would suggest some possible preference for 6 that attracts more lobsters from its surrounding shoals (East Bank) than the West Bank pits attract from their respective shoals. Catches of crabs (Figure 17) were marginally highest in the East Bank pit, but contrasted poorly (as did lobsters) with stations in Raritan and Chapel Hill Channels. The West Bank pit (4) sampled by Woodhead and McCafferty (2 and 4) had far less lobsters than were found in the smaller pit (2). This might indicate that the even larger, unsampled West Bank pit (3) might have even the least value to the lobster fishery, and therefore take precedence over 4 for use, though this would be a contradiction to the size effect (see c above) that seems to yield greater, more stable populations in larger pits, compared to their smaller neighbors on the same bank.

e. Commercially and ecologically important shellfish (soft, hard, and surf clams, mussels, oysters) were looked at separately by Cerrato et al. (1989). Their findings uphold the preliminary benthic ranking established in paragraph b above. Very little shellfish were found in any pit. Those stations that did have shellfish catches were mostly on the East Bank, where juvenile mussels were especially prevalent, but only from spring to early fall (which implies unfavorable conditions for mussel population growth). Among the West Bank pits, only the larger one (3) produced any shellfish catches, and then only hard and soft shell clams and mussels, and even then only during one or two cruises. Consequently, this data serves to maintain the preference for using the smaller West Bank pits over the East Bank pits. It also supports concluding that the largest pit on the West Bank (3) is the least preferable to fill, at least with respect to benthic and shellfish impacts.

f. Fishery use has been measured by past studies at two West Bank pits (Pacheco, 1983; Conover et al., 1985; NMFS, 1984). Total abundance and species generally was greater at the CAC pit (4) than the larger West Bank pit (3 - see Table 12, 13). This was different from the Woodhead and McCafferty (1986) study, where little real differences were found among fish communities of pits 3,4, or 6 (Figure 18,19). The CAC pit (4) had the largest single catch, but the East Bank pit (6) produced the higher number of species. The larger West (3) and the East Bank pit (6) generally had similar but lowest total abundances of all the pits, but number of species and community richness and diversity was greatest. Assuming that greater abundance and lower diversity was a potential indicator that a given pit was providing a particular advantage to a species, the fishery ranking would select the two larger pits as being preferable to fill. Since the greatest abundance was in 4, the West Bank pits would be least preferable. Thus, the finfish ranking would be 6, 3, 7, 4.

g. Combining the above factors (Table 11) results in the greatest biological constraints on using the smaller East Bank pit (7) and the least on using the large West Bank pit (3), the smaller pits on either bank being equal, and between the larger pits for preference. In a letter responding to some preliminary conclusions regarding fish use of borrow pits, NMFS (1987) voiced a concern that, because of the fine-grained, highly organic nature of sediments within the existing pits, these fish habitats may not be as desirable as their abundances would make them appear. As a potential attractant, they could draw fish into waters that may be more prone to anoxia. During winter, these habitats could also serve as temporary oasis of warmer water that may disrupt migratory patterns enough to expose inhabitants to sudden and prolonged cold shock. This consideration could lead to a reversal of the above ranking, because it would select for the most used pits as being preferable for filling, since the habitat may be unsuitable. As such conditions have not yet been documented, the initial ranking for the fishery use (selecting least used pits as preferable for filling) has been retained. However, the NMFS concerns do point out the uncertainty regarding the actual value of pit habitats to fish in general.

2.3.1.6 Ranking of Existing Borrow Pits for use as a Disposal Area

Table 6 ranked the four feasible existing pits according to physical limitations. Adding on the biological ranking in Table 11 produces a final ranking that is shown in Table 14, in which the large East Bank pit (6) is most preferable and its smaller neighbor (7) is least. The two West Bank pits are in the middle and very close in preference, with a slight edge given to the smaller (4). It should be pointed out that the numerical ranking system assumes equal weight to biological and physical considerations, and is not based on an absolute value behind assignment of rank for a given category. It is, however, a relative comparison of feasible sites among themselves, and does therefore represent a reasonable method of selection. In actuality, as Woodhead and McCafferty (1986) concluded for fish use, the differences among the pits are not great; certainly none show a clear-cut preference overall. Final choices could reasonably center around avoiding potential conflicting uses and any other factors (political, institutional, public) that may substantially delay or prevent the use of one of the four feasible pits. The borrow pit alternative remains the environmentally preferable alternative for disposal of category II and III material. In view of the similarities among the four pits surviving the screening process, emphasis should be placed on implementing one as soon as possible.

2.3.2 Construction of New Borrow Pits

a. The purpose of constructing a new pit would be primarily to avoid impacting the biotic communities that reside in or utilize existing pits. A secondary benefit would be the ability to design a pit specifically for disposal, which could provide some operational advantages over using existing pits. The main disadvantage in using such an alternative would be in disturbing a previously undisturbed portion of Bay bottom. An additional disadvantage would be in substantially extending the time by which the borrow pit alternative can begin to be used as the preferred disposal alternative for category II and III sediments. To minimize the impact on the existing bay bottom, an area should be selected based on its low biological population levels/structure, or value to the ecosystem. Such a consideration must also take into account impacts to the non-biological resources of the area, especially cultural, water quality, and sediments. With regard to sediments, the selection of a site for a new pit needs to consider the suitability of the material for construction or other uses, or the project may produce more dredged material than it disposes of, exacerbating the problem further. Finally, if the pit site has been wisely selected, and care taken in its operation and completion, the disturbed area can be returned to its former role within the ecosystem, though not for some time (10 - 25 years).

b. In October 1984, members of the environmental committee of the PICG produced a detailed proposal for the disposal of contaminated dredged material (NY Bight Restoration Group (BRG) 1984). Part of that proposal contained the results of a screening for sites of new borrow pits. In addition to physical criteria such as minimum depth, nearness to channels, and suitable substrate (see pp 27-48 of the above-referenced proposal); a number of biological criteria were included in an attempt to avoid productive or highly utilized areas. Some of the biological criteria were from quantitative studies, while others were based on private experience and interviews. Though preliminary in nature, this technique offered an initial overall attempt at relative comparisons of areas in the Bay complex. The four BRG sites for potential borrow pit construction were identified in the December, 1985 Public Information Notice that announced the scoping process for this EIS (figure 20). The sites were intended to serve as a starting point in discussing this topic, but no objections (or discussion) on using any of the four areas occurred at the public scoping meeting that same month, nor in the written comments received subsequent to it.

c. The BRG sites A and B fall within the Lower New York Bay complex, and can thus be considered as alternative disposal sites to ocean dumping. This is not true of sites C and D, as convention regarding the territorial sea marks the ocean boundary at the transect between Sandy Hook, NJ and Rockaway Point, NY (Figure 2), placing both these latter sites in ocean waters. Section 211 of the Water Resources Development Act of 1986 (WRDA) states that alternative ocean disposal sites for "unacceptable" materials should be sought at least twenty miles from shore, thereby questioning the appropriateness of sites C and D for further consideration. The Environmental Defense Fund (EDF; a member of BRG) challenged this point in letters to EPA (September 19 and October 7, 1988). In a letter dated February 24, 1989 EPA confirmed the Corps decision to exclude further consideration of sites C and D.

d. Though legal and traditional factors can be construed to warrant exclusion of sites C and D, there are far more compelling reasons for not considering these two BRG sites as suitable for the construction of new borrow pits. The Bight Apex represents a sharp constriction in flow between the ocean and the Bay Complex within its shelter. Substantially rougher seas are common outside the transect. The area is thus subject to greater turbulence and swifter currents, especially immediately adjacent to the apex, where sites C and D are located. This difference tends to produce a less favorable containment environment than is found within the sheltered Bay complex, increasing the chance of sediment-bound contaminants being carried away during and after disposal. The rougher seas also make it technically difficult to dig a pit in that location, especially to the type of specifications best for maximum security (see 2.3.3.2). Consequently, the search for new borrow pit sites will be limited to inside the Bight Transect, where more stable sea conditions lend themselves to better construction and disposal conditions and greater site security. The discussion below therefore still considers BRG's initial screening selection (as they pertain to sites A and B) as well as other existing information on the physical parameters, benthics, and fishery uses of the Bay. All factors are then combined to arrive at the most preferable areas of the Bay complex in which to construct a new pit.

2.3.2.1 Non-Biological Constraints to Selecting a New Borrow Pit Area

a. A major concern here is to locate an area that contains sufficient quantities of sand suitable for construction purposes. This is considered necessary because it will avoid the unwanted generation of millions of cubic yards of material that would have to be disposed, with all the resultant impacts associated with such a large-scale operation. An ancillary, and very important, benefit of such a site would be its attractiveness to private enterprise. By providing a marketable resource, the new pit might be dug by private sources, with regulating agencies dictating location, depth, and configuration. The states, by charging royalties for the use of this resource, would gain funds for their respective public treasuries through sale of mining rights. This is especially important as no Federal funds have been authorized for new pit construction, possibly (in view of recent budget constraints) closing off this alternative if other funding sources are not pursued. Based on a survey by Kastens et al. (1978), sediments suitable for various construction purposes are fairly common in the Lower Bay complex (figure 21), with east and west banks being most likely areas of mining (See 3.3.3 below).

b. In view of the restrictions in section 211 of the WRDA, selecting an area outside the Lower Bay Complex would not be practical. Even without this restriction such a selection would be inappropriate. Deeper waters of the Bight, together with greater transportation distances, would increase cost and logistical problems of using a pit situated in such an area. Because of harsher environmental conditions in the ocean, it would likely be more difficult to manage and monitor disposal operations. A major component of successful use of borrow pits will be precision dumping and accurate surveys (see 2.3.3.3 and 2.3.4.2). Generally, more severe ocean conditions and storms would greatly reduce the potential for meeting these needs. In addition, the greater depth and more active hydrological regime in the Bight is more conducive to a dispersal environment that would likely lead to reduced containment of the disposal material.

c. Within the Bay Complex, selecting deep sand deposits would reduce the surface area of bay bottom disturbed by enabling the needed capacity to be created by a deeper, narrower hole. On that basis, the sands around the southeast corner of Raritan Bay (Union and Keansburg, NJ) would be of lowest priority for beneficial uses because its deposit is smallest in size and depth. On the other hand , deposits off Coney Island would be the highest preference (Figure 21). An additional concern is the depth of water within an area. Ideally, water should be deep enough to allow most readily available barges access (18 feet or more); pits within that depth range would also minimize wave disturbances when filled and capped, thereby increasing the disposal sites stability and long-term durability. With this in mind the East Bank area off Coney Island is the most preferable area, with the southeast corner of the West Bank second. This would be followed by the remaining West Bank area (except for the offshore shallows along Staten Island, and then the East Bank and Romer shoal adjoining Ambrose channel). The area in Raritan Bay would again be least preferable.

d. Still another factor to consider before finalizing any selection would be the potential for impacting shore erosion along the eastern shore of Staten Island, and the southern shore of Coney Island. While this is not quantified, models have been developed in an attempt to predict what effect (if any) new pits might have on tidal ranges and wave/current action. These impacts are discussed in detail in 4.2.2. Wong and Wilson (1979) used a mathematical model to determine impacts of large and small borrow pits dug at Romer shoal, East Bank off Rockaway Point, and West Bank off Staten Island (figure 22). They found that alterations to the bathymetry at the mouth of the Bay system (between Rockaway and Sandy Hook) are most likely to increase erosion along Staten Island by increasing tidal range. Such actions would, however, tend to reduce tidal ranges at the opposite end of the Bay (Coney Island). This is more marked for larger holes, but apparently exists for all sizes tested. A pit along the West Bank and in Raritan Bay however, has little effect on tidal range. Such a finding would tend to favor the West Bank area, especially the southeast corner in Raritan Bay, with the East Bank less favorable.

e. The potential erosional impacts from an East Bank pit to Staten Island can likely be reduced by locating the pit further north, away from Rockaway Point and the mouth of the Bay complex. This can be seen from the modeling of wave attack that may result from dredging East Bank pits (Kinsman et al., 1979); a decrease of up to 20% of wave attack on Staten Island could occur, but at with a somewhat lesser increase in attack along Coney Island (Table 15 and Figure 23). The purpose of constructing a pit would be to create an area that will eventually be filled again, thus making any erosional impacts temporary. Depending on the period of time a pit would remain empty (and therefore impact potential erosion), and if other advantages warrant such a selection, an East Bank pit (even with its potential for increased shore erosion along Coney Island) may be acceptable. It should be noted that studies in the Chesapeake Bay suggest that increased tidal range may decrease erosion by spreading tidal energy over a greater distance and producing beaches with higher berms that offer greater protection from waves (Rosen, 1977). If true, then impacts to tidal actions may have little or no influence on selecting a new site.

f. Based on all the above criteria, both East and West Banks would appear similar in their preference, with East Bank deposits being deeper but in shallower water. Given the potential for digging as deep a pit (with as small a surface area) as possible, a site along the East Bank may have some advantage. That area also contains the greatest variety of sands suitable for mixed uses, was previously mined for sand, and is the preliminary choice of NY's Office of General Services (OGS) for future sand mining leases. A pit in this area however, might have a greater potential for accelerating shore erosion, and may be more exposed to currents. In actuality, the differences between the two areas are not great, and a clear biological reason for selecting one over the other would likely be sufficient to override any limited physical preference discussed above. Delineation of a precise site location within either area will depend on location of physical barriers (pipelines and cables), as well as the results of a cultural survey (See 2.3.2.4). Such work can be planned at a later date, as the results will be used to locate a pit within an approved area, and not to select such an area.

2.3.2.2 Biological Constraints to Selecting a New Borrow Pit Area

2.3.2.2.1 Benthic Criteria

a. An extensive, large-scale survey of the Lower Bay Complex was conducted during the winter of 1972-73 by McGrath, (1974) and summarized by Radosh and Reid (1980). McGrath's effort has been essentially updated by the Marine Sciences Research Center of the State University of New York, at Stonybrook (MSRC), and extended to cover more stations and four seasons. The year-long effort began in the spring of 1986, and the findings are reported by Cerrato et al. (1989). The full effort was preceded by a one-time preliminary survey during summer 1983 (Cerrato and Bokuniewicz, 1986). Section 3.4.1 details the benthic resource more thoroughly, while section 4.3 provides an in-depth consideration of impacts. Figure 24 and 25 summarize species richness and diversity, based on the McGrath data. They show areas of low use that appear to correspond to pits along the East and West Banks (A-C, in figure 24). The MSRC data confirm this (Figure 12 and 13). Non-pit areas generally have more stable benthic communities, often with greater abundances and diversity.

b. Based on McGrath's data, areas E and F (Figure 24) emerge as being relatively low in benthic richness, while also meeting the non-biological criteria (2.3.2.1). The more recent, year-long MSRC study basically confirms these general locations, though it does alter the specific areas of lowest use somewhat. Cerrato et al. (1989) divided the Lower Bay complex into a series of roughly 250 acre quadrants, each of which was then scored based on their benthic species richness and abundance. Figure 26 depicts the lowest areas of overall benthic use (those with the highest score), which includes about 8% of the quadrants. A large portion of the East Bank located east and south of pit 6, and a small part of the Lower Bay below and south of pit 4, appear to meet the non-biological criteria. If the screening criteria is broadened to consider 15% (instead of only 8%) of the lowest use quadrants, then the potential areas of use are expanded significantly (Figure 27). If the lowest use quadrants (6% of total) for commercially and ecologically important shellfish (hard, soft, and surf clams; mussels; oysters) are considered, then the overall benthic low use area is reduced to an even smaller part of the Lower Bay southwest of pit 4 (Figure 28). Broadening the shellfish screening criteria to include 18% (instead of only 6%) of lowest use quadrants expands the Lower Bay area available for overall use, and now also includes a part of the East Bank as well (Figure 29).

c. During the year-long SUNY survey of the Lower Bay fisheries, blueclaw crabs and lobsters were also sampled (Woodhead and McCafferty, 1986). The principal occurrence of both these important commercial species was primarily within the channels, with relatively high abundances in pits as well. Shoals appeared to be areas of lesser use (Figure 16 and 17). Within the low benthic use areas, all of which are shoals, the area in the southeast corner of Lower New York Bay, near pit 4, is highest for catches of both crustaceans, while the East Bank was lowest. Such a consideration would warrant preference of the East Bank site as having the least potential disturbances to benthics. This would be in some contrast to the shellfish screening (which would tend to favor the Lower Bay are as lowest use), but does indicate that both these areas are potentially acceptable sites for a new pit, as one or the other consistently emerges from any screening criteria used.

2.3.2.2.2 Fishery Criteria

Woodhead and McCafferty (1986) analyzed their one year survey of the Lower Bay Complex with respect to borrow pits. Section 3.4.2 provides a detailed account of this and other fishery data, and 4.3 analyses impacts. In brief, seven parameters were used to describe the community at each station (Table 16), with particular attention being given to total abundance and number of species. These parameters were then ranked, and those below the 30% boundary of each parameter were then selected as areas of low value. These stations were then combined (where possible) to identify the five areas of low usage depicted in Figure 31. The five areas are described by Woodhead and McCafferty (1986), who then considered those findings in light of additional data from an expanded sampling effort during the preceding fall. The resulting conclusion as to priority for locating a new pit was site 1 (East Bank-lowest overall fish use), followed by site 2 (SE of Romer Shoal), 5 (Inner Raritan Bay), 3 (east Raritan Bay, between Chapel Hill and Raritan Channels), and 4 (off North Belford, outside Sandy Hook Bay).

2.3.2.2.3 Combined Biological Constraints

Three of the low fish use areas identified by Woodhead and McCafferty (Figure 31) are close to new pit areas recommended by the NY Bight Restoration Group (Figure 20). Two of these fish areas overlap with at least parts of the overall low benthic use areas (figure 27 and 29). The resultant combination of fish and benthic criteria are two areas of relatively low biological use. One is a roughly 400 acre site located in the southwest corner of the Lower Bay, just south and west of the CAC pit (4). The other site is approximately 1200 acres on the southeast part of the East Bank, roughly south and east of the Large pit (6). These two areas are shown in Figure 32, and represent portions of the Lower Bay Complex that are least likely to suffer an adverse environmental impact if a small (50 acre) pit were constructed within their bounds.

2.3.2.3 Ranking of Acceptable Areas for New Borrow Pit Construction

a. In considering all the above biological and physical constraints, in conjunction with the recommendations made by the BRG, it would appear that the most preferred site for locating a non-ocean disposal new borrow pit would be the East Bank area (Figure 32). It is an area of low benthic richness, has some of the smallest lobster and crab catches (often none), and low fish use. In addition, it has ample useable, deep sand deposits, is close to dredging areas, has been disturbed in the past, and is near BRG area B (Figure 20). Shellfish use of this area is greater than part of the Lower Bay area identified in Figure 32, but only substantially different for surf clams (Cerrato et al., 1989). This area is also closer to the mouth of the Bay, and therefore more likely to increase shore erosion (Wong and Wilson, 1979). However this negative potential impact is only temporary (until the pit is filled) and may be minimized by locating the pit site within the upper part of the area, further away from Rockaway Point (Kinsman et al., 1979). The temporary impacts could, if necessary, even be mitigated by use of sand from the pit to nourish any affected beach.

b. The Lower Bay area (Figure 32) would be another preferred location for a new pit, though not as attractive as the East Bank. Its use by three groups of biota is somewhat higher, but it is very close to BRG site A (Figure 20), and further removed from ocean waves/current (therefore somewhat more protected). Pits in this area, being outside the Bay entrance, (Wong and Wilson, 1979) are unlikely to increase shore erosion along Staten Island, though they may cause a slight increase in attack along Coney Island.

c. Figure 32 shows the location of both the preferred areas described above. It should be noted that these areas of new pit location represent roughly 1200 (East Bank) and 400 (Lower Bay) acres of Bay bottom, within which a much smaller pit (roughly 50 acres) would be located. The remaining portions of either area selected would be left undisturbed. Further, upon reaching capacity the pit would then be capped with sand and returned to ambient conditions, thereby limiting the impact to the short-term (albeit 10 - 15 years).

2.3.2.4 Cultural Constraints on Siting a Specific Borrow Pit Location In an Acceptable Area

a. The ranking process discussed above was designed to recommend an area within which a borrow pit might be dug with the least impacts. As a result, the recommended area represents a general location within the Bight Apex that best meets a series of physical and biological constraints. As indicated above (2.3.2.3), the area's boundary is not a precise demarcation for a specific pit site but rather a larger area within which a pit occupying less than 10 to 20% of the area's actual bottom acreage, should be constructed (see Figure 32 for contrast of area size vs pit diameter). However, before construction of that pit is actually begun, several other factors need to be considered in arriving at a decision on its exact location. Impacts to cultural resources such as shipwrecks and archaeological sites which may be eligible for listing on the National Register of Historic Places would be foremost among those other factors. Relative to environmental resources such as fish populations, cultural resources, such as archaeological sites, are spatially localized. Therefore, it was decided to first select optimal borrow areas using the environmental ranking system, and to factor in data on cultural resources in the selection of the location of the specific pit site within the larger area.

b. As part of that analysis NYD staff prepared an assessment of the potential for cultural resources within the Lower Bay (NYD, 1986b). The assessment evaluated the relative likelihood of resources being present at each of the borrow areas considered in the ranking process. The study determined that, depending on the part of the Bay under consideration, there is a reasonable basis to expect historical or prehistorical resources at or under the Bay floor. Recommendations for each of the borrow areas were made (Table 17). Remote sensing surveys to locate potential shipwrecks were recommended for all borrow areas. If warranted, further evaluation of potential shipwreck sites conducted by underwater archaeological investigation was indicated. In some borrow areas remote sensing and sediment coring were recommended to evaluate the presence of prehistoric archaeological sites. A remote sensing survey of the two areas identified in 2.3.2.3 above has been conducted.

c. Of the two areas most favorable for pit construction (Figure 32), the East Bank was found to be an area with high potential for shipwrecks, while the Raritan Reach area had a strong likelihood of containing prehistoric resources (NYD, 1986b). It was not anticipated that the cultural survey work would exclude either area from consideration as a potential new pit site, though it might influence the precise location of the smaller pit (about 50 acres) within the larger identified areas (400 - 1200 acres). The initial remote sensing survey would identify if potential cultural resources were present at each area, and help determine whether a new pit could be located so as to avoid impacting those potential resources. If this were not possible, then the survey results would be invaluable in assessing the additional level of detail needed to determine if the resources were significant, and if so what mitigation might be necessary.

d. The screening process for cultural resources is discussed in more detail in section 4.5.2. The remote survey was undertaken during the winter of 1987 - 1988 at the two areas being evaluated for new pit creation (Figure 32). Analysis of the data from the survey identified 27 targets which may be shipwrecks. Additional data are needed to confirm which targets are shipwrecks (if any) and to assess their eligibility for listing on the National Register of Historic Places (NRHP). As the size of the proposed borrow pit is small relative to the borrow areas surveyed, the Corps evaluated whether a pit might be positioned to avoid any remote sensing targets which the contractor's marine archaeologist determined could be shipwrecks. This would obviate the need for further evaluation of those targets as part of this SEIS. However, if too many targets were encountered making avoidance impossible, and if they could not be discounted by thorough examination of the remote survey data by a marine archaeologist, it would be necessary to conduct a more detailed examination by underwater archaeologists before the construction of a new pit.

e. The remote sensing survey also identified several features in the Raritan Bay area as possible submerged river channels dating to the post-glacial epoch. Whether or not these features do represent prehistoric landforms, and, if they do, further information regarding the potential presence of archaeological sites could be obtained through sediment coring. This latter analysis could be conducted as part of a coring program primarily aimed at facilitating engineering decisions regarding best construction sites within an area. A contractor, undertaking an extensive boring program for such construction information, might be required to analyze coring data with respect to the presence of ancient land forms as part of their required coordination under section 106 of the National Historic Preservation Act (NHPA).

f. As discussed in Sections 4.5.1.1.d and 4.5.1.2.c, the remote sensing survey identified four zones in the southern half of the East Bank pit area where a new borrow pit might be constructed without impacting any cultural resources (Figure 33). If any of those four locations are selected for a new pit, it will not be necessary to conduct additional cultural resource evaluations prior to construction, pending section 106 review by the New York and/or New Jersey State Historic Preservation Officer (SHPO). If a pit is proposed for the remaining portion of the East Bank area, or the Raritan Bay area, further detailed archaeological studies would be necessary to determine the nature of the effected target, and its cultural significance. This information could be obtained at a later date, during the permit application stage when specific sites have been selected, as part of the section 106 cultural resources coordination.

2.3.3 Operational Alternatives for Managing a Borrow Pit Disposal Site.

2.3.3.1 Capping

a. This is similar to the current practice at the Mud Dump site, in which material considered to be a risk to the environment (because of its toxicity or bioaccumulation potential) is isolated from that environment by covering with a layer of clean sediment. In principle, the clean layer would act as a barrier to keep the contaminants from getting into the water column and, more importantly, from being accumulated into the tissues of benthic organisms during their contact with the disposed sediment. Laboratory and field studies (Brannon et al., 1985) have demonstrated that capping is an effective barrier to contaminant uptake, even from category III sediment unable to pass toxicity criteria (see 2.1); this would suggest that such an approach with a borrow pit site should be even more effective, as it not only isolates but places the material in a depositional environment as well. Two concerns then remain, what kind of cap to use, and whether to use interim caps between disposal operations (as opposed to one final cap).

b. The reason for use of interim caps would be to minimize or deter the loss of contaminants to the water column, or their availability to bioaccumulation, during filling of the pit (which could take ten years or more). The disadvantage is that such caps would reduce the overall capacity of the site, perhaps substantially if a cap were used after each disposal project (especially if each project was small in volume). Because of the apparent attraction of many contaminants to sediment particles, especially the clays and organics common to most of the sediments from New York Harbor that are evaluated by the CE/EPA ocean disposal test criteria, little of this material is normally released to the environment, and what is released is quickly diluted. But the adsorptive capacity of various sediments, and their affinity for contaminants, does vary (see section 4.1b-d). Because of the potential for some release (however small), and perceived dangers from currents or storms resuspending the contaminated sediments, there has been some desire expressed for covering contaminated dredged material after each disposal operation. Capping after every operation is not considered necessary. Pits are areas of deposition, and currents would not resuspend sediments within them, at least as long as the pits were still deep enough below the Bay floor to maintain the stratification that appears to enhance sedimentation (Bokuniewicz, 1986 -See 2.3.3.2d). Normal sedimentation would begin to cover a deposit within a pit as soon as disposal was concluded, though such a cover would be thin. Further, surveys of the exposed mound at the Mud Dump have shown it to be very stable in the face of storms. Though the pits would be in a shallower water area (Lower Bay), it is still reasonable to assume a submerged deposit in a depositional area (such as a pit or a sheltered area like the Lower Bay) would be even less likely to be physically disrupted than the ocean disposal mound.

c. Irrespective of the above, there are good reasons for planning on some use of interim caps. The "sandwich" effect created by alternating layers of mud and cleaner sand would increase the internal stability of the overall pit deposit (Bokuniewicz, personal communication). It would not be necessary to layer after every project. Indeed a manager might wish to maximize a pit's capacity by allowing a period of consolidation between disposal projects. The main reason for capping centers around reducing the uptake of contaminants by burrowing organisms. Again, such a practice would not be necessary after each disposal project was completed. Recolonization of a disturbed bottom does take time, and occurs most swiftly during the fall and (to a lesser extent) spring recruitments (Cerrato and Scheir, 1983; Cerrato et al., 1989). Thus, as long as the disposal operation doesn't occur during either of these more active biological periods, a cap should not be necessary. An exceptional case might occur if a particular dredged material is of special concern, such as category III material like the Dutch Kills sediments from Newtown Creek that exhibited a high toxicity during bioassay tests (See 2.1 and Appendix A). For precautionary measures such material should be capped expeditiously (within 2 weeks), with no dredging allowed until a suitable capping source, and an alternative source, were identified. An exception to the above might arise if two operations were to follow each other very closely. If of sufficient volume the second disposal action would cover the first, thereby (if thick enough) serving to isolate it from the water column and biota even during periods of maximum benthic activity (spring/fall). A cap over the second material (if warranted) would thus suffice to isolate both sediments, thereby preserving more of the pit's volume for confinement of contaminated material, instead of category I cap material, which doesn't present a potential threat to the environment.

d. In order to strike a reasonable balance between preserving as much of the pit capacity for disposal of contaminated sediment as possible, and the need for exercising caution to ensure minimal loss of contaminants to the water column and biota, it would be appropriate to cap any material disposed during the spring and fall periods of greatest benthic activity, and all category III material (irregardless of time of disposal). The need to cap category II material disposed during periods of low benthic activity should be evaluated by the NYD, with consultation from the SC, on a case-by-case basis, with the general practice being not to require such caps if it is reasonably certain that the operation will be begun and ended before the active benthic seasons, and there are no special concerns surrounding the contaminants within a given dredged material. In this manner, pit capacity is maximized, thereby extending the site's life and minimizing future disturbances to the Bay. The SC maintains a hand on the process to be sure no extraordinary circumstances may be overlooked. Similarly, should the applicant be able to demonstrate, to the satisfaction of the NYD, that another disposal operation in the pit would begin shortly after his ends (within 2 - 4 weeks), the NYD might not require any interim cap, providing there were no other extenuating circumstances. When an applicant applies for a dredge/fill permit the

NYD would review the application and, after consulting with the SC, inform the applicant of what (if any) capping requirements there were, and what period of time (if any) he can start and end the job without such requirements. If a cap were required, the applicant would have to demonstrate the availability of a suitable volume and type of cap, as well as an alternative source (both subject to NYD approval), that would be available within two weeks of the end of his operation, before dredging could begin. Capping guidelines are presented in the proposed management plan outlined in Appendix D.

e. Once a decision on the need for an interim cap is made, the question becomes what type to use. Solely in terms of increased structural capability, a sand cap would be best (see above), though not necessarily one as coarse as the ambient sediments of the seafloor around the pit; the finer sands characteristically dredged during maintenance dredging of Ambrose Channel would suffice. A mud cap spreads less evenly and thus requires larger volumes to cover the same deposit a sand cap covers, thereby decreasing the pit's overall capacity. In addition, the lower permeability of a mud cap could increase the pore water pressure and thereby act to destabilize the cap. In spite of this, both sand and mud caps have been used successfully in Long Island Sound. As long as it is suitable for unrestricted ocean disposal, a mud cap would provide as good an isolating barrier against contaminant release and uptake as a sand cap. In this sense, with regards to its ability to protect the environment from short-term impacts, a mud cap would be an acceptable alternative. The thickness of the interim cap need not duplicate that of the final cap in that it is not intended as a permanent protection, but instead will be covered by additional dredged material. The actual thickness of the cap will depend on the time between disposal operations, the nature of the sediment being covered, and the amount and type of clean material available. If enough time will lapse between disposal actions such that recolonization and subsequent uptake of contaminants by benthics becomes a concern (such as a full growing season), and the sediment warrants special care in handling (category III), then the interim cap should be near 50 cm, the thickness already determined sufficient to isolate even sediments as contaminated as from Dutch Kills, from all but deep burrowing organisms (Brannon et al., 1985;1986). Lesser thickness could be used if recolonization was unlikely (as may be the case if the disposal started toward the ends of either growth period), or if the dredged material was of lesser concern or just marginally unacceptable for unrestricted ocean disposal.

f. As with the decision regarding the need for interim caps, the thickness of such a cap should be reviewed by the NYD, in consultation with the SC, on a case-by-case basis. This determination would be transmitted to the applicant during the permit review process, so that he could plan his operation accordingly, being sure to secure sufficient volume of cap to meet the SC requirements. In this manner, environmental concerns regarding contaminant loss/uptake are addressed without unwarranted reduction of pit capacity through use of one set of inflexible (and therefore necessarily worst-case) capping requirements that doesn't take into account differences in the dredged material or disposal circumstances. The proposed management plan lays out guidelines that would lead to an informed, but environmentally conservative decision process (Appendix D).

g. The final cap, which would close the disposal site permanently, needs to more closely resemble the ambient sediments around the pit, if it is to replace that shallow water habitat lost when it was dug. Such a cap must also provide a more stable long-term barrier to penetration and bioaccumulation by benthic organisms, as well as help reduce loss of contaminants. While a 50 cm thickness may be adequate to protect against such loss or accumulation in non-burrowing benthics, a thicker cap is needed to ensure that burrowing organisms do not penetrate. Since few organisms are common at depths below 50 cm, doubling the cap thickness to approximately three feet can be expected to isolate the underlying sediments to all but an occasional organism, and certainly protect the vast majority of burrowers from uptake and bioaccumulation of contaminants. It should be emphasized that this would be a minimum thickness, and may be exceeded over the higher portions of the deposit so as to ensure adequate coverage at its edges. In addition, if the goal of the project is to restore the Bay floor to its original bathymetry, (and, as indicated in 2.3.3.2d it likely should be) then the cap may be even thicker. This would be because a pit cannot be filled above the -5 foot level, at least near its walls, without risking the loss of some disposal sediments over its edge. It would thus be necessary to stop before such a point, thereby requiring a cap at least five feet thick at its outer edge (thinner in the middle) to raise the pit's contents to the ambient depth of the surrounding bottom. If a depression is left above the final cap (See 2.3.3.2d) then there is no need for such a thick cap, as there would be no danger of overspill, since the disposal material would never reach the -5 foot level. This scenario, as discussed in detail below (2.3.3.2d) would more severely reduce the capacity of a pit for containing the sediments of concern, with limited (if any) environmental benefits.

h. Whatever its thickness, the final cap should be ideally composed of sediments similar or coarser in grain size to the sands that naturally occur in the pit's vicinity. As these sands do not show any signs of movement, a pit cap of the same material would not be expected to undergo loss of sediments, thereby preventing the underlying disposal deposit from being exposed. In reality, because of a scarcity of such material, the cap material may have to be finer-grained, though it will still be at least 90% sand. Winnowing of the cap deposit by currents may remove some of the finest grained material, thereby leaving the remaining cap closer in coarseness to the surrounding bottom, but thinner than intended. This can be estimated in advance (with knowledge of grain size) and measured directly by the proposed physical monitoring plan (2.3.4.2.1). The monitoring results will then confirm the need for, and frequency with which, cap maintenance should take place. Of course, limiting the fill to some lesser depth, at which the stratification that likely causes sedimentation would still occur (see 2.3.3.2d below), would ensure that the underlying dredged material would remain under the depositional conditions that makes the pit such a good containment site. This would necessitate even thicker caps than discussed above (in excess of five feet,) in order to return the pit surface to ambient depth of the surrounding Bay floor. Such a thick cap would reduce the pit's overall disposal capacity for the material of concern, without any real need. Existing currents (even storms) do not excavate pits naturally, so there is no reason to assume the final cap would be scoured away, providing it was consistent in grain size to normal Bay sediments.

2.3.3.2 Configuration of the Borrow Pit Disposal Site

a. Three options exist here: use a pit as is, modify an existing pit, or create a new pit to specific design criteria. Since suitable pits do exist (see 2.3.1), using an existing pit is the fastest, easiest, and most economic of the above choices. The four pits identified in section 2.3.1.5 can all be used immediately upon receipt of necessary approvals. This provides the most timely means of reducing the pollutant load to the Bight, and meets the Corps' legislative mandates to reduce or eliminate ocean dumping of materials potentially harmful to the marine system. Associated with this option are all the impacts summarized in 2.2.3 (and discussed in more detail in section 4), including disruption of areas proven to have high fish concentrations (though of unknown value). If such impacts are considered unacceptable by agencies responsible for providing necessary permits, the implementation of the plan may be delayed or prevented. Such a condition could result in a long-term delay in reducing Bight contaminant loads and limiting ocean disposal.

b. At the other end of the spectrum is the option of digging a new pit. It has a strong logistical advantage in that the pit can be designed specifically for disposal needs, instead of adapting what's already present. Such pits can be planned to minimize habitat disruption and sediment loss, while maximizing site capacity. A smaller diameter pit would disrupt less shoal habitat, decrease the volume of capping material, reduce the surface area of the deposit, and both reduce current velocity in a pit while having a lesser impact on currents outside the pit (Wong and Wilson, 1979). Based on MSRC recommendations, the ideal configuration would be a narrow but deep pit of some 1500 feet in diameter and 90 feet (or more) deep. The pit's location would be somewhere within the areas discussed in section 2.3.2.3, selected to minimize biological and cultural impacts while maximizing physical advantages. However, time will be needed to find a private contractor to dig the pit before it can be used. If a pit is located in an area of good sand resources a contractor could probably be found quickly, though final commitments will likely be held off until the contractor surveys it to ensure the marketability and size of the resource. In addition, past limits on sand mining permits prohibited excavating more than 45 feet below the bay floor. Therefore, the construction of such an ideal configuration would necessitate the state authorizing the construction of a pit deeper than previously permitted. Finally, this option has associated with it all the impacts summarized in section 2.2.3, including disruption of previously undisturbed bay bottom and loss of benthic population.

c. Intermediate between the above two options would be modifying existing pits. This would most likely be done by deepening, as such an option would both increase capacity and reduce the potential for loss of sediments over the pit sides. Though at first this may seem an acceptable compromise, its potential problems outweigh any advantages. It would still disrupt the fish communities in the selected pit. If it involved widening then it would also incur impacts associated with constructing a new pit. Finally, the pits described in section 2.3.1.2 have been naturally accumulating fine-grained muds. Analysis of the muds from one of the Hoffman-Swinburne pit (2) have shown the muds to be similar to other harbor muds, and high in contaminant levels. It is thus very possible that mud removed from a pit may be the very type that should instead be contained there. That mud would be unsuitable for construction use and would pose its own disposal problems, detracting from a private contractor's interest. This alternative is thus not environmentally preferable, as well as not being practicable.

d. Regardless of which design is selected, consideration must also be made to the filled pit's final configuration in relation to the bathymetry of the surrounding area. Because of a suggestion by DEC, the final pit cap elevation for the demonstration project that started in late 1981 (see section 1.3) was to be three feet below ambient sea floor. This was intended to provide a depression that would potentially be attractive to fishes. This concept has been examined by SUNY (Bokuniewicz, 1986). Using salinity profiles for two West Bank pits (2 and 4) as a means of identifying current regimes that are likely responsible for the conditions in a pit that appear to set it apart from adjacent areas in terms of its attraction to fish. Bokuniewicz feels that there is a minimum depth beyond which a depression may no longer retain the physical characteristics that would distinguish its habitat from that of the surrounding shoals; without such a difference there may then be no attaction to cause fish to concentrate in the area . For the two pits analyzed, Bokuniewicz suggests that a minimum depression (below ambient sea floor) could be 2 and 2.5 - 4 meters, respectively. He then attempted to generalize from these calculations an aspect ratio (comparative relief of a pit: depth/diameter) that might be needed to maintain the hydrological patterns that appears to keep the pit operating as a sediment trap. For West Bank pits this came to 0.005; the pit's relief must be greater than its diameter divided by 200.

e. Bokuniewicz cautioned that because the salinity data is limited, the two depths may be somewhat of an overestimate; more detailed vertical salinity measurements may show that a shallower hole would be adequate to maintain a pit's physical characteristics. He further warns that the calculations are based on tidal currents and salinity ranges found on the West Bank, other areas may differ. This could mean that places with faster currents are mixed to deeper depths and therefore a pit in such an area (like the East Bank) may have to be deeper still to maintain the needed salinity stratification. Under these circumstances a three foot depression would be insufficient, and a hole up to 13 feet (4 meters) below ambient may be needed to maintain these physical features that make a borrow pit differ from its surrounding Bay floor. Obviously, to maintain the final cap (itself up to three feet in thickness) at such a depth would significantly reduce the capacity of most existing pits, nearly eliminating pits 3, and 7, and reducing 4 and 6 to half of the dredged material they might contain if filled (including cap) to ambient sea flood level.

f. A depression shallower than the minimum discussed above could prove to be a useless compromise in that it would reduce a site's capacity without recreating the physical conditions that distinguish it from the surrounding Bay floor. However, though stratification of the water column and large fish numbers occur together, they may not be related. It might be possible that any break in bathymetry may be sufficient to attract fish. If it's a bathymetric discontinuity that attracts fish then any minimal depression may suffice, and three feet may sacrifice more pit capacity than is needed. It is not now possible to conclude which (if any) of the above factors is responsible for the large concentration of fish in existing borrow pits. However, the physical factors regulating sedimentation in a pit are a tangible difference unique to borrow pits. These are the conditions that should most likely be mimicked, and, as suggested by Bokuniewicz's computations, that would likely require leaving a deeper final depression than originally conceived by DEC, with a correspondingly larger reduction in disposal volume. Further, leaving any depression would eliminate the opportunity of returning the bay bottom to its undisturbed state. All factors considered, the best alternative would appear to be recommending that pits (new or existing) be filled to ambient sea floor elevation. This will return the area to its original bathymetry without attempting to create an environment of unknown parameters, and without compromising a site's capacity (thereby maximizing the removal of a source of contaminant loading to the Bight, in keeping with the goals outlined in section 1.2).

2.3.3.3 Operational Constraints

Several additional points should be considered in determining the operational management of a borrow pit disposal site. Disposal could be carried out by requiring barges or hopper dredges to discharge at a specific mark (point dumping) or allowing them to dispose of material anywhere within a designated area. The former of these is the preferred alternative in that it allows the resulting mound to be spread out in a planned manner, by periodically moving the marker buoy, with greater control over the discharge process. This would avoid the building up of mounds that could both reduce the overall capacity of the site (by reaching the maximum elevation over a small peak area only) and adversely effect the proper settling of a cap (interim, and especially final). In order to ensure that the material placed into a pit will have sufficient strength to support subsequent overburdens (including caps), the sediment should be excavated by a clamshell dredge (Bokuniewicz, 1987). Another constraint would be scheduling disposals and caps. This was dealt with partly by section 2.3.3.1 (c and d), which stipulated cap thickness based on intervals between disposal events. In the event some dredged material of an exceptional risk were encountered it may become necessary to delay its removal until a sufficient volume of approved interim capping material were available. The decision as to what material would fall into this category, and how quickly capping material had to be placed, should be made on a case by case basis, utilizing guidelines similar to those discussed in 2.3.3.1. There likely should be some elapsed time allowed between the last disposal project and placement of the final cap, so as to maximize consolidation of the deposit. Procedures for incorporating these concerns into the overall site management are outlined in Appendix D.

2.3.4 Minimizing Impacts from the Use of Borrow Pit Alternatives

2.3.4.1 Mitigation

a. The concept of mitigation involves replacement of habitat that is unavoidably lost through the project action. In the case of digging a new borrow pit this would be unnecessary, as the goal would be for the filled pit to duplicate the Bay bottom habitat lost when it was originally dug. Use of an existing borrow pit would similarly result in recreating the original Bay bottom from which it too was dug. However, during the years these pits have remained unfilled, they have attracted large numbers of fish and developed their own unique physical/chemical parameters. Filling such pits would thus remove the artificial "pit habitat" from the Lower Bay complex. Not all such pits are usable for disposal sites, and of those that are, only a few are needed to meet even very long-term goals, still leaving the majority of this habitat undisturbed. However, all the pits may not serve an equal role in attracting fish. Size, depth, and location probably play a part in determining how a pit is used. Some pits left unfilled may therefore not provide similar habitat to those lost by filling. Partially filling a pit so as to leave a depression was not deemed practical because of the dubious value of such an action (2.3.3.2), and the loss of disposal capacity (thereby reducing the amount of contaminants that could be removed from the Bight and increasing the number of pits that would have to be used).

b. A potential form of mitigation for loss of fishery habitats has been construction of artificial reefs. DEC and DEP, as well as members of the general public, have expressed interest in constructing such structures on or around the final cap. This would be to provide a potential fish attractant, and possibly even increase overall productivity of that part of the Bay. If such a reef serves primarily as an attractant, the fish that eventually would be found there may come from other Bay areas (thereby reducing the other area's population) or may be different from the populations that now use the pit. In that the Bay complex is naturally shallow, such congregation of fish populations would be artificial, and, as may be the case with pits, detrimental to long-term viability of stocks. The pit's ability to attract fish may not be necessarily desirable. It's conceivable that fish drawn to the pit could be put in greater risk of fish kills from the onset of anoxic conditions, or from sudden and prolonged cold shock to those migrants that may have delayed in its warmer winter temperatures (NMFS,1987). Though reefs may improve harvesting efficiency (commerical and recreational), such actions could also serve to reduce fish stocks if harvesting became excessive. On the other hand, a small increase in catches might off-set any small negative impacts that could be brought about by loss of a pit.

c. On the other hand, if the reef acts to increase habitat diversity (such as creation of added "edge effect" where there would otherwise have been uniform bottom), then it may indeed increase diversity of the community within its immediate vicinity. However, the potential for the reef to sink or otherwise disturb the cap, thereby risking the site's security, must be seriously examined. This analysis must be both site-specific and include a detailed knowledge of the reef material, two factors which cannot be assessed until a final alternative is selected. DEP has suggested creating a ringed reef around the site's perimeter. This approach may be a workable compromise in that it reduces the risk to the cap and offers an added protection to the site by possibly enhancing deposition within the ring and thereby protecting the cap further from currents and storm-drain waves. Attraction of fish does provide recreational, and to a limited extent, commercial benefits. However, an very important point to consider would be the advisability of enhancing a fishery, and therefore encouraging recreational fishing, in such close proximity to a disposal area, regardless of how secure it is. This would be in contrast to current site practices that stipulate isolation of disposal sites. Consequently, such actions might not be a desirable long-term goal, especially when the value of such an artificial habitat remains to be established (see 3.4.2 and 4.3.2).

d. Another alternative could be to dig a new pit to replace the one filled, instead of using another existing pit. This would result in the creation of another large volume of dredged material that would have to be disposed, as well as a major disturbance to a previously undisturbed shoal habitat. If the material removed from the new pit is suitable for use either as a capping material or for construction needs (as required by new site criteria - see 2.3.2.1a), then such a mitigation scheme could be feasible. The shoal habitat lost by digging the new pit would be replaced by filling the old one. Such a situation thus results in no net loss of habitat, though the Bay area is subjected to continual disturbance during the construction/filling phases. The potential success of such a plan would depend on the willingness of State regulatory agencies to authorize new pit habitat construction in the Bay. In the absence of such permission, only creation of a fishing reef would be considered as practicable mitigation for habitat lost, and then only if it increases productivity or attracts fish similar to those found in the existing pits. The positive impacts of reducing contaminant loads in the Bight, in conjunction with the partial habitat replacement (shoals) that a filled pit provides, would still warrant use of an existing pit. This is especially true in that the irreparable loss of the artificial pit habitat does not necessarily mean a similar loss of the resource, as the fishery has existed naturally before these pits were created.

Measures could be taken to insure the disposal operation occurs in an approved manner, and to safeguard the integrity of the disposal site. These are described below.

2.3.4.2 Monitoring During and After Disposal into a Sub-Aqueous Borrow Pit

The purpose of monitoring a sub-aqueous borrow pit is to ensure that the disposal material does not escape from the pit directly, and to ensure that contaminants are not taken up by the biota. At this time it is not appropriate to propose a detailed monitoring scheme, as has been requested by some state agencies responding to the DSEIS. A detailed plan would depend greatly on the specific alternative selected, approved operational methods of use, and existing information available at the time of use, all of which will not be finalized until after this FSEIS is reviewed. Instead, what is being described here is an outline for what a monitoring plan will assess, and recommendations for procedures that might best accomplish those goals. It should be pointed out that a good monitoring program is one that is flexible and responsive to actual field conditions and analysis of the data it accumulates. Some adjustments to the program should be anticipated to reflect real world conditions encountered in the field as well as the results obtained to date. Therefore, the NYD reserves the right to propose changes to the program (either as outlined here or as detailed later) to accomodate findings derived from actual field work and data collections, ongoing research, and/or new technology.

2.3.4.2.1 Physical Monitoring

a. To be successful, a physical monitoring program must ensure that the site is properly filled, confirm that no sediments are leaving the site during disposal, and establish the long-term integrity of the final cap. The first of these goals is straightforward, and may be accomplished through bathymetric surveys and on-site inspection. Periodic surveys would establish both how much capacity remains in the pit and how uniformly the deposits have been placed. The former cannot be inferred by accurately totaling barge loads as some small portion of material will be lost (generally under 5%), consolidation of the deposit may take three months or more, and barges never hold their full volume (too much water with the sediment to allow full compaction of a load)). This parameter is, however, important to know for employment of interim caps, as they will be based on volume. In addition, if it is also necessary to determine the actual volume to keep an accurate record of remaining usable capacity and develop subsequent schedules for usage.

b. An initial detailed bathymetric survey of the pit would be made to obtain baseline topography. This will be used to both set the disposal sequencing at the start, and serve as a reference for planning changes in buoy location, capping, and other procedures as the pit is filled and its topography altered. Accuracy is most important here, so a rather tight spacing interval (perhaps fifty feet) would be appropriate. follow-up precision surveys during the life of the pit could be more widely spaced. A close eye should be kept on changes in the topography of the pit, as it could effect the ability of the pit to retain all the sediment deposited in it. Creation of high mounds or slopes near the pit boundaries could lead to premature topping if its sides, and resultant escape of sediment-bound contaminants. A routine survey conducted periodically would provide an overall picture of the site topography at set intervals, irrespective of how many disposal events had occured would (perhaps every 100 -200,000 cys). Between such surveys the manager could estimate the configuration of the disposal mound from conservative projections based on maximum deposit thickness. After each routine survey the manager would also utilize the available data on porosity and compressibility (based on tests that would be required of all candidate sediments for borrow pit disposal), as well as volume and mass calculations of the discharge, to predict the actual volume of the deposit. For project-specific information, additional surveys could be planned after all projects of substantial size are completed (maybe 35,000 cys or larger) so as to be able to track the effect of each project individually.

c. Information from the above surveys is necessary for efficient site management, in order to estimate remaining site capacity, and determine if the disposal buoy should be moved, or the final cap placed. The former would occur if the disposal mound reached to within five feet of a pit rim, or within three feet of ambient bottom. If either condition occurred and there was no place left to move the buoy, then the final cap would be called for. In order to ensure that dumping occurs at the designated points an independent inspector could be stationed on each barge. Other techniques, however, may be capable of providing the same assurance at a lower cost and greater dependability. An electronic signalling system such as employed at the 106 sludge dump site or adaptation of the traffic management system now being deployeed by the Coast Guard, are two examples of techniques that might be further explored for this role.

d. An effort should also be made to determine that there is no unexpected loss of dredged material during disposal. Such an event could only occur if the sediments spread out and over the pit wall, and onto the adjacent Bay floor. The actual occurrence of such a surge can be determined in several ways: The most complex of these is the system used to monitor disposals during the Dredged Material Research Program (DMRP), and originally proposed for the old borrow pit demonstration project. Acoustic transducers onboard at least two separate vessels, coupled with sampling of suspended sediments, were to be used to detect the spread of the surge.

e. Such a labor intensive effort may neither be necessary nor appropriate for operational monitoring. Transmissometers, such as those used to study the Long Island Sound site, could be employed around the pit rim to detect large movements of sediments that would occur if a surge topped the pit. The detection of such a surge would be a signal to halt further disposal, and assess the causes. Corrections could then be made to the disposal procedure, or (if warranted) the entire operation would be terminated, and a final cap installed. A variation of this concept, employing a vertical array of optical sensors with a radio telemetry link to a vessel, had been discussed in the DSEIS. The concept would involve use of an onboard device that both tests and activates the sensor display during a disposal event to identify any substantial movement of material out of the pit during that specific disposal action. Though nothing could be done to halt the single disposal event monitored, any material lost would only represent a small portion of a single barge load (no more than a few thousand cys, and probably much less), and a warning would be provided to halt the remaining disposal until the problem could be assessed. The prototype for such a system has been developed and is now undergoing tests by a combined team from SUNY and University of New Hampshire (Irish and Bohuniewicz, 1988). If satisfactory, such a system could be considered for use in monitoring the disposal events.

f. The third monitoring program would be designed to assess the stability of the final cap, and therefore the long-term integrity of the site. It involves bathymetric surveys and grain size analysis. Depths should be accurate to within ten centimeters (cm), and the bathymetric surveys should be run along 50 foot spacing. They should be conducted when the pit is filled, and again on completion of the cap. Similar surveys would occur at 10,30,60,and 120 day intervals, as the majority of consolidation is expected within the first four months. The occurrence of large ridges, bumps, depressions, or sand waves in the range of several feet in height/depth (as opposed to the natural range of inches that such features normally occur at) could be a sign of cap instability, though such a condition could also occur from deposition on top of the cap; grain size analysis would be useful in determining the cause. If erosional were suspected, additional sand may have to be deposited to stabilize the cap and replace any material it may have lost. Grain size analysis, conducted at the same frequency as the bathymetric surveys, would also be useful in determining if any of the cap is winnowing away. Increases in grain sizes may indicate the cap is being winnowed, and, if the grain size doesn't stabilize, the cap should likely be supplemented with sand of coarser size (more closely resembling the ambient sediments). As an alternative, a slightly thicker cap might be applied so that the current can winnow out the finer sizes and leave a coarser, sufficiently thick and stable cap behind. Once the site stability (consolidation) has been established, long-term monitoring of the cap could be reduced in frequency.

2.3.4.2.2 Biological Monitoring

a. The purpose of the biological

monitoring is to detect whether contaminants from the disposal site are available for uptake and accumulation in marine organisms. The benthic community provides the best opportunity to detect such losses as they are relatively immobile, and any findings can best be correlated with the disposal site. Use of fish, on the other hand, presents an added concern in that it is never certain that contaminated individuals picked up such material from the borrow pit, or that fish free of such contaminants had only just entered the vicinity and did not have enough time to accumulate representative levels actually in the environment. Identification of individual test species would not be appropriate, as there would be no way of enduring collection of a sufficient amount of biomass for tissue analysis. Instead, representative genera would be selected, and target species pooled to obtain the needed biomass. The actual genera selected for testing will depend on the communities present in and near the selected pit site. This will be determined from a one-time broad seasonal survey in and around the selected alternative and control pits. A minimum of two genera should be chosen, as alternates are necessary due to sampling uncertainties. The genera should be one whose members are likely to repopulate the cap after site closure, with preference for those of a sufficiently long life spans and lipid content to be able to bioaccumulate any contaminants that may become available. If possible, the genera will be selected to represent the two major functional groups of benthos: filter-feeders and deposit feeders.

b. The detailed monitoring plan will be finalized during the permit process, after a decision has been reached concerning which alternative to pursue. At this stage a conceptual plan has been proposed and reviewed by the SC and PICG. This plan proposes that benthic stations should be sampled just before the pit is first used, in order to determine ambient tissue levels before disposal starts. This survey can also serve to provide baseline data described above, with all samples preserved and tissue analysis later conducted on the selected test genera. Routine sampling would occur during the life of the pit, and following the final cap. The DSEIS initially proposed locating stations along a transect oriented in a line consistent with net tidal movement so as to increase their likelihood of exposure to contaminants leaving the disposal site. However, reviewers of the DSEIS pointed out that such an arrangement did not account for the complex current/tidal patterns common to the Lower Bay complex. Instead, sampling might be more appropriate in quadrants set up around the circumference of a pit. Several such concentric rings might be established at various distances, such as 500, 1,000, 2,000 and even 4,000 feet from the edge of the pit (providing the outer ring is far enough away from other pits not to be influenced by events within them). Within each ring could be four quadrants to start; one axis would be oriented along the direction of net tidal flow, with the other axis perpendicular. Within each quadrant enough random samples would be collected of the benthos to provide a large enough pooled biomass for tissue analysis and statistical comparisons between the disposal pit and a similar array set up around an undisturbed control pit (an unused borrow pit similar in its physical/chemical regimes to the disposal pit, yet minimally influenced by what occurs at the disposal pit). The purpose of sampling is not to obtain a quantitative population estimate, but instead to determine contaminant uptake in relation to the pit. Therefore, enough samples should be collected in each quadrant as is necessary to obtain the minimum weight of individuals of the test genera to perform the chemical tissue analysis on; a record of how many samples are needed at each station to reach the minimum testing weight will be kept. As test results are analyzed, the distances between rings and/or the number and size of quadrants could be revised to more realistically reflect actual findings.

c. Sampling should occur following the season of greatest increase in populations (spring), and no more than twice a year. Summer and winter are seasons of lowest population levels and therefore would not provide as good an indicator of potential contaminant uptake. This would also be consistent with Fitzpatrick's (1983) finding of contaminant levels (at least for metals) peaking in two genera of polychaetes during fall and spring.

d. No identification or other enumeration of any non-test organism is planned, but they could be preserved in the event that information on abundances and species diversity would lend insight into disposal impacts, should the tissue analysis prove inconclusive. Benthos from all stations will be collected during each sampling period. However, not all samples may be chemically analyzed. Test organisms from ring closest to the edge of the disposal and control pits would be tested first, with tissue analysis undertaken for the same contaminants tested for in the most currently approved bioassay program. If organisms from the disposal pit are determined to have a statistically significant higher level of any of the test criteria than those in the control pit, then the individuals from the next ring of be analyzed. If organisms here too contain significantly higher levels from organisms from the second ring at the control site, then the remaining organisms from the outer rings will also be tested. Such a procedure would help to determine if there is pattern of uptake that can be correlated to the pit as a source of origin. If such a gradient were found the disposal operation would be stopped until the cause of the loss can be determined, its impact assessed, and corrective action taken (if necessary) or the site closed permanently. Depending on their analysis of the findings, an interim cap may be ordered put down expeditiously, while possible revisions to the disposal procedure are considered (thicker or more frequent interim caps, exclusion of certain dredged material, increased monitoring, seasonal restrictions, site closure, as examples).

e. The above sampling protocol could be modified based on results obtained over the life of the pit, though some form of monitoring would occur throughout its operation. Modifications would have to be in compliance with any permit conditions, and would be discussed with the SC before implementation. Once the final cap is installed a sampling quadrant/ring could be added on top of the cap, and the overall benthic sampling frequency can be adjusted to coincide with the long-term physical monitoring schedule. Routine collection of samples from inside the pit while it is still being used for disposal is not considered warranted as the habitat will be subjected to continual disturbances. As a precaution however, samples in the pit could be collected and analyzed if a sufficiently long enough time has elapsed between disposal events for a substantial repopulation to occur. If there has been no disposal after two sampling periods, then the interim cap (as well as the control pit) could be sampled and analyzed, along with the routine outer quadrant stations, during the next scheduled monitoring period.

2.3.4.2.3 Chemical Monitoring

Routine testing of water and sediment samples is not warranted, as the water column is heavily influenced by tides, currents, and storms, and is therefore an unreliable indicator of a contaminant's source and levels, especially if measured at one point in time. Only continual monitoring would provide a useful picture, and no established monitoring systems exist to measure the contaminants of concern. Even if they did, it is doubtful that the results would be of any added value to these from the biological monitoring described above. Similarly, sediment testing, while more useful than water column testing, will not add a better insight into potential contaminant loss than what would already be available from the biological sampling. This is because the benthic organisms concentrate contaminants, thereby being able to identify their presence even though sediment levels may be too low to detect. In addition, the concern with contaminants is their effect on the biological community. The biological monitoring gets to this point directly , instead of the more indirect interpretation of chemical results.

2.3.5 Environmentally Preferred Alternative for Implementing Borrow Pit Disposal

a. The conclusion of section 2.2 was that the use of sub-aqueous borrow pits is still the preferred means of disposing of dredged material that did not meet the CE/EPA testing criteria for ocean disposal. Based on a consideration of the various implementation alternatives for such an action, the construction of a new specifically-designed borrow pit, located inside the Bight transect, would seem the most acceptable on environmental grounds. Though such a choice would result in disruption of a previously undisturbed habitat, construction of a narrow and deep pit, in an area of good stability and relatively low biological use, reduces the adverse impacts sufficiently, in light of the overall benefits to the Bight ecosystem. The impacted area will thus be minimized in its size and biological disturbance, and will be returned to its original state when the pit is filled, taking only a relatively small part of the Bay floor out of production, and then only temporarily. Of the areas considered for construction, the East Bank north of Rockaway Point, and an area of Lower New York Bay between Chapel Hill and Raritan channels are the most suitable (Figure 32), with the East Bank being somewhat preferable because of its larger size and lower fish and lobster/crab use (see section 2.3.2). The precise location within each area should be set so as to avoid impacts to the potential cultural resources identified by the remote sensing survey (see 2.3.2.4). Such a recommendation would focus the selection on the four zones discussed in 2.3.2.4d, and pictured in Figure 33.

b. The major draw-back to this alternative is the time it would take to implement, especially given the absence of Federal funding for such an action. During the time it would take to find an interested contractor (or governmental sponsor) to fund the operation, obtain the necessary approvals still needed for the actual dredging of the pit (a site-specific process), and then actually complete construction, the marine system would still be receiving the added pollutant load from exposure to undredged contaminated sediments and placement of category II material at the Mud Dump. Realistically, under a new pit scenario, current disposal practise would thus be expected to remain in effect for some time in the future, until the pit was completed.

c. The use of existing pits thus represents an attractive alternative with the environmental advantage of being available immediately, thus minimizing contaminants available to the ecosystem. Such an alternative avoids impacting undisturbed shallows, and would likely redistribute (rather than destroy) pit fishery resources. However, the potential exists that the pit habitat may be responsible for at least concentrating fishery resources. Consequently, the loss of a pit might be construed as adverse to the fishery, Although this risk is small (in probability) it can be avoided by constructing a new pit, at the cost of a relatively small, and temporary loss of less utilized fishery habitat. However, because new pit construction is not a certainty (it may not be attractive to private industry) or its undertaking could be substantially delayed, it would be advisable to utilize existing pits in order to provide a timely reduction of the potential contaminant load to the Bight. This would be in keeping with the requirements of the CWA and MPRSA, to reduce or eliminate potential sources of degradation to the marine system. Further, because these habitats are artificial, serve no apparent critical needs, and are relatively recent features on the Bay floor, the loss of one or two should not have an adverse impact on a fishery that developed and flourished in a naturally shallow water system. Further, as pits serve as sinks for fine-grained sediments, their filling could reduce fish/benthos exposure to contaminants that are most associated with such fine-grained materials.

d. The order of preference for use of existing pits was determined to be 6, 4, 3, 7 (Figure 1 and Table 14). However, with no overwhelming preference apparent, the final selection could include non-environmental factors, with little risk in choosing an environmentally unacceptable pit. Physical and biological monitoring identical to that proposed for the new pits would also be required if existing pits were used. The same capping procedures would also be followed.

e. A final cap of the same elevation and grain size as the surrounding area will be deposited, with thinner interim caps of category I mud or sand deposited over all category III sediments, and any category II that is disposed during the spring or fall seasons of highest benthic activity, or is of special concern (as determined by the SC). The final cap will be at ambient depth, unless the monitoring determines there is a danger of dredged material topping the pit sides. It may be possible to increase fish use by constructing an artificial reef atop or around the periphery of the filled and capped pit. Such a feature must not be a hazard to navigation, nor affect the cap stability or integrity. It should also have a reasonable chance to increase overall fishery productivity, and not just draw fish from other areas to a disposal site. The excavated material (from a new pit) will be of sufficient quality to allow its use for construction fill, to avoid its disposal in the ocean and to provide an incentive for private funding to construct the pit. Physical and biological monitoring will be required during filling to confirm the containment and isolation of contaminated sediments, and to ensure that capping has been successfully executed.

f. In conclusion, a combination of a new and an existing pit would be the best overall method for ensuring the quickest and most effective relief from further dredged material-related impacts on the Bight. Such an approach would involve initiation of an operational program for disposal of dredged material unsuitable for unrestricted ocean disposal into one of the four pits identified in section 2.3.1.5. The construction of a new pit on the East Bank (or possible the eastern portion of Raritan Bay) would be pursued concurrently with use of the existing pit. This will enable it to be available for use when the existing pit is filled. The actual use of the new pit (once constructed) will be dependant on the on-going monitoring program (in place at the existing pit) establishing that the dredged material was being safely contained and isolated from the environment. This method would provide for an immediate, safe containment of material that is not able to pass testing criteria for unrestricted ocean disposal, while limiting disruption of existing habitat to one pit.

g. This approach would represent a long-term solution to the disposal problem, while also provide a form of mitigation in that filling the existing pit would return that portion of the Bay bottom to its original depth, thereby offsetting the loss of Bay bottom that the new pit will incur. In the unlikely event that the monitoring program shows that the existing pit is not containing the contaminants, the new pit would not be used, thus serving as a replacement habitat for the pit that was filled. If the process is successful, it could eventually be extended in the far future. Each filled pit would be mitigation for its replacement's impact on shoal habitat, and only one existing, artificially deep water habitat (the first filled) would ever be lost, with minimal (if any) impact to the aquatic resources of the Lower Bay complex. Implementing this future scenario would, however, need its own detailed evaluation, and possibly its own future EIS. For now, the project's preferred alternative is to use and monitor one existing pit while persueing the digging of a new pit. That new pit would only be used if the monitoring study showed that the operation functioned as predicted, with minimal risk to the environment.

3.0 Affected Environment

3.1 Project Setting

a. All of the subaqueous borrow pits that passed the screening criteria are located adjacent to the New York Bight Apex, (Figure 34), specifically within the Lower Bay complex (Lower New York Bay, Sandy Hook Bay, and Raritan Bay). Consequently, the following discussion of existing conditions and resources will deal specifically with the pertinent environment of the Bay waters outside the Bight. Conditions inside the pits will also be described.

b. In general, this water area, and its associated land masses, are among the most highly utilized in the world. Because of the central location and proximity to the heavily populated metropolitan New York area, the Bay complex (and adjacent Bight waters) has been modified by human activity. Normal estuarine circulation patterns (bottom intrusions of saline waters) have been modified by an extensive network of channels, and shoals in an otherwise fairly uniform bottom (Figure 8). Bight waters are of great ecological importance because they serve as a mixing area for the boreal, temperate, and tropical species (NOAA, 1980); the southern range of the former and northern range of the latter often coincide within this area.

3.2 Hydrology

3.2.1 Circulation

a. A general description of the Lower Bay Complex (Raritan, Sandy Hook, and Lower NY Bays) was most recently prepared for NOAA's report on the biology of the Hudson-Raritan Estuary (Berg and Levinton, 1985). Mixing of freshwater from the Hudson and Raritan Rivers (as well as lesser inputs) with seawater from the Bight produces a large counterclockwise gyre. The Raritan and Hudson flows are separated by a clockwise eddy off Staten Island. Higher salinity water enters the Bay complex during flood tide between Ambrose Channel and Rockaway Point, continuing in southwesterly direction along the Staten Island Shore. During ebb tide, the lower salinity water from Sandy Hook and Raritan Bay escapes around Sandy Hook into the Bight; Lower Bay water (diluted by the Hudson River) flows out over Ambrose channel. Typical velocities are generally less than one knot (especially in the western part of the Bay) but do exceed three knots through the Narrows and between Sandy Hook and Breezy Point (NYD, 1984). Non-tidal circulation is driven primarily by density differences, with lighter, less saline water leaving the bay near the surface, while a tongue of more dense saline water persists in channels and depressions. Non-tidal velocities typically are slower, not exceeding a few cm/sec. The combined actions of non-tidal (Figure 35) and tidal (Figure 36) circulation produce a net movement that defines overall estuarine circulation patterns: saline water moves inward along the floor while fresher surface water flows out. Flushing of the Bay complex is slow, with an estimated 42 tidal cycles needed (at minimum river flow) for complete flushing (Berg and Levinton, 1985).

b. Within the existing borrow pits (Figure 1), currents have been measured in Hoffman-Swinburne (2) and CAC (4). Both pits showed similar patters (NYD, 1984). A net southwest drifting current (4 cm/sec) occurs over the pits in general, but is superimposed by a rotary tide (36 cm/sec) that markedly reverses flow direction and speed on a daily basis. Near the bottom, however, the net flow is west-northwest (also at 4 cm/sec), but with no reversing tidal effect. At the pit bottom the current was near the low detection limit of the current meters (less than 0.8 cm/sec), with a drift in the same west-northwest direction and no tidal effect. Though no tidal influences seems to be exerted at lower pit depths, the non-tidal circulation is sufficient to exchange its water slowly (one or two days). The suppression of tidal currents is the likely cause of a salinity stratifications common to the pits, as well as their rapid deposition of fine-grained sediments (Bokuniewicz and Hirschberg, 1982). Such a depositional climate would also reduce resuspension of sediment. Such conditions make the pits an excellent sediment trap. In a computer simulation, flow patterns in and around hypothetical borrow pits were examined (Wong and Wilson, 1979). Results of their studies confirmed tidal currents do decelerate over the pits. The studies also show that the currents are deflected towards these areas of man-made depressions, and accelerate once they leave the pit. The magnitude and direction of current changes are greater with large holes, while smaller holes are more effective in decelerating the current within the hole.

3.2.2. Salinity

a. The Lower Bay complex receives freshwater input directly from the Raritan River and coastal drainage off Staten Island, southwestern Long Island, and the northeast NJ Coast. In addition, the Hudson (along with Passaic and Hackensack) drainage enters the complex through the Narrows. Saline water enters from the Bight. As a result, salinity in the area varies widely in both time and space. Maximum values usually occur in the winter and minimum values in early summer, following spring run-off. At any given time salinity maximums generally occur in bottom waters near Rockaway Point and in deeper points of the Bay, while minimums can be found in surface waters at the Narrows and the mouth of the Raritan River (NYD, 1983; 1984). The pattern of seasonal/spatial variation is typical of estuaries, with fresher surface water flowing seaward over denser saltwater that moves landward. Maximum tidally-averaged salinities are found at depths below 16 feet, inside Ambrose Channel.

b. Salinity structure has been measured (Bokuniewicz et al., 1986) for a tidal cycle at the CAC pit (4). Surface waters varied from 26 ppt (part per thousand) to 24 ppt (July) as the flooding tide carried more saline water over the pit and the ebbing tide carried fresher water over it. However, within the pit, salinity was denser and less varied (28-29 ppt), indicative of reduced circulation and stratification.

3.2.3 Temperature and Dissolved Oxygen

a. As described in the generic disposal EIS (NYD, 1983), winter generally has nearly isothermal conditions, with an unstratified water column and average minimum annual temperatures below 2 degrees C. Spring run-off and warming begins to build a stratified system that peaks in August with surface temperatures averaging 17-20 degrees C and a sharp thermocline, below which temperatures are distinctly lower (4-10 degrees C). Fall storms and cooling begin vertical mixing that dissipates the thermocline and breaks down the summer stratification; both spring and fall transitions are generally brief and variable. Dissolved oxygen also exhibits seasonal trends, but is subject to man-made influences, especially sewage input (up to 10% of the total Hudson discharge -Berg & Levinton, 1985) that dramatically increases the systems Biological Oxygen Demand (BOD). The most marked impact is generally witnessed in the summer, when high temperatures and a stratified system produce bottom oxygen levels that can fall below minimum state water quality standards of 3.0 mg/ml (the point at which many fish become stressed after prolonged exposure). Because of high levels of photosynthetic activity, and wind-driven turbulence, surface layers are still generally at or above saturation. Maximum oxygen levels within the Bay complex coincide with winter and early spring, when water temperatures are low and vertical mixing common. Increased secondary sewage treatment (especially from the new North River plant in Manhattan) is likely to reduce BOD loadings, thereby improving DO.

b. Temperature and salinity data were collected during fish trawls at the CAC (4) and the Hoffman-Swinburne pit (2). Temperature varied little between the two pits, or between the pits and a control site on the undredged shoal bottom of the West Bank. Though cooler waters generally could be found in the two pits during summer, the difference was very small (less that 0.25 degrees C cooler; Pacheco, 1983), but no consistent pattern of warmer bottom waters in the winter was evident (Conover et al., 1985). Lowest oxygen levels were found during the summer at all three sites, but no consistent pattern of seasonal variation could be discerned. Oxygen levels never went below the 3.0 mg/ml critical value in either of the pits. No persistent oxygen differences were discernable between either of the pits, or among the pits and the control site (each of the three stations varied from sample to sample as to which had highest or lowest temperatures and oxygen levels). Measurements of water column levels at four pits (2-5) showed DO levels decreased gradually with depth, but generally remained above the 3.0 mg/ml level (Swartz and Brinkhuis, 1978). The exception to this was the CAC pit (4), where lower levels occurred in May and August; this pit also had the highest sulfide, organic carbon and oxygen demands of the four pits surveyed, which likely caused the lower DO levels.

3.2.4 Water Quality

NY State classifies its waters within Lower Bay as SB; suitable for primary and secondary contact recreation, except for the taking of shellfish for marketing. The NY classification specifies DO levels of not less than 5.0 mg/l and prohibits toxic wastes or other deleterious substances in amounts that would interfere with primary contact recreation or be injurious to edible fish and shellfish or their culture or propagation; no adverse effect on the color, odor, or sanitary conditions is permitted. NJ classifies its Raritan Bay and Sandy Hook waters as FW2-NT/SEI; suitable for primary and secondary contact recreation, maintenance, and migration and propagation of natural and established biota, but not shellfish harvesting (in accordance with N.J.A.C 7:12). DO levels shall not fall below 4.0 mg/l and must average a minimum 5.0 mg/l over 24 hours, and the waters must be protected from any measurable changes. The Interstate Sanitation Commission (ISC) classifies all of the Lower Bay as class "A"; suitable for primary contact recreation and shellfish harvesting in designated areas (the entire Bay is within a shellfish closure zone-no harvesting allowed by NY or NJ). DO levels must have a minimum value of 5.0 mg/l. The NY and ISC classifications apply to the entire water column; conditions within some pits (2,4) are known to violate DO standards, as do parts of the surrounding area (NYD, 1984). In actuality, DO levels below 5.0 mg/lit are common throughout the lower Bay complex (Woodhead and McCafferty, 1986). The NJ classification is only for surface waters; surface waters over the pits do generally meet standards.

3.3 Geophysical Traits

3.3.1 Geology

a. The Lower Bay complex lies within the coastal plain physiographic province of the Northeastern United States (Figure 37) that includes the continental shelf. This is a dissected plain that rises gradually from sea level, and is divided into a broad shallow (less than 100 feet above sea level) depression to the west (inner plain). Both are underlain by unconsolidated clays, sands, marls and gravels, with the inner plain having a greater portion of clays.

b. The Triassic basin, which underlies much of Staten Island and the Raritan estuary, consists of Triassic-age basalts, reddish shales, sandstones and conglomerates. The Manhattan and Reading Prongs, through which the Hudson and Raritan Rivers flow, consist of gneiss and schists. Sediments consisting mostly of unconsolidated marine clays, silt and gravely sand of late Cretaceous and Tertiary ages outcrop along the south shore of Raritan Estuary (Figure 38). Locally resistant beds of these sediments occur when iron oxides and carbonates are present to cement them. Overlying these sediments are unconsolidated quaternary sediments of clay to gravel composition and marine and alluvial origins. The lower Cretaceous and Tertiary formations are truncated by younger quaternary sediments for depths to 200 feet, as the erosional surface deepens into NY Harbor.

c. The Staten and Long Island shores bordering NY Bay consist of unconsolidated Pleistocene and more recent geological sediments. A terminal moraine extends across Brooklyn and Staten Island, consisting of a heterogeneous mixture of sand, gravel, boulders and clay. Glacial outwash of sand mixed with some gravel forms a surface layer from the moraine seaward, comprising the upper sediments of the continental shelf (including the Lower Bay complex). These sediments were deposited in thick beds of relatively uniform grain size (sand) by streams that drained the melting glaciers. Holocene beach sands and intermittent tidal marshes occur along the undisturbed sections of shoreline.

3.3.2 Topography and Bathymetry

a. Much of the topography and bathymetry within the study area is the product of glacio-fluvial processes modified by subsequent wave and current action (Kastens et al. 1978). The maximum extent of glacial activity occurred about 18,000 years ago, and is marked by the terminal moraine extending from Staten Island across the Narrows through Brooklyn and eastern Long Island. Sea level was some 325 feet lower, and the Lower Bay complex was exposed to deposition and erosion by streams winding down from the melting glacier across what is now the bay and continental shelf. With melting glaciers the sea level rose, drowning the lower valleys of the Raritan and Hudson Rivers, and exposing much of the glacio-fluvial features to wave and current actions. The main feature along Staten Island is the irregularly-shaped terminal moraine that parallels its southern shore (northern boundary of Raritan Bay); the northern shore of NJ (Raritan Bay's southern boundary) is bordered by high bluffs of up to 300 feet (Atlantic Highlands), with numerous small tidal creeks flowing into the Bay. Sandy Hook is a sand spit fed mostly by sand from the eroding highlands along the ocean shore of New Jersey to the south. Brooklyn's border on Lower NY Bay is a flat outwash plain with a gentle slopes towards the Bay. Jamaica Bay (along Brooklyn's southeastern shore) is a wide, shallow embayment that opens to the Lower Bay between a former barrier island (Coney Island) and a sand spit (Rockaway Beach).

b. The Lower Bay contains two drowned river valleys (Raritan and Hudson) and its bathymetry derives from a mix of glacial activity (banks/channels from melt water streams) and later littoral processes. Recently, man has added extensively to the forces affecting bottom topography: ship channels, anchorages, sand mining and disposal areas (most just inside the transect that separates the Apex from the Bight proper) are common. Figure 8 depicts present bathymetry.

c. Sand is being shifted northward off of Sandy Hook, and some minor shifting of depths is occurring, but no major or rapid natural changes in bathymetry occur within the Lower Bay (Kastens et al., 1978). The continental shelf adjacent to the Bight Apex is a flat, sandy plain that slopes gently to the southeast; the submerged

Hudson River channel bisects the shelf beyond the Apex transect. Prominent features (displayed in Figure 8) are the main navigation channel (Ambrose) that trends northwest through the Lower Bay to the naturally deep (90 feet) Narrows. Outside the 45 foot deep Ambrose Channel (and channels leading through Raritan and Jamaica Bays) the Bay bottom is generally less than 30 feet deep. The upper portions of Ambrose Channel are bordered by two large shoals: the East Bank has depths at low tide of less than 19 feet and the elongated West Bank varies from 1-17 feet at low tide. Two small dredged material islands (Hoffman and Swinburne) lie along the West Bank. Two other shoals are located southwest of Ambrose: Romer Shoal parallels the channel, with depths as low as six feet common, Flynn's knoll lies southwest of Romer Shoal and is generally somewhat deeper (10 feet); a natural channel of 18-27 feet (Swash Channel) separates the two. Raritan Bay is a shallow body (under 20 feet) that passes an even shallower shoal (Old Orchard Shoal) with depths of less than 5 feet. A number of channels cut through this and Sandy Hook Bays. The major navigation channel (Raritan Channel) has a control depth of 35 feet, the others are small channels (5-12 feet) leading to recreational and fishing harbors along the NJ and Staten Island shores. Subaqueous borrow pits are found mostly to depths of 30 - 60 feet below the ambient bay floor (though some may be deeper) along both East and West banks (Figure 1).

3.3.3 Sediments

a. The floor of the Lower Bay Complex is predominantly sandy, made up of 6% gravelly sand, 6% gravelly silty sand, 55% sand, 10% silty sand, 9% clayey silty sand, 14% sandy clayey silt and 1% sandy silt (NYD, 1984). Twenty nine surficial sediment bodies have been identified in the Lower Bay complex (Figure 39), and their grain size, area, depth and volume summarized from several core surveys (Table 18). These bodies are stable, with no significant shifting along the floor of the Bay complex. Figure 40 depicts idealized sediment transport into and out of the Bight Apex. Sand from the Bight generally accumulates in channels of Lower NY and Sandy Hook Bays, while silt/clay sediments move into Raritan Bay and out the transect into the Bight itself. As a result, sand, potentially suitable for construction uses, is commonly found in the Lower Bay and parts of Sandy Hook Bay, while mud (unsuitable for most construction needs) dominates most of Raritan Bay and the floor adjoining Raritan Channel (Figure 41). Nearly 3,500 million cubic yards of sand are estimated to exist in the Lower Bay, with probably even more located below the current levels of estimation (Bokuniewicz and Fray 1979). Estimations of thickness vary from over 100 feet in the East Bank to 50-60 feet along the northern part of the West Bank, closer to Staten Island, and in Sandy Hook Bay. Figure 21 depicts a series of schematics showing areas containing sand suitable for construction uses, and their approximate depths.

b. In Figure 41, several small pockets of mud can be clearly designated within the sand-dominated Lower Bay. These coincide with borrow areas from previous sand mining operations (pits 1-7). The West Bank Pits (1-5) are accumulating fine-grained sediments at rates exceeding 100 times typical estuarine deposition (4-9 cm/yr-see Bokuniewicz, 1979). Comparisons of the large East Bank Pit (6) to three West Bank pits (2-4) showed a distinct difference in sedimentation. Those on the West Bank had accumulated more fine-grained sediments (Swartz and Brinkhuis, 1978). This was confirmed more recently by Cerrato and Bokuniewicz (1986) and Cerrato et al. (1989), who found East Bank pits still sandier than those in the West Bank. The East Bank pits thus appear to be undergoing a slower sedimentation, perhaps due to faster circulation patterns that keep materials in suspension longer (Brinkhuis, 1980). Regardless of differences in the rate of sediment accumulation among the pits, they still have converted over a thousand acres of seafloor from sand to mud. This phenomena of pits accumulating fine-grained sediments has been well documented for a number of pits and similar depressions (canals) throughout the eastern coastal area (Cerrato and Scheier, 1983).

c. In the Lower Bay, size and depth apparently plays a role in determining sedimentation rates. This can be seen from Table 19, which lists the grain size analyses for the benthic stations sampled during the MSRC survey (Cerrato et al., 1989). The two smaller West Bank pits (2 and 4; stations 37 and 10 respectively, in Table 19) are far muddier than the large, and relatively shallow pit (4, see station 38) between them. This may be due to reduced circulatory patterns/rates, which may also account for their opportunistic benthic communities (see 3.4.1). In fact, the large pit (3) contains less mud (17.5% mud/silt - see Table 19), than the average grain size in the old East Bank borrow area (45%, see area C in Table 20). However, the sediment composition of the East Bank varies greatly with station location, with those stations in the lower part of area C (most likely actually in pit 6) have equal or greater amounts of sand than pit 3 (see Table 20). Based on the grain sizes from the MSRC cruise, the East Bank in general does have higher portions of gravel/sand than the more sheltered western shoals (Table 19).

d. Since many contaminants have an affinity for fine-grained sediments, the pits are serving as a sink for such contaminants. Table 21 depicts levels of heavy metals from pit 2 and compares them to muds from a number of other heavy deposition areas including the Mud Dump site. The mud accumulating in that pit is similar in grain size and contaminants to muds normally dredged from the harbor (Bokuniewicz et al., 1986). Because of its apparent lower sediment rate, material in the East Bank pits should have lesser amounts of such contaminants, simply because it accumulates less fine-grained sediments. Similarly, coarser sands along the undisturbed portions of the Lower Bay complex yield even lower trace metal levels. Greg and McGrath (1977) found heavy metal concentrations decreased away from Raritan Bay proper, with low levels in the West Bank north of the Raritan channel, and lowest levels along the East Bank, where sediment accumulation is least. Pits, as accumulaters of fine-grained sediments, are thus likely to be areas of contamination even without filling.

3.4 Biological Characteristics

3.4.1 Benthos

a. A number of benthic surveys of the Hudson-Raritan Estuary have been conducted over the past twenty years, and the majority of them are discussed and summarized by Brinkhuis (1980). Unfortunately, the studies often varied in gear used, mesh sizes, analysis technique and time of sampling, making comparisons, while not impossible, somewhat qualitative in nature. No one single study covered the entire present area of interest. Brinkhuis (1980) developed a species richness map (Figure 24) from findings of three major studies in the area (Steimle and Stone, 1973; Dean, 1975; and Brinkhuis, 1980). Perhaps the most extensive (in area) study had been conducted by McGrath (1974) during the winter of 1974 (see Figure 42). His results were compiled and displayed as a diversity map (Figure 25) by Pearce et al. (1981). Smaller studies were conducted along the West Bank (Walford, 1971), the East Bank (Woodward-Clyde Inc, 1975), and portions of Lower NY Bay (Swartz and Brinkhuis, 1978; Brinkhuis, 1980). NMFS conducted a reconnaissance and monitoring cruise in the Bight Apex from 1973-76 (Pearce et al., 1981) that surveyed inshore benthic distributions just beyond the Lower Bay Complex covered by the above studies. The Marine Science Research Center at SUNY-Stony Brook (MSRC) conducted a one-time benthic survey of the major sediment types of the Lower New York Bay during the summer of 1983 (Cerrato and Bokuniewicz, 1986). This has been followed up by the most comprehensive benthic study to date. Sponsored by the NYD, it was designed to duplicate and expand the geographic coverage of McGrath's work to include the East Bank and Romer Shoal (Figure 11) as well as to sample all four seasons. The data was to be used to site possible containment island locations in areas of low use (Cerrato et al., 1989), and is therefore a good basis for describing the benthos of the Lower Bay Complex. In Figure 12 and 13 the seasonal changes in abundance and diversity over the whole study area is depicted, while Figure 14 and 15 represents the same comparisons for the more intensely studied special area within the East Bank (area C of Figure 12 & 13).

b. McGrath (1974) and Walford (1971) characterized the benthic fauna as being impoverished. This appeared to be consistent with comparisons to other east coast estuarine systems, whose abundances and diversities are generally higher (NYD, 1984). Further, Berg and Levinton (1985) suggest that a comparison of McGrath's 1973 survey data (which they summarized in Figure 43) to an earlier 1958 - 1960 survey of Dean (1975, which they summarize in Figure 44) suggests a substantial decline in the abundance and quality of the benthos had occurred between the two studies. Caution however, must be used in deriving such a conclusion, as Dean's survey was over a smaller area, with few stations outside Raritan Bay (Figure 45 and 42). c. McGrath divided the Lower Bay into a sand community (dominated by the bivalve Tellina agilis and the polychaete worms Streblospio benedicti and Nephtys bucera), and a mud community (dominated by Mulina lateralis). The sand community was mostly within the central portion of the system, with the eastern end of Raritan Bay and Sandy Hook Bay being more typical of the mud community; mixing of the two systems was most prevalent in the lower part of Lower NY Bay and the western part of Raritan Bay (where the mud and sand habitats border each other). Pearce et al. (1981) developed diversity indices from McGrath's data (Figure 25) and Berg and Levinton (1985) plotted out his abundance and diversity data (Figure 43). Both these efforts tend to correlate well with McGrath's description of the benthos. Densities and diversity is greatest in the central part of the complex (between Chapel Hill and Raritan channels, and including Old Orchard Shoal and the West Bank), declining as one moves west into Raritan Bay or south into Sandy Hook Bay. Similar patterns can be seen from Brinkhuis'(1980) diagramatic compilation of studies by Steimle and Stone (1973), Dean (1975), and Brinkhuis (1980) (see Figure 24), though none of those studies (Figure 46, 47, 45) were as extensive, nor as uniform in coverage, as that of McGrath (1974 - see Figure 42).

d. Neither McGrath nor Dean sampled the East Bank. Steimle and Stone (1973) did have one station (A1) of their western most transect located on the East Bank (Figure 46). The results of their year-long survey yielded an average abundance of 15,200 organisms/m2 and a diversity of 19 species/grab (Table 22). However, the late spring -summer samples had remarkable high numbers of blue mussels (Mytilus edulis), with a very sharp drop in the fall (from over 92,000/m2 to below 16/m2 in October - see Table 22). This is probably indicative of a high recruitment level but low survivorship. The MSRC survey shows a similar pattern (Cerrato et al., 1989). Without the mussels, the average abundance drops to 232/m2. Woodward-Clyde Inc (1977) had eight fixed stations along the East Bank (Figure 48), that were sampled before dredging (June, 1975), during (September, 1975), and after dredging (October 1976). The pre-dredging survey (which most closely approximates conditions present during the earlier Steimle and Stone sampling) resulted in average abundances of 13,130/m2, and diversities of 18.9 species (Table 23). This too was heavily influenced by mussels, especially at those stations (5 and 6 in Figure 48) close to Steimle and Stone's A1 station (Figure 46). By excluding the mussels (which accounted for over 90% of the total catch from all eight stations) the average abundance dropped to 1640/m2. This is still nearly an order of magnitude higher than the earlier study, though they surveyed a greater part of the East Bank than the one station of Steimle and Stone. The during and post-dredging surveys (which yielded few mussels; most likely because of the fall die-off and not dredging impacts) produced similar abundances and diversities to their June survey (Woodward-Clyde Inc, 1977).

e. Only the recent MSRC survey (Cerrato et al., 1989) sampled the East Bank along with the rest of the Lower Bay Complex. They concluded that the remaining unmined East Bank shoals had the lowest overall benthic use of the study area (Figure 26 and 27). Parts of the shoals that had been mined in the past (area "C" in Figure 11) did have greater abundances and diversity (Figure 14 and 15), generally approaching (and sometimes exceeding) the East Bank levels reported (Table 19) by Woodward-Clyde's (1977) pre-dredging survey (especially their stations (1-4, see Figure 48) that were in the same general area as the area C of the MSRC survey (see Figure 11). The MSRC stations along the furthest portion of the East Bank (98 and 99 in Figure 11) reported consistently higher abundances and diversities than the other East Bank stations (Table 9 and 10, Figure 12 and 13), as well as exceeding the levels reported by Steimle and Stone (Table 22) for their one station (A1 in Figure 46) in close proximity to the two MSRC stations.

f. Seasonal trends were evident from the MSRC data (Table 9 and 10), with spring/summer being the heaviest period of recruitment, followed by large die-offs of many species in fall (especially mussels). Based on a comparisons of abundance (Figure 49) and diversity (Figure 50) schematics from the MSRC study (Cerrato et al., 1989), to those developed by Brinkhuis (1980 - see Figure 24) and Berg and Levinton (1985 - see Figure 44 and 43), it would appear that the benthos of the study area has improved markedly since McGrath's (1974) and Walford's (1971) description of the resource as impoverished. The average abundances reported by Cerrato et al. (1989) were an order of magnitude greater (ranging from 7264 - 5502 individuals/sq m) and their diversity more than double (ranging from an average 13.9 - 16 species/grab) the latest estimated values of McGrath's data (660 individuals/sq m and an average of 6.0 species/grab, respectively), as revised by Steimle and Cerracilla-Ward (1989), and as reported by Cerrato et al. (1989). Steimle and Cerracilla-Ward's recent reexamination of McGrath's data for the Sandy Hook lab of NMFS questions the accuracy of previous interpretations of McGrath's data and its value in being used as a true representative of the benthic community; the quality of the benthos may never have been as poor as McGrath's preliminary (and only) analysis lead him (and others) to believe. In any event, the population levels reported by Cerrato et al.(1989) are more consistent with those representative of other east coast estuaries in the immediate region (NYD, 1984).

g. Beyond the Bight Apex, benthic populations show an increasing trend in abundance and diversity. Communities along the East Bank (at the Apex boundary) have been characterized as being more typical of sand communities in general (Woodward-Clyde Inc, 1975); The dominants (bivalves and polychaete worms) being similar to those of McGrath's sand community. A notable exception would be the relative absence of <u>S. benedicti</u>, which is characteristic of a stressed environment. The Steimle and Stone (1973) study showed a great deal of similarity throughout its stations along the entire length of the south shore (communities tended to change as they moved further offshore, and not as they moved from east to west). This would indicate that the East Bank is part of a stable community, at least as it adjoins the Bight Apex.

h. Pockets of lowest diversity/richness in figure 24 correspond to existing borrow pit or sand mining locations. Cerrato and Scheier (1983) have reviewed the literature on benthic communities in borrow pits and canals along the east coast. Most such studies have found the populations within these habitats to be both less abundant and less diverse, even when there were no noticeable degradations of water quality inside them (lower oxygen, slower currents, and greater sedimentation). For those few cases where this was not true, the pit's benthic communities were similar to the surrounding area, never more productive or diverse than adjacent shoals. Such general community degradation also seems to be the case for the pits in the Lower Bay Complex. Pits fell within the stressed mud community of McGrath (1974), and his samples in the CAC pit (4) found its benthic fauna consistently low in density and diversity (nearly one-quarter of all samples had 2 or less organisms). Woodward-Clyde Inc (1975) sampled the large East Bank pit (6) and found both fewer individuals and species than were found at stations outside the dredged areas, though that survey was conducted soon after dredging. Swartz and Brinkhuis (1978) sampled three pits along the West Bank (2,3,4) and the large East Bank borrow pit (6) well after dredging (Figure 47). They report (Table 7,8) a discernibly "better" benthic population on and within pits of the East Bank (where there was less frequency of hypoxia, and much less sediments accumulate than in the West Bank pits). This can also be seen from the comparative survey of Cerrato and Scheier (1983), taken during the period of greatest stress. That study, and the results of their more recent 1986-87 survey (Cerrato et al., 1989), confirm lower numbers and species in pits 2,4 and 6, compared to the surrounding shoal stations (Figure 9 and 10).

i. No clear difference between the pits and their respective control stations on either Bank were observed by Swartz and Brinkhuis (1978). However, Brinkhuis postulates that the close proximity of their control sites to the pits may have resulted in adverse effects on the water quality/sediments in those control areas adjoining the pits, thereby diminishing the benthic communities in those shallows adjacent to pits (Brinkhuis, 1980). When Cerrato and Scheier (1983) looked at control stations some distance from the pits they were able to easily discern differences between the two communities, though there were far less obvious differences between the same pits and shoal stations that closely adjoined the pit. Communities in these closer shoal stations were more often transitional in nature, with characteristics of pit benthos as well as shoal benthos outside the area of a pit's influence.

j. The communities in the pits themselves were less stable and more opportunistic than would be found at an undisturbed shoal station. These pioneering pit species would often undergo a population explosion during their heavy recruitment seasons (usually spring), especially if there had been a recent disturbance to the benthos inside a pit. This increase would be followed by a rapid and precipitous fall in numbers if the disturbance continued, or if physical conditions within the pit remained stressed (low DO and/or circulation, increased sedimentation). Under such adverse conditions the pit community would undergo cyclic and sharp population fluctuations as recruitment attracted organisms to the relatively unpopulated pit, only to have most killed off by the adverse physical conditions within the pits. This cycle, and its corresponding results, is very evident when comparing the small poorly circulated West Bank pits (2 (station 37) and 4 (station 10)) to the more likely turned over waters of the larger pits (3 (station 38) and 6 (area C) depicted in Figure 12, 13, 14, and 15. The small, generally deeper pits are more likely to have poor circulation and water exchange. This would tend to reduce DO levels and also may lead to increased sedimentation (which could increase organic load and deplete DO even further). It was these pits that had unstable benthic communities, much lower in abundances and diversity during periods of non-recruitment. Such habitats would tend also to be poor (or at least unreliable) food resources for higher level consumers (such as fish). The larger pits, where circulation would likely be better, have developed more stable benthic communities since the original disturbances ended. Though better than the smaller pit habitats, these areas still tend to be under some stress, and generally have less abundant/diverse populations than the surrounding shallows.

k. Cerrato and Scheier (1983) characterize the benthic populations of the two smaller West Bank pits (2 and 4), which had large but unstable populations of S. benedicti, as stressed (compared to control sites) and further concluded that the adjacent shoal area, with its mixed fauna, is a transition zone between the pit and the uninfluenced Bay bottom communities. Based on a ranking of populations (in which evenness of population is a measure of its stability) the most disturbed fauna occurred in the smallest West Bank Pit (2) followed by the CAC pit (4). The least disturbed were the control sites along the West Bank and Old Orchard Shoal; the areas of mixed fauna (transition) lay between the shoal and pit habitats in terms of stability. The negative influence of pits on their benthic fauna can be seen in Figure 24, where points A, B, C, and D (corresponding to pits 2,3,4,6/7) are areas of lower richness (under 5 species), in contrast to their surrounding, richer areas (15-25 species). In addition, area J, adjacent to the East Bank sand mining area, is also lower in diversity than the rest of the East Bank, and probably corresponds to Cerrato and Scheier's (1983) transition zone, as well as the impacted area of proximity discussed by Brinkhuis, 1980). A pre-dredging study along the West Bank (Dean, 1975) reports 29 species collected in grabs at stations that correspond to pits 2 and 3, where Brinkhuis (1980) reported 3 or less species in a .24 sq. m sample area, after dredging. In each of the studies above, little difference could be discerned among the fauna within pits. However, Cerrato and Scheier (1983) reported a considerable difference between pit fauna and that of the surrounding Bay bottom (far enough from the pit to be free of its influences). This was also true of the findings from Cerrato and Bokuniewicz's (1986) preliminary survey, and continues to hold true, with minor modifications, when the most recent MSRC survey data (Cerrato, et al., 1989) are examined. It is evidently only when the pit conditions are sufficiently degraded long-term (such as likely occur in pits 2 and 4) that stable (though perhaps less abundant and/or diverse) populations do not permanently repopulate a dredged pit. A pit's configuration and depth are thus important to the habitats ability to sufficiently recover from a stress (such as dredging) to reform a viable community. Large, shallow pits offer a better opportunity to both repopulate rapidly (from the surrounding area -see Cerrato and Scheier, 1983), and maintain a suitable enough physical environment to allow the repopulated species to develop with some degree of normalcy.

1. During a year-long survey of the Lower Bay Complex by SUNY (Woodhead and McCafferty 1986) data on the commercially important lobster and blueclaw populations was collected as an ancillary to a fish sampling program. Annual catches for each species is depicted in Figure 16 and 17 respectively. From each of the figures it becomes evident that, unlike the benthic populations, these two epibenthic species are more common in the deeper water areas, including borrow pits (see figure 51 for station locations). Results from the borrow pit stations show noticeably higher catches than from shoal stations immediately adjacent. This is especially true for the East Bank. West Bank shoal catches, especially those stations towards its southern end (near Raritan Channel) are not markedly less, and for lobsters even exceed the two borrow pits in that general area. In any event, both organisms are even more prevalent in the Raritan and Chapel Hill channels; with catches of blueclaw crabs of up to three or more times greater than similar trawls within borrow pits, and up to ten times or more for lobsters. Interestingly, Ambrose channel contains markedly less individuals than the other two more southerly channels, with lobster catches more in the order of magnitude found in the borrow pits, and even less than the total blueclaw catches from the same pits.

3.4.2 Fish

a. Up until the recent extensive survey of the Lower Bay Complex (Woodhead and McCafferty 1986) the only comprehensive year-round sampling data for the area came from a 20-year old study by NMFS (Wilk et al., 1977). Other more limited efforts were centered on Sandy Hook Bay (Wilk and Silverman, 1976) and specific areas of Lower N.Y. Bay, especially Romer and Old Orchard Shoals and East and West Banks (Gandarillas and Brinkhuis, 1981; Pacheco, 1983; Conover, et al., 1985). This latter group specifically sampled populations in one or more borrow pits, as well as adjacent and/or control sites in undisturbed areas. The two complex-wide surveys (Wilk et al., 1977; Woodhead and McCafferty, 1986) also provide some data on pits as well.

b. Brinkhuis (1980) has reworked the tabulated data of Wilk et al. (1977) so as to be able to present the monthly occurrences of species by area (Lower N.Y. Bay, Raritan and Sandy Hook Bays). Sampling stations are depicted in Figure 52. All three areas showed similar patterns of seasonal abundance; from a fall high the numbers of species and individuals declined through the winter to a low in February/April. Spring witnesses an increase to a second peak high (less pronounced than the fall), followed by summer declines that were rather abruptly reversed by the fall peak. Sandy Hook Bay stations were generally as productive as the Lower Bay (Brinkhuis, 1980), but this area did see a summer increase in numbers of species and individuals that coincided with reductions in Raritan and Lower Bays. Such a reversal has been attributed to a concentration of contaminants in the northern and western portions of the bay complex due to low water conditions in the Raritan and Hudson. The Sandy Hook Bay area, which is more strongly influenced by the cleaner Navesink and Shrewsbury rivers, might provide a summer haven from the more polluted portions of the system (Berg and Levinton, 1985). It is also true that Sandy Hook Bay is closer to the ocean and contains (at least along its northeast quadrant) sandier sediments than the more muddy Raritan Bay bottom, and so would be expected to contain somewhat different populations anyway. Raritan Bay, the most contaminated part of the system (probably due to its relatively poor circulation and deposition of fine-grained material) generally yielded the fewest numbers of individuals, as well as species, though seasonal trends were similar to those in Lower NY Bay. Brinkhuis (1980), Berg & Levinton (1985), and Woodhead and McCafferty (1986) all believe that the seasonal variations are most likely the result of migratory species. The fall peak would be a combination of outward migration into the Bight (summer residents and spawning/juvenile anadramous fish), as well as north-south offshore migrants briefly moving through the system. The departure of anadramous fish, along with some winter dormancy of resident species, produces the winter lows. This begins to reverse with the return of anadramous fish moving into the estuary to spawn in spring. Figure 53 is a summary of the findings of Wilk et al. (1977), reported as mean annual fish distribution in the Lower Bay Complex (Berg and Levinton, 1985). Highest catch densities are in the central region, with numerical lows adjacent to Ambrose and Chapel Hill Channels, as well as Raritan Bay. Fifteen species of fish accounted for 96% of the total density (Table 24) and the Bay Anchovy made up 60% of that total catch.

c. Berg and Leviton (1985) compared the Lower Bay Complex (as sampled by Wilk et al., 1977) to other typical mid-Atlantic estuaries. They concluded that densities and number of species were lower than in the nearby Great Bay -Mullica River estuary, (along the NJ coast, about 10 miles north of Atlantic City). This was hypothesized to be the result of the depauperate nature of the Lower Bay benthic communities (generally one-two orders of magnitude lower than other bay systems in the area - Cerrato, 1983). However, the more recent survey of Cerrato et al. (1989), together with the reanalysis of the old 1973 benthic survey of McGrath (Steimle and Cerracilla-Ward, 1989) bring this conclusion into doubt (see 3.4.1b above). The abundances of fish found by Woodhead and McCafferty also suggest estuarine productivity is greater than it was in the past (or at least not as low as was originally conceived). The NJ DEP conducted a study of recreational fishing in the Lower Bay Complex (Figley, 1988) and produced a series of schematics (Figure 54) that tend to show the primary fishing centers are concentrated in the eastern and southern portions of the complex.

d. Woodhead and McCafferty (1986) have conducted the most recent and quantitative fish sampling of the Lower Bay Complex. The study concentrates on the Lower NY Bay, but includes part of Sandy Hook and Raritan Bays, as well as the Bight Apex (Figure 51). Results essentially support the general description of the system given above. A strong seasonality is evident, with migratory fish having a major influence. Table 25 depicts the average abundance by season for all fish caught. Late fall is characterized by resident species, with winter and windowpane flounders, spotted and red hake, and Grubby sculpin dominating. Pelagic migrants are very prevalent in early fall, with river herrings (alewife, blueback herring, american shad, Atlantic menhaden) dominant. In the spring adult fluke and four-spot flounder join the other bottom-dwelling residents, with bluefish, black seabass, and weakfish increasing through late spring/summer. River herrings had decreased markedly by summer, while butterfish, scup, blackfish and striped searobin become more common. Adult striped bass were present in larger numbers in late fall, possibly returning from upstream spring spawning areas, where they remain feeding through the summer. Dominant species correlated well with those reported by Wilk et al. (1977-See Table 24), whose ten most abundant species were anchovy, butterfish, winter flounder, weakfish, river herring scup, red hake, silver hake, windowpane flounder and longhorn sculpin. These are also similar to fish caught by NMFS (1984 - see Table 13).

e. Yearly distribution and number of species, each by station, is shown in Figure 18 and 19 respectively. By comparing those to bottom depth (Figure 55), it becomes obvious that the deeper water habitats (channels and pits) have markedly greater abundances and diversity than the naturally shallower Bay bottom. A number of recent studies have attempted to specifically characterize the fish communities within the borrow pits, and compare them to those of the surrounding bays. Pacheco (1983) sampled two pits (3+4) and an undredged portion of the Bay shoals along the southern portion of the West Bank, just below the lower of the two sampled pits (4 - see Figure 56). After five seasons (fall '81 - fall '82) of sampling, he concluded that the populations in the two pits were similar (with 4 often having more individuals of a given species) but different from the shallow Bay bottom, which yield only about half the number of species and substantially less total catch than either pit (Table 12). About the only species that consistently occurred in greater numbers outside the pits was the scup; all others were either equal or more often greater in at least one of the pits (most often 4). Hydrographically, all 3 sampling stations were similar. Temperature extremes were often greater at the shallow station (undredged Bay bottom about 20 feet deep) and salinity was generally greater with depth (pit 4). None of the differences were great enough for Pacheco to postulate a physical/chemical reason for the apparent preference of most species for the pit habitat (or at least the greater catches of them there).

f. Conover et al. (1985) sampled pits 3 and 4 and an undisturbed Bay bottom site close to Pacheco's control station (Figure 56). They also found fish abundance at either borrow site to be greater than the control station along the shoal; this difference is especially marked during the late summer/fall season of greatest abundance, and is evident from both catches of individuals as well as seasonal trends (Figure 57). Catches between the two pits were similar, as was their ten most abundant species. Overall trends in occurrence and abundance observed by Pacheco (1983) and Conover et al. (1983) closely paralleled those trends reported from the Bay wide survey of Wilk et al. (Brinkhuis, 1980). Similar trends were also described by Gandarillas and Brinkhuis (1981), and Woodhead and

McCafferty (1986). Pit communities reflect the larger estuarine trends. Though pits contain more fish, they are not havens and/or self-contained communities distinct (in species composition or diversity) from the surrounding shoal communities. When migrants enter the system they are found in all habitats, though not in equal abundances. When fish leave the system they leave the channels and pits, as well as shoals.

g. NMFS (1984) expanded the study of Pacheco by adding five additional stations outside of borrow pits (Figure 58). Based on total catches (Table 13) each of the two pit sites yielded at least twice as many fish as any other station, except one inside Raritan channel and another within Gravesend Bay (possibly in pit 5). Twelve dominant species were found over all stations (Table 26), the eight most abundant of which were also the dominants within the pits (red hake, winter flounder, silver hake, weakfish, windowpane flounder, bay anchovy, alewife and butterfish). These same species were also dominant pit species in the studies by Conover et al. (1983), Pacheco (1983) and Woodhead and McCafferty (1986 - see Table 26). The remaining four species (grubby, scup, American shad and summer flounder) were found mostly outside the pits but only account for about 5% of total catch. None of the pit dominants were restricted to that habitat, but their numbers were generally greater there, except for bay anchovy, silver hake, winter flounder and weakfish, which occurred in greater overall numbers within Raritan channel (see station 5 in Table 13). Populations in undisturbed (generally shallower) areas (stations 1,4,6,7,8 in Table 134 consistently showed lower overall catches of the dominant species. Comparing the two pit stations, the dominants were similar in both, but were equally divided in terms of which pit had greater numbers. Popular recreational species, such as winter flounder and weakfish (along with the red and silver hakes), were found in greater overall numbers in the smaller but deeper CAC pit (4).

h. When the above three studies are compared (NYD, 1984), those stations along the shoals (West Bank, Old Orchard, Romer) are not found to differ significantly among themselves in terms of catch size, number of species and weight. The remaining group of stations (all dredged except for the one in Sandy Hook Bay) similarly did not differ among each other. However, when individual stations of the two groups (dredged and undredged) were compared to each other, they almost always differed significantly. Though no consistent differences in temperature, DO or salinity separated the two groups, the first (undredged shoals) were all sandy, shallow (undisturbed) areas and the latter five (pits or channels) were all deep (23-52 feet) and muddy. Pits and channels represent bathymetric breaks in the otherwise uniform Bay bottom, and as such may attract fish because they provide a variety of habitat types, not because of differences in the measured chemical parameters or sediments.

i. In an attempt to determine what (in lieu of physical/chemical parameters) might serve to distinguish the pit environment from the Bay bottom, feeding habits of the bottom-dwelling winter flounder were studied (Conover et al., 1985). Benthic populations and feeding patterns were similar between the two pits

(Conover et al., 1985). The data do suggest a difference in diet between fish in the two pits and those in the adjacent shoal station. However, except for _Asabellides oculata_, none of the dominant benthic species in the pits were a major component of the flounder's diet, suggesting food was not a major attractant. Even the one exception (_A. oculata_) showed great inconsistencies; winter flounder catches were low when _A. oculata_ density was high in July, and conversely, these fish reached peak levels at pit 4 when no _A. oculata_ were collected. Though this last seeming contradiction could be due to absence and then presence of predators impacting the abundance of worms, it has also been shown that the mean size of individuals (of all fish species caught) did not vary significantly among the three stations. While the flounder obviously feeds on a pit's benthic resources, those organisms do not appear to exert a controlling influence on the fish community (Conover et al., 1985), and there is thus no apparent preference or growth advantage to feeding in a pit habitat.

j. FWS (1987) has pointed out that though the pits do not likely serve a major feeding role, the pits could offer shelter from predators, or a haven for conserving energy that might otherwise be expended in habitats with higher overall currents. NMFS (1987), on the other hand, suggests that the attraction of fish to pits might not always be advantageous; anoxic summer conditions could lead to massive fish kills, while warmer waters might cause migrants to linger in pits longer than normal, thereby subjecting them to potentially adverse affects of sudden and prolonged cold shock. Further, the affinity of the pits to attract the fine-grained sediments most associated with contaminants could be producing an environment that is potentially harmful to both fish and humans who consume them.

3.4.3 Plankton Resources

a. Phytoplankton resources have been fairly well studied throughout the Lower Bay Complex, and those results summarized by Brinkhuis (1980). Diversity generally increases towards the Apex, as contaminant levels are reduced with distance from their main sources (Raritan and Hudson Rivers). Distribution is strongly correlated with circulation patterns, as would be expected with organisms whose lack of mobility leaves them at the mercy of basic water movements. Productivity is very high throughout the system, with Lower Bay averages (817 g C/square meter/yr -O'Reilly et al., 1976) among the highest estuarine values reported (as opposed to relatively low fish and benthic populations in the Lower Bay Complex). The productivity is light-limited (Yentsch, 1982) indicating the amount of nutrients (especially nitrogen) are present in greater levels than can be utilized, probably as a result of high sewage inputs. Only in Sandy Hook Bay, where contaminant loadings are likely lowest, did productivity appear more moderate (Kawamura, 1966). Within a given area, production began to increase in spring and peaked during summer, becoming sparse by late fall or early winter. Diatoms dominated cold-water periods, while dinoflagellates and _Mannocloris atomis_ were dominant during summer months.

b. Zooplankton studies are less extensive than phytoplankton. Those summarized by Brinkhuis (1980) indicate that the Lower Bay Complex community is similar to other protected east coast estuaries. Two copepod species dominate: Acartia clausii is common in the winter but replaced by A. tonsa during summer. Species of other copepod genera (Eurytemora americana and E. hirundides) increase during the winter-spring transition of the two Acartia species. Many invertebrate larvae are common constituents of the zooplankton during spring and summer, occasionally even appearing as the dominant component of samples; fish larvae are also more prevalent during these times.

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3.5 Cultural Resources

3.5.1 Cultural Resources Within Existing Pits

The existing borrow pits within Lower New York Bay represent a disturbed environment from a cultural resources point of view. Any cultural resource that may have existed in these pits has been significantly disturbed, if not completely destroyed, by sand mining activities. No intact cultural resources eligible for listing on the National Register of Historic Places (NRHP) are known or expected to remain in any of the existing borrow pits. Therefore, utilizing an existing borrow pit for the disposal of dredged material would have no effect on any NRHP eligible properties.

3.5.2. Cultural Resources in Lower New York Bay as a Whole

No cultural resources eligible for or listed on the NRHP are currently known to exist at any of the proposed new borrow areas. However, prior to the initiation of this EIS process there had been no systematic survey of those areas to identify cultural properties. Intact cultural resources, such as shipwrecks or archaeological sites, could be preserved in those areas of Lower New York Bay under consideration for new pits. If intact historic properties eligible for listing on the NRHP were identified within a new borrow area, those properties could be adversely effected by project actions. In order to evaluate the potential for impacts, it was necessary to first determine the potential presence of cultural resources. The following discussion details the procedures used to make that determination for prehistoric and historic resources. A discussion of impacts and measures which would avoid cultural resource impacts is presented in Section 4.5 below.

3.5.2.1. Prehistoric Resources

a. The first entry of peoples into the Greater New York Harbor region is believed to have been circa 12,000 years before the present era. This coincides with the retreat of the last glacial advance, and the beginning of the transgression of sea water across the continental shelf and into what is now the Lower New York Bay area. The precise timing of the retreat of the glacial ice and the rise in sea level is not known. Present evidence suggests that 12,000 years ago the modern-day Lower New York Bay may have been a relatively dry coastal plain, dissected by the ancestral Hudson and Raritan rivers, and perhaps meltwater streams as well.

b. Available data did not provide any direct evidence of prehistoric utilization of the Lower New York Bay floor (NYD, 1986b). However, current modeling of the timing of glacial retreat and marine transgression into Lower New York Bay suggested that there may have been several thousand years when portions of the Bay floor were available for human utilization. Due to insufficient information about the post-glacial time period on the Atlantic Coast and about glacial outwash plains it is not possible to rule out the possibility that humans utilized the Bay floor during part or all of the time prior to its inundation. Furthermore, it is not clear whether the dynamics of the marine transgression into Lower New York Bay would have permitted any prehistoric sites to survive inundation intact. It remains a distinct possibility that the lack of evidence of prehistoric utilization of Lower New York Bay is in large measure a function of the sparse data available.

c. The Corps assessment of glacial and post-glacial history of New York Harbor and the present-day sediments in the Lower New York Bay bottom suggested that portions of Lower New York Bay have the potential to contain a post-Pleistocene land surface that may have evidence of prehistoric human utilization (NYD, 1986b). The assessment found that areas having this potential are those containing the West Raritan Bay Muds or the Sandy Hook Bay Muds in the Lower Bay and the East Bank areas (Figure 39). It is very probable that any prehistoric resources identified in Lower New York Bay would be found to be eligible for listing in the NRHP under Criterion D of 36 CFR Part 60, due to their contribution in the study of the life and culture of indigenous peoples before the advent of written records. The documentation of the presence or absence of such sites would be important to the interpretation of prehistoric regional settlement patterns, demography, and ecology. Therefore, creation of a new borrow pit in the Lower Bay or East Bank areas could potentially impact NRHP eligible prehistoric cultural resources. The Corps assessment recommended several measures to determine whether post-Pleistocene land surfaces were preserved in either area. Remote sensing techniques, specifically side scan sonar and subbottom profiling, were suggested as a means of identifying buried and submerged landforms such as old river valleys which might have been attractive to prehistoric cultures. The data obtained from the subbottom profiling survey might also indicate whether any such landforms were associated with preserved geologic strata containing land surfaces which had been available for human occupation. In this case, profiles would show discontinuous stratigraphy, with terrestrial materials above glacial deposits. Alternatively, the remote sensing data could demonstrate that all stratigraphic evidence for prehistoric occupation of Lower New York Bay was destroyed by the erosional processes accompanying marine transgression. In the later case, subbottom profiles would indicate continuous columns of maritime deposits above glacial materials.

d. In the winter of 1987 to 1988, a remote sensing survey of the East Bank and Lower Bay borrow areas was conducted for the Corps by Ocean Surveys, Inc. (OSI) in 1988. The survey included subbottom profiling, among other remote sensing techniques as discussed below, in order to investigate the potential for prehistoric landforms or other cultural resources located below the sea floor. For the subbottom profiling survey, lines were spaced at 328 feet to provide 100% coverage of both borrow areas. Positioning control was obtained by using the Racal "Micro-Fix" system consisting of a Microwave Transponder and three shore stations linked to the Control Measurement Unit on the survey vessel. Raw and processed data were recorded on a microcomputer hard disk and processed into post-plot charts. Subbottom data were obtained using a EG&G Uniboom seismic source whose signals were amplified, filtered, and finally recorded on a Gift Model 4000T recorder. Timing divisions were set at 12.5 milliseconds and vessel velocity was approximately 4800 feet per second. As part of stratigraphic analysis, the subbottom records were compared with core data presented in Bokuniewicz and Fray (1979). This aided in the confirmation of geologic interpretation suggested by the remote sensing data (OSI, 1989).

e. In the East Bank Area, subbottom profiling and side scan data did not identify any submerged geomorphic features (OSI, 1989). These data indicate that the stratigraphy in this part of the Lower Bay is relatively flat. Soils were found to consist of coarse to fine sand and gravel, and no preserved, non-sedimentary strata were present. No post-pleistocene landforms, such as river channels, were identified. The OSI (1989) study concluded that no prehistoric sites, were preserved in the East Bank Area.

f. In the Lower Bay area, subbottom profiling data partially conformed to the expectations of the Corps assessment (NYD, 1986b). Stratigraphic analysis of the remote sensing data for most of the survey area indicated relatively uniform layering of coarse to fine sand and gravel, as in the East Bank Area. However, geologic features, interpreted as post-glacial river and stream channels, were identified in the southern third of the survey area. The largest of these, running east-west across the full width of the survey area, was estimated to be approximately 250 to 400 feet wide. The age of the channels cannot be determined with available data, however, they probably date to the post-glacial era (OSI, 1989, p.25). In their final report, OSI indicated that it was likely that this portion of the survey area was selected for habitation by prehistoric peoples. It is also likely that erosional processes associated with marine transgression during the inundation of Lower New York Bay could have destroyed most of the archaeological record of that occupation (OSI, 1989,p.28). It is not possible on the basis of the remote sensing data alone to determine whether any evidence of prehistoric occupation remains. However, of all the areas surveyed for this EIS, the southern portion of the Lower Bay Area is the most likely candidate for the preservation of those data.

g. In the event that potential prehistoric land surfaces were identified, additional information about their age and ecology could be obtained through sedimentary coring as part of the site-specific data collected after final site selection is made (providing a new pit in the Lower Bay is selected for implementation). Cores could be taken and analyzed for sediments pertaining to exposed land surfaces. Should a soil horizon containing organic material, such as peat, be discovered in the column, it could be radiocarbon dated to establish its age and the relative age of other strata in the column. These data would be very useful for addressing questions of post-Pleistocene environments in Lower New York Bay as a whole, as well as establishing the potential for prehistoric utilization. As traditional archaeological data recovery is not feasible in these conditions, the Corps assessment proposed a coring program, and subsequent analysis of the recovered columns, as mitigative measures to compensate for any adverse effects to prehistoric resources. If warranted and if no alternative data retrieval methods are identified, the coring program would be presented to State Historic Preservation Officers (SHPO) of New York and New Jersey as part of the Section 106 consultation process (Section 6). If adopted as a mitigative measure, a coring program would obviate the need for additional work or the avoidance of those areas in the siting of a borrow pit. Information regarding the presence or absence of prehistoric sites would have been obtained, and data relevant to their age and environmental setting would have been preserved. It is possible that core data could be obtained prior to actual construction, by examining the contractor's survey borings.

3.5.2.2. Historic Resources

a. Historic resources potentially present in Lower New York Bay would be shipwrecks and other isolated artifact either lost or dumped at sea. The potential for shipwrecks is substantial (NYD, 1986b). There has been commercial shipping in New York Harbor since the early 1600s. The volume of shipping from that time to the present has remained high. By the last half of the nineteenth century, New York was handling two-thirds of the nation's foreign commerce, and was the third largest port in the world. Lower New York Bay would have received a substantial number of the shipwrecks occurring in the Greater New York Harbor area. Lower New York Bay sits in a relatively unprotected position, and can experience the full force of gales. Moreover, the shoals and wrecks in the vicinity of Sandy Hook were treacherous to ships wandering from the major sea lanes. Presently available information indicates that at least 120 shipwrecks are recorded in Lower New York Bay (NYD, 1986b). This probably considerably underestimates the actual number of shipwrecks that occurred.

b. As discussed above in Section 3.5.2.1.e, a remote sensing survey of the East Bank and Lower Bay borrow areas was conducted for the Corps in the winter of 1987 to 1988 (OSI, 1989). In addition to subbottom profiling, the survey included magnetometer and side scan sonar techniques. The data generated from the survey were used to evaluate the potential for historic resources on or below the Bay floor. The survey was primarily aimed at identifying shipwrecks and the magnetometer survey lines were spaced 65 feet apart which enabled targets having an equivalent ferrous mass of 200 to 300 pounds to be identified. The magnetometer investigation was conducted using an EG&G Model G-866M marine proton precession magnetometer. Magnetometer anomalies were point plotted and integrated into contour maps. Side-scan sonar and subbottom profiling was conducted simultaneously and lines were spaced at 328 feet. A Klein Model 400 dual-channel side scan sonar system set at 100 kHz. with a sweep width of 75 meters was used to obtain 100% coverage of the survey areas. Side scan sonar targets were point plotted and correlated with magnetometer anomalies (OSI, 1989). Positioning control and subbottom profiling techniques are discussed above in Section 3.5.2.1.e.

c. In the East Bank area (Figure 32) 24 side scan targets and 86 magnetometer anomalies were identified. Of these, the OSI (1989) study classified 84 anomalies and 20 targets as being possible or probable cultural resources (PCR). Combined analysis of magnetometer, side scan, and subbottom profiling data led to the identification of twelve potential shipwreck sites. The northern half of the East Bank area contained a greater number of targets than did the southern half (OSI, 1989). If effected by project actions, additional analysis would be needed to determine if any of these resources are eligible for listing on the NRHP (Section 4.5.1.2).

d. In the Lower Bay area (Figure 32) 33 side scan targets and 61 magnetometer anomalies were identified. Of these, the OSI (1988) study classified 58 anomalies and 30 targets as being PCRs. The interpretation of all remote sensing data indicates that fifteen possible shipwreck sites exist in the Lower Bay area. The PCRs were distributed fairly evenly across the survey area. If effected by project actions, additional analysis would be needed to determine if any of these resources are eligible for listing on the NRHP (Section 4.5.1.2).

3.6 Socioeconomic Resources

a. Industrial use of this area has been restricted to sand mining of deposits along both east and west banks. No permits for such activity have been issued since at least 1973 (NYD, 1983), except for a recent operation in conjunction with maintenance dredging of Ambrose Channel. NY State Office of General Services (OGS) is currently preparing an EIS on sand mining in NY waters of the Lower Bay, with the intention of identifying areas where such activity would be permitted in the future. The East Bank (which has been subjected to previous mining) is currently under active consideration (OGS, 1985) and would include existing pits 6 and 7 (Figure 20). Maritime traffic is restricted to the authorized channels (Figure 8), with the exception of occasional tugs with barges in tow that may cross the shoals. Commercial fishing is relatively restricted within the Lower Bay Complex. The entire area is within the shellfish closure zone; harvesting of hard clams is prohibited because of polluted water conditions (since 1961); DEC has recently proposed relocating clams from its closed waters to cleaner areas where contaminants would be depurated, and clams would then be harvestable. Distribution of hard clams is confined mostly to the south shore of Staten Island, in the western portion of Raritan Bay (Figure 30). Their numbers have been reported to have declined substantially (Berg and Levinton, 1985), but not as markedly as the oyster, which was a major commercial species in the nineteenth century and is all but gone from the estuary now. Blue claw crabs are still harvested by commercial dredge (Figure 54). Lobster pots are also commonly set, especially in the deeper areas around the Narrows and in the vicinity of Lower NY Bay (including within pits). The bulk of the commercial finfish harvesting occurs outside the Lower Bay Complex, in the coastal and offshore waters of the NY Bight.

b. NJ DEP surveyed recreational fishing in the Lower Bay/Bight Apex area (Figley, 1988) and prepared a series of maps designating the primary and secondary fishing regions for nine of the more popular species (Figure 54). Recreational fishing by both small private vessels and charter/party boats occurs throughout the Lower Bay Complex but the primary fishing areas are in eastern end of the Bay complex, and into the Bight apex (including coastal waters off both shores of Sandy Hook, Romer Shoal, East Bank and waters adjacent to Chapel Hill and Ambrose channels, See Figure 8). Several of the larger borrow pits (3,4,6) are reported to be active locations for fishing. Shore-based fishing is common along the many beaches, piers, jetties, and other structures that are located throughout the system. Other recreational activities include extensive power boating (and some sail) and bathing (mostly along the NJ and southern NY coasts -Staten Island beaches are all officially closed to bathing because of poor water quality). Part of the reason for the area's popularity (beyond the large population base) is its aesthetically pleasing nature. The large, relatively uncluttered expanse of water and miles of generally undeveloped beaches and shorefront (including the extensive and wide-spread holdings of Gateway National Park) mix well with the commercial marine activity that are associated with the nation's largest port. The fact that the main port facilities and associated industrial development is centered far north of the Lower Bay/Bight system adds to its overall attractiveness.

c. Air quality in this study area is heavily influenced by the extremely urbanized metropolitan NY area. Undoubtedly, the heavily commercial and recreational vessel traffic provide some direct source of emissions, but this is likely small in comparison to that produced by land-based emissions from numerous power plants, industries and numerous autos, trucks and buses. Fortunately for the area's air

quality, prevailing southerly winds during the summer would tend to carry (or keep) much of this adverse material away from the area. Prevailing northwest winds tend to accumulate these contaminants, but generally occur during the cooler part of the year when they create less of a problem. No monitoring of air over the Bay or Bight is conducted.
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4.0 Environmental Impacts

4.1 Feasible Alternatives

a. Section 2.0 outlined the process by which feasible disposal alternatives for the disposal of large volumes of contaminated sediments were limited to four options: Ocean disposal with capping (existing practice), subaqueous borrow pits, containment facilities, upland disposal. All other alternatives identified by the Mitre Corp (1979) and discussed in the generic EIS (NYD, 1983) were determined to be either infeasible or incapable of handling the long-term volume of dredged material classified as unsuitable for ocean disposal (See Section 2.1f). In this section the impacts of using each of the four feasible alternatives will be discussed in detail; a summary and comparison of impacts among the four alternatives can be found in section 2.2. Since sub-aqueous borrow pits were determined to be environmentally preferable (reaffirming the 1983 generic EIS conclusion - See Section 2.2.6), impacts arising from two different methods of implementing this alternative (use of existing or new pits) will also be discussed in detail. In general, the impacts considered will be both those related to a given disposal operation (short-term) as well as those arising from continued long-term use of the site. Any impacts arising from construction needed to make a given alternative operable (construct a new pit or modify an existing one-as an example) will also be discussed; as such construction impacts end prior to the actual use of a site, they will all be short-term.

b. In order to facilitate discussions related to disposal impacts derived from the dredged material itself, a particular case will be used as an example of actual material that would be considered for disposal into a borrow pit. The material in question comes from the Federal Channel in Newtown Creek, a tributary to the East River in New York City (Figure 60). The sediment to be removed for maintenance of the authorized channel has not met the unrestricted ocean disposal criteria, and as such, exemplifies the type of material that this document is concerned with. The final EIS for the Newtown Creek Project identified subaqueous borrow pits as the preferred disposal alternative. The inability to utilize that option because of a lack of a detailed analysis (and necessary state approvals) led, in part, to the undertaking of this SEIS, in which such an option is fully examined and subjected to public scrutiny. In that this document is intended to analyze impacts of any potential candidate project, each section will have a general discussion of impacts followed by specific references to Newtown Creek (as appropriate) to serve as a practical example of actual dredged material that would be considered for disposal in sub-aqueous borrow pits. Testing results on sediment from Newtown Creek are discussed in section 2.1 and appendix A. In that other projects have been permitted to be disposed of in the ocean, with capping, even though their tests showed statistically significant bioaccumulation, these have also been included in appendix A, as an example of the least contaminated sediments that may be considered for disposal in a borrow pit. Sediments passing the criteria for "unrestricted" ocean disposal (disposed of at the Mud Dump without restrictions or special conditions) will not be assessed. Such dredged material does not present a significant threat of degradation to the waters of the Bight, as exemplified by the absence of restrictions such as capping. Consequently, this clean (category I) material is not being considered for placement in the more restrictive disposal conditions that borrow pits or the other three alternatives possess.

c. A brief description of the four feasible disposal alternatives follows (more detailed comparisons can be found in Section 2.2). Updated descriptions (including the most recent reports) can be found in the latest NYD disposal management summary (NYD, 1990). The remaining portions of this SEIS Section (4.2-4.6) will discuss impacts of the four alternatives on physical, biological, cultural, and other resources identified in section 3 of this document. In addition, secondary and cumulative impacts arising from the use of the alternatives will also be discussed (4.7). For a more detailed description of the alternatives, as well as a summary of impacts, the reader is again referred to the alternatives section of this SEIS (2.2).

4.1.1 Sub-Aqueous Borrow Pits

These are artificial holes (borrow pits) in the Bay floor that either exist because of past sand mining, or were proposed (based on screening results in section 2.3.2.3) for construction to meet future needs (Figure 32). The sand removed in creating such holes is used for construction purposes (and occasionally beach nourishment). It is proposed that the dredged material under consideration in this document be disposed into such a hole over a minimum ten year (preferably longer) period. When the borrow pit is nearing capacity the disposal would end, and a layer of clean sand (at least three feet in thickness) would be deposited on top of the dredged material, elevating the pit floor to that of the surrounding ambient bay bottom (from which it was originally created). Since disposal into the pit is likely to be intermittent over its life, intermediate (and thinner) caps of clean material may be used to isolate disposal material, especially those of some concern, that would otherwise be exposed to Bay waters and biota for prolonged periods of time. This alternative would ultimately both isolate the sediments of greatest concern from biotic accumulation, and return a formerly disturbed portion of Bay bottom to its previous state.

4.1.2 Shallow Open-Ocean Disposal with Capping

This is the current method of rapidly rendering harmless (in conjunction with the CWA requirements) most dredged material disposed at the Mud Dump that does not meet criteria for ocean disposal. Potentially toxic sediments (category III; see 2.1) are not currently eligible for this alternative, now used for category II. The procedure involves disposal at a pre-designated ocean site, followed by coverage with an equal or greater volume of clean sediment, within a minimum time frame (generally 2-4 weeks after disposal of dredged material). The procedure is intended to isolate sediments of greatest concern, but in doing so created a disposal mound at the currently used Mud Dump site (Figure 2), so that it now rises above the otherwise deeper Bight floor. In that the Mud Dump has been historically used for disposal of dredged material, its immediate area (including benthic community) has already been substantially altered. Depending on clarifications of provisions in the Water Resources Development Act of 1986, some or all of this material may no longer be considered suitable for disposal at the Mud Dump. Even if all category II material continues to be considered suitable for ocean disposal with appropriate safeguards (capping), the Mud Dump site could conceivably reach its maximum capacity (based on EPA limitations) before the end of the century. Procedures for locating a new site are now underway.

4.1.3. Containment Facilities

a. This alternative consists of diking off a portion of sea floor (in this case Lower New York Bay) and disposing the dredged material between the dikes. When placed adjacent to land, the structure is called a containment area and becomes an extension of that land; when placed in open water it is called a containment island. In either case the end result is creation of dry land, and the subsequent loss of an equal portion of bottom habitat. On the other hand, the dikes contain all (or most) of the suspended sediments (including material often lost during disposal), and isolate the contaminants from the aquatic environment. The feasibility and technical/environmental factors of the larger island sites were summarized by MSRC (Bokuniewicz and Cerrato 1984), while the Corps Waterways Experiment Station (WES, 1985) studied criteria for building/siting the smaller containment areas. The FWS (1982) looked into biological criteria for locating both types of facilities.

b. Based on criteria developed by the SC, and WES recommendations (WES, 1982) the NYD identified four potential locations for the smaller, land-connected containment areas (Figure 3). Two of these sites are still under consideration (Raritan and Newark Bays), having sufficient capacity to meet the minimum containment goals set for this SEIS (4 million cubic yard capacity -see 2.1g). Based on the Bokuniewicz and Cerrato (1984) summary, NYD determined that the building of a large containment island (1000 acres) would require an assessment of ecological value of lost habitat. The SC recommended that a smaller island (500 acres) be considered. If limited to contaminated sediments such an island could be used for 80 years or more (depending on the type of dikes employed). NYD subsequently funded MSRC to identify and evaluate potential sites for such a structure (which FWS already concluded should only be constructed in the Lower Bay Complex -FWS, 1982). Figure 6 identifies three locations that were initially identified. A more recent MSRC report (Cerrato et al., 1989) has concluded that the upper portion of the middle site (B), between Raritan and Chapel Hill channels, has the least biological usage of the three. In addition, the MSRC survey (Cerrato et al., 1989) also identified a second area along the East Bank, adjacent to the deepwater Ambrose channel, as having low overall biological use, and therefore a potential island site (Figure 6).

c. WES has recently concluded a preliminary planning report that identifies costs and technical components to be used in designing islands for the two sites (Stark, 1989). The variation in costs and capacity (Table 5) result mostly from the types of dikes used to create the site. The concrete, arc-cell dikes offer the greatest capacity (and therefore life-span) because they basically provide vertical walls and therefore utilize nearly the entire acreage of the site for disposal (unlike sand dikes which require stabilizing slopes and therefore use more acreage for the dikes and less for disposal). The concrete dikes are also less permeable to water loss and benthic invasion. On the other hand, these structures require substantially more materials and effort to build, and therefore carry a much greater cost.

4.1.4 Upland Sites

This alternative involves diking off an existing upland area and disposing the dredged material, via hydraulic pipeline and/or trucks, into the diked interior. This alternative avoids loss of aquatic habitat, but may require rehandling of dredged material and cause greater mobilization of contaminants that will necessitate costly control of effluent and drainage water. The contaminated sediments are isolated within the dikes, and minimal loss of resuspended sediment occurs (usually via effluent return to the adjacent body of water). A major hindrance towards utilization of this alternative has been the availability of suitable large portions of land capable of containing volumes of sediment consistent with long-term disposal goals (See Section 2.1f). Mitre Corp (1980) identified over 600 vacant parcels of land within the Greater New York Area. The NYD then subjected these to a series of siting criteria (developed in conjunction with members of the SC) and a Public Hearing. Thirteen sites survived the initial screening. Of these, two (Figure 4) are still being considered, though alternative uses for both have also been proposed, and atleast one had local opposition raised during the review of the draft of this SEIS. This shortage of sites has lead to consideration of using dredged material as cover for sanitary landfills, as a lower volume upland alternative (2.2.1.4).

4.2 Impacts to Physical Resources

4.2.1 Water Quality Impacts

a. A draft section 404(b)(1) evaluation under the Clean Water Act has been prepared to assess the potential impacts that disposal of dredged material into borrow pits might have on the waters of the United States (see Appendix B). Essentially, it concluded that this disposal option would not result in a significant degradation of the aquatic environment. This conclusion is based on a worst-case evaluation of category III material, and results from the determination that the immediate effects of dredged material disposal operation in open water are temporary and restricted to the vicinity of the disposal area. This finding is based on a series of laboratory tests (Burk and Engler, 1978) and has been repeatedly substantiated by field monitoring of a variety of disposal operations (Gordon, 1974; Sustar and Wakeman, 1977; Bokuniewicz et al. , 1978; Tavolaro, 1982 Truitt, 1986). WES (1986) has most recently reviewed past studies and concluded that loss of sediment into the water column does not exceed 5% of the total disposal volume, and is most often limited to 1-2%, especially when removed by mechanical means (clamshell/bucket dredges). Two factors lead to such a result: the fact that the vast majority of disposal material settles out of suspension within a few minutes, and within a few hundred yards of the disposal point, and the fact that no statistically significant elevation in contaminant levels have been found in the receiving waters during and just after disposal (Bokuniewicz et al., 1986). This occurs because the disposal sediment settles as a mass (WES, 1986 - See Figure 5) without appreciably dispersing sediments into the surrounding water (Bokuniewicz et al., 1981). Also, the common methods of open-water disposal do not alter the chemical properties of the dredged material, and therefore do not break the bonds that hold contaminants to sediment particles (Burns and Schubel, 1983; Bokuniewicz et al., 1986). As a result, any sediment that may remain suspended after the main deposit reaches the bottom would not likely release its absorbed contaminants to the water column, thereby not causing an elevation in ambient levels of those contaminants. This is consistent with field studies at disposal sites; none have ever detected a statistically significant increase in contaminant or nutrient level in the waters at the disposal site (NYD, 1984; Bokuniewicz et al., 1986). This would be true regardless of the dredging technique used, though hydraulic and hopper dredges, because of their greater water content, tend to produce a deposit with a broader base, that takes a little longer to settle (Morton and Miller, 1980; Bokuniewicz et al., 1986). To maximize the cohesiveness of the descending mass (thereby minimizing loss) only material excavated with a clam shell dredge will be allowed at the disposal site.

b. Based on model calculations for the Mud Dump (Mitre Corp, 1979), almost all of the sand and silt would be deposited within 20 minutes and 200 yards of disposal. Any clay particles that did not descend within cohesive blocks of dredged material would take nearly an order of magnitude (ten times) longer, though even a dilute clay slurry would still be 90% deposited within three hours. Average dredged material composition from NY harbor is 4.6% coarse material, 48.5% sand, 30.2% silt and 16.7% clay (NYD, 1983). Clay content has been reported as high as 51% (Newark Bay). Typically, dredged material that would be potentially a candidate for borrow pit disposal would be more fine-grained that the average, as it is the silt and clays that absorb a greater portion of contaminants. The Newtown Creek sediments have been tested on two occasions (1979 and 1984) and contain a reported 22-44% clay within the main channel and 8-32% clay in the auxiliary Dutch Kills section (Figure 60). Another potential category III candidate (Gowanus Creek) contained less than 15% clay (NYD, 1983). Therefore, less than half of any of the dredged material of concern would consist of the slower settling clays, and even then they would be mixed with and even lumped with the faster settling silts (especially when clam-shell dredged -see Appendix D). It is thus reasonable to project that any expected disposal of candidate material would occur within the time frame and settlement rates described above, with the vast majority of potentially contaminated material deposited within the boundary of the Mud Dump. Even less material should be lost from a borrow pit because the spread of the bottom surge would be confined within the pit. Loss of resuspended particles would be further limited by the pit walls, as well as its passing through a shorter water column before reaching those walls (water depth above the pits is generally half or less than the depth above the disposal mound). Moving the ocean disposal site further off shore would likely increase the distance the dredged material would fall through the water column, and possibly result in a greater loss of the total disposal volume. Recently, a disposal into a shallow pit occurred at Seattle, where even the low walls of that pit (3-4 feet) still effectively contained the bulk of the disposed sediment (Truitt, 1986); the higher walls of existing pits should thus easily hold all the surge and most of its generated suspended material (See Appendix C). A containment area would represent the least sediment loss of all aquatic alternatives, as its dike walls could extend to the surface, containing the entire disposal within the site. Upland disposal does not resuspend sediment and therefore offers the least impacts to this resource.

c. Field and laboratory studies have failed to detect statistically significantly releases of contaminants or nutrients during any disposal operation (NYD, 1984; Bokuniewicz et al., 1986). As indicated above, this is likely a result of the binding of contaminants to sediment particles (particularly the fine-grained organic and/or clay components) which tend to immobilize the contaminants and prevent their release to the water column (O'Connor and O'Connor, 1983). Numerous laboratory and field studies (see NYD, 1983; O'Connor and O'Connor, 1983; Bokeniewicz et al., 1986) have confirmed this absorption capacity of sediments for a wide range of substances (organic and inorganic), and over a variety of conditions, especially reduction conditions prevalent at aquatic disposal sites (NYD, 1983). Since no statistically significant release of metals or nutrients has ever been detected at any monitored disposal operation, these operations must not alter the common chemical property of these particles, and therefore do not encourage their release to the surrounding waters. The relatively minor levels of such material that is detected at the disposal site (either as released contaminants or associated with the disposed sediment that may remain in suspension) never lasts very long, being quickly diluted; a major operation monitored by NMFS (1977) showed DO, suspended solids, pH, eH, turbidity and dissolved organic carbon levels all returned to background values within two hours. Elutriate tests on the Newtown Creek sediments have shown that of all required contaminants to test for, only cadmium (with a very low release potential -See Brannon et al., 1980; Dayal et al., 1981) is present in high enough amounts to exceed existing environmental levels (by up to 1.4 ppb -part per billion). Even this would, after only four hours, be diluted to less than .01 ppb (Appendix A). Similar conditions could be anticipated for all alternatives except possibly at an upland site. Because of its closer proximity to the atmosphere, greater rates of oxidation are more likely to release chemical contaminants from sediment bonds.

d. Long-term impacts to water quality have been studied at the Mud Dump capping site. This operation, initiated by the NYD during 1980, involves capping disposal deposits of dredged material that have not met EPA's test criteria for ocean disposal with deposits of "clean" sediments (meeting all ocean disposal testing criteria) . The clean cap is intended to isolate the contaminated sediments from benthic organisms, thereby rapidly rendering them harmless by reducing or prevent release of contaminants to the water column or biota. Studies have been conducted on the cap, and on its ability to isolate contaminants of underlying sediments (O'Connor, 1982; O'Connor and O'Connor, 1983). All indications continue to show that the Mud Dump cap is containing the buried contaminants. Laboratory studies on Newtown Creek sediments have shown that transfer of PCB, PAH and heavy metals was prevented by a 50 cm cap, even under heavy bioturbation. Caps less than half that thickness prevented changes in DO, as well as NH4 and nitrogen ion transfers after 40 days (Brannon et al., 1985). Chemical analysis has shown significantly lower contaminant levels in the cap than in the underlying sediments (O'Connor, 1982) and field tests show no difference in bioaccumulation between Mud Dump stations and outside controls (Morton and Karp, 1981). A review by O'Connor and O'Connor (1983) reported that rarely is there any case of sediments (capped or otherwise) causing elevated contaminant levels in the biota (suggesting a strong contaminant-sediment bond). A study of the cap at the Duwamish site in Seattle five years after the disposal has shown that neither lead nor PCBs have penetrated the cap, let alone gotten into the water column (Sumeri, 1988).

e. The major difference between the capping operation at the Mud Dump and its use in the borrow pit alternative would be the degree of exposure of the deposit to the surrounding environment. The capped deposit exists as an exposed mound above the ocean floor, whereas the majority of the deposit in a borrow pit would be confined within the walls of a pit, below the level of the Bay floor. A major avenue for contaminant loss occurs during compaction of a deposit, when chemicals that accumulate in the interstitial (pore) water escape with the water squeezed from the deposit (Bokeniewicz, et al, 1986). Studies at the Mud Dump have demonstrated that heavy metal levels remain high in the deposit and low in the cap, indicating no loss of contaminants with extrusion of the pore water (O'Connor and Moese, 1985). A deposit in a borrow pit would be even less likely to release contaminants with extruded pore water since it is enclosed on all sides by its walls and cap, which providing it is sufficiently thick, serves to contain any water (including released contaminants) that may be extruded from the deposit. In addition, the chemically reduced state of the buried sediments would further limit, or prevent, oxidation reactions that are responsible for releasing bound contaminants from sediment. Studies in Hiroshima Bay (Kuroda and Fujita, 1981) show that a capped deposit actually reduces nutrient release.

f. Because of its location under the seafloor, in an area of active deposition, the borrow pit site would also be less likely to lose its contaminant-laden sediments through natural erosion (current action) or extraordinary storm events; little erosion was observed at the current capping site in the Mud Dump following hurricane Gloria (Germano, personal communication). Monitoring of the Mud Dump indicated as much as 98% of the material deposited there over a six year period remained at the unprotected site (Dayal et al., 1981). O'Connor and O'Connor (1983) estimated that the cap alone should survive at least 20 years of normal conditions, though major storms could reduce that survival, thereby risking exposure of the buried sediments. The recent detailed survey of the Mud Dump cap (Parker and Valente, 1988) show that it is indeed very stable after five years, with no substantial erosion or evidence of bioturbation. Not only should virtually all of a borrow pit deposit remain in place (including its cap), but, when completed, the site's vulnerability to storms should be far less than the capped mound because of the added protection of being below the bay floor surrounded by walls (Bokuniewicz et al., 1981), and within the more sheltered and quieter waters found inside the Bight Transect. Even in a worst-case projection, the material lost by release or sediment migration would be expected to be occur slowly, over a long time frame. This would provide ample opportunity for such a small loss to be easily diluted to undetectable levels within the well-mixed waters of the Bay system and adjoining Bight. Sudden and rapid expulsion of all or most of such sediment by a severe storm is beyond reasonable expectation (given the long-term stability of the existing Bay bottom, in addition to the depositional nature of the pit environments). Yet, because such physical events are not likely to alter the chemical properties of the sediment, any such material that may be expelled from the pit would not be expected to release its bond contaminants to the water column (at least not in sufficient quantities to noticeably affect ambient levels at the site or throughout the Lower Bay/Bight waters).

g. A containment area is exposed on one or more sides (all four if an island) to currents and wave action. Such a deposit would be theoretically more vulnerable to long term erosion and storm attack, while offering more surface exposure and somewhat more favorable chemical conditions (surface oxidation) for loss of contaminants. Location in an area of low currents and storm/wave protection would reduce the severity of storm attack, and erosion. Lining the area's bottom and sides with impervious material (eg., clay or synthetic geotextiles) and careful maintenance of its perimeter (a potentially expensive and long-term task) would improve its ability to resist contaminant uptake and loss. Even so, a capped borrow pit's location within an active depositional area still makes it even less likely to lose sediment-bound contaminants placed within it, and more resistant to long-term erosion or wave attack. The surface of a containment site, seemingly out of influence of Bay waters (because it is dry land), would now be subject to erosion and percolation from rainwater and storm overflow. In addition, its sediments would be more likely to undergo oxidation than those within a borrow pit (the reduced state of chemical action common to buried aquatic sediments is more likely to retain absorbed contaminants). These impacts could be minimized by use of control measures, though at increased costs. Finally, the ability of a borrow pit's cap to prevent bioturbation and leaching of contaminants should at least equal to that of a containment site dike's ability to prevent leaching and benthic utilization of the interior of the site. This is because a containment facility is built above the Bay floor, and the isolation of its deposit is limited (to some extent) by the thickness and permeability of its dikes. A borrow pit, on the other hand, is protected by the thickness of the entire Bay floor and the depositional nature of its environment.

h. Upland disposal has the least potential impacts to water quality of the Bay. Assuming an upland site was operated properly (adequate retention times are maintained and coagulants added as needed), up to 99% of the sediment and its associated contaminants would be retained on-site (O'Brien and Gere Inc, 1980). These contained sediments would not be available to future long-term loss, as the deposits are not in contact with the estuarine waters, and are not subject to their erosional or storm attack. Such a site would be subject to rain and run-off erosion as well as oxidation. Depending on its relative proximity to the Bay, such areas may lose some material to the estuary as a result of erosion. Release of contaminants from sediments into the estuary would be negligible, and could be reduced further by control measures, though at increased site costs. Increased oxidation at the surface of such sites would be a concern, but could be controlled by application of specific measures to limit it. About the only additional reasonable avenue of such loss would be through the contaminants entering the surface waters and/or groundwater system, thereby becoming a potential health hazard to drinking, agricultural or recreational waters. However, the two sites still being considered (37 and 61 - see Figure 4) do not flow into any existing groundwater systems that can be used for drinking/agricultural purposes, as they are too brackish. The two specific sites under consideration here thus negate most health-related impacts often associated with upland sites. Because they are not within the aquatic system, their use also offers the least impacts to that environment and its resources.

4.2.2 Impacts to the Hydrology and Bathymetry of the Bay Complex

a. The 2.2 square mile Mud Dump site (Figure 2) has been used for disposal of dredged material for over 50 years. During that time mounds reaching above the 50 foot depth has been created. This is a substantial bathymetric feature that has no doubt altered local circulation patterns to some extent. As this disposal site is not located by any hydrological control section (such as the Narrows between Upper and Lower NY Bays) it would not affect circulation and tidal movement into or out of the Lower Bay. Further, since future disposal will only add to the already large existing mound, it will not represent a new potential impact to the Lower Bay, and will not produce a threat of flooding or erosion to the shoreline inside the transect, or to the New York and New Jersey beaches adjacent to the Bight Apex.

b. Sub-aqueous borrow pits have been determined to have localized impacts on currents, and minor effects on tidal regimes and wave action. Using modeling techniques, Wong and Wilson (1979) concluded that digging of new pits could increase tidal range along the east shore of Staten Island. The impacts are most pronounced for large pits (boundaries exceeding 2000 yards) within the Bight Apex transect (Sandy Hook, NJ to Rockaway Point, NY), though projected increases in tidal range for the worst case barely exceed four inches. What's more, reductions of tidal range simultaneously occur along the Coney Island shore (though of a lesser magnitude). The smaller the hole, and the further away from the Transect it is dug, the lesser its effect will be on tidal ranges (a large hole in Raritan Bay has virtually no impact on this parameter). Interestingly, these two investigators also found that holes influence tidal currents by deflecting them toward a hole, slowing them down as the water passes over a hole and then speeding up the tide-generated current as the water leaves the pit boundary (Wong and Wilson, 1979). This condition is very localized, and has a negligible effect on system-wide tidal currents. Existing holes should already be exerting their influence on local tidal currents and rage. Presumably, filling in an existing pit would return its local bottom to original current patterns, which could be either beneficial or detrimental to the biota (See 4.3 below). A filled pit could also have the potential for reducing erosion (tidal range) along Staten Island, while (perhaps) increasing it at Coney Island. As none of the pits are as large as those used for the upper end of the Wong and Wilson (1979) model, nor are they in the sensitive Transect region, their effects would be minor in both magnitude and overall hydrology. In this context, it should also be pointed out that any impacts from digging new pits would eventually be reversed when the pit was filled (10-20 years).

c. The use of an upland disposal site would have no effect on tidal action. Containment areas, being relatively small in size, show minor tidal variations resulting from construction at any of the four sites studied (Figure 3). The tidal changes are all localized, very small, and well within natural variability commonly encountered in their respective locations (Bokuniewicz and Cerrato 1984). Similar conclusions are the preliminary findings of Vieira (1986), who studied hydraulic impacts from the construction of containment islands in the Lower Bay complex (Figure 6). Small changes in tidal range and currents were detected around the edges of the hypothetical islands, but all were sufficiently far enough from land to have no impact on shore erosion or flooding. Shaping the islands as ellipses would reduce, even further, any impacts on currents in the bay (Stark, 1989).

d. In addition to erosion caused by tidal action, some of the disposal alternatives have the potential for affecting wave attack as well. The Mud Dump is situated far enough from land, in water too deep to affect wave formation. Future disposal at that site would not raise its overall height to a point where it can begin affecting wave generated attack along the shores of the Bight Apex or present a hazard to navigation. Because of their general location in shallower water, borrow pits can impact this activity. In a study conducted by MSRC (Kinsman et al., 1979) the effects of dredging 45 to 90 foot borrow pits at several points within the OGS proposed sand mining area on the East Bank were simulated by model (Figure 61). The findings are summarized in Table 15, and show that deepening the entire area would result in substantial reduction (up to 20%) of wave intensity along the most heavily attacked portion of Staten Island (Hugenot to Midland Beach), at least until the pit was refilled. The result of such protection would be increased intensity along the similarly sensitive Coney Island coast, though less than 5% at the worst. On the other hand, wave attack at Coney Island can be reduced by some 7% if only the smaller portions of the area are dredged to 90 feet (Figure 61). However this would increase attack at Great Kills Harbor and Rockaway. Dredging these portions to only 45 feet has essentially no effect on Coney Island, and would eliminate the increased attack at Rockaway while substantially reducing the negative impact at Great Kills, though not eliminating it (a 17% increase in wave intensity was still predicted, but the rest of Staten Island's problem areas would either see no change or a slight reduction in wave attack). No similar modeling effort exists for projecting impacts of mining in the western part of the Bay, where the proposed new pit location in the northeast corner of Raritan Bay (Figure 32) is located. A pit there would be more removed from the main ocean wave direction, but in direct line with Staten Island and behind Chapel Hill Channel. This would be likely to increase the spread of the wave's movement and decrease its energy at any given point.

e. Similarly, predicting the impacts of filling in already existing borrow pits would require a more detailed assessment of wave patterns. However, based on the hypothesis of Kinsman et al. (1979), reduced wave concentration would occur from "filling in" Ambrose channel, leading to a similar dissipation of waves, with resultant spreading out of the impact area, should one or more pit be filled. This is a qualitative assessment, and would require modeling analysis to quantify impacts, if this were deemed necessary. It is interesting to note that along the East Bank (the only location where wave and tidal impacts have both been modelled) the impacts of a new pit are almost complimentary in their effect on tides and waves. Tidal erosion along Staten Island could be increased while wave erosion is reduced. Given the generally minor magnitude of the predictions for change to either parameter (Kinsman et al., 1979; Wong and Wilson, 1979) the net result may be either no change, or at the very worst minimal long-term effects that would be difficult to quantify, and even harder to notice.

f. As with tides, upland disposal will similarly have no effect on wave attack. Studies in the Gulf Coast region (Joan Pope, personal communication) show that islands appear to have a generally positive impact on shore erosion within the larger region they occupy, because of their ability to absorb wave energy. However, there is a potential for localized increased attack from waves that are forced around a containment island and refocused behind it, or defracted away from its sides. This could cause a concentration along the shore in the island's immediate proximity. This is more likely to be of concern for an island along the East Bank, as this area is closest to land and subjected to the least altered wave patterns. Even there, the presence of a deep water channel and extensive shallows behind that location would tend to deflect and reduce the degree of attack. Islands in the southwestern portion of the lower New York Bay would be in shallow water, further from land, with resultant greater dissipation of wave energy originating from the island. A study of the potential impacts of islands on circulation within the lower Bay complex has concluded that the only changes will be in the immediate vicinity of the island, with no impact on bay-wide circulation (Vieira, 1986). Containment areas, being extensions of existing mainland features, would not affect wave attack except to provide shelter to those shorelines previously exposed. However, by extending the land outward, the boundaries of the containment area could come under greater attack than the unaltered shoreline was subjected to. This could necessitate stronger shore protection to prevent breaching the site's dike.

4.2.3 Impacts to Sediment Resources within the Lower Bay Complex

a. The Mud Dump's previous long history of use has resulted in its current varied sediment state; the direct result of long-term disposal of large volumes of sediments that range from fine clays to coarse sand. Continued use of this site will not alter this state of affairs, except to spread the multigrained deposit more evenly within the site's boundaries. Use of existing pits (by filling) would eliminate existing sediment-traps for fine-grained material (3.3.3). Placement of a sand cap on top of the deposit will return that portion of the Bay floor to its original sandy condition, though its thickness and underlying contaminated sediments would preclude its use for sand mining. Filling the existing holes would also likely increase the movement of fine grained sediments into the Bight by an amount no greater than the volume currently accumulating in the pits. Though the rate of accumulation is relatively quick, far exceeding typical estuarine sedimentation (Bokuniewicz, 1979), not all pits have the same rate nor will all pits be filled. Consequently, the actual amount of fine grained muds entering the Bight will not be markedly greater than occurs now; certainly no more than would normally be found had no pits existed to divert such movement. The areas of accumulation would be the same places that such material now accumulates, producing no negative impact to the Bay's sand resources. In fact, some of the mud in the pits probably comes from the Bight (Olsen et al., 1984).

b. Digging new pits could result in the loss of the sand resources harvested during the pit's construction. This will be avoided by either directing the material to a beneficial public use (such as beach nurishment or habitat creation) or allowing its sale to private contractors, thereby continuing historical uses of the resource. The major difference between this alternative and past sand mining practises lies in the eventual fate of the hole after it is dug. Instead of leaving an open pit to accumulate mud, the newly constructed pit would be deliberately filled in a far shorter time, and under far more controlled conditions. The sediment trap would thus only function for a limited time (during disposal use), and the Bay bottom eventually reclaimed and returned to its natural sandy condition. Use of a containment area/island, on the other hand, results in the permanent loss of sediment resources under it, without meeting construction needs. It is even conceivable that it would generate an increase in demand for sand to construct the island's dike (though such material could also be excavated from within the site, thereby also increasing its capacity). Sand mining would thus likely continue, or even increase, in other areas of the Bay if this alternative were used. Minor localized accumulations of fine-grained sediments may occur around the island's periphery, especially in quiet water areas, thereby altering existing sediments further. This would be very minimal, as the MSRC study has concluded that there will be little impacts to circulation (Viera, 1986). Upland disposal at the two sites still under consideration has no impact (positive or negative) on the Bay's sand resources.

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4.3 Impacts to Biological Resources

Impacts to the biological community are essentially two-fold: a direct impact to the organism (physical or chemical), and an indirect impact caused by the loss or alteration of habitat. In both cases there are short-term impacts associated with disposal and construction, as well as long-term impacts that may persist for some time after the final cap is installed. Of special concern are impacts to benthic and finfish populations, both of which are discussed below. Reference to impacts arising from disposal of sediments from Newtown Creek will be again used (as appropriate) as an example of a likely worse-case impact.

4.3.1 Impacts from the Use of Shallow Ocean Disposal with Capping

a. This is the currently employed method of disposing of most sediment that does not meet the EPA/CE testing criteria for ocean disposal, but that can be rapidly rendered harmless enough to still be disposed of in the ocean if expeditiously capped. This alternative has been extensively employed and studied by the NYD since 1980. The most dramatic change noted during its use has been an increased turbidity during some disposal events. Most aquatic organisms have been found to be relatively insensitive to this very short-term perturbation (Hirsch et al., 1978). Laboratory tests under confined conditions have found stress conditions (increased oxygen consumption, increased red blood cell hemoglobin and hematocrit, gill damage) in fish tested under turbidity levels similar to those found at dredge/disposal sites (O'Connor et al., 1976). Larval and juvenile fish were most susceptible, as are filter-feeding benthic organisms (U.S.Army Corps of Engineers, 1979). Fish associated with high sediment environments (such as bottom-dwellers) are less sensitive to high turbidity levels than the pelagic forms in the same area (Sherk et al., 1975). Though the more free-swimming pelagic fish showed various levels of adverse impacts under confined conditions, in the wild they would have the added advantage of being able to avoid the impact area, especially as the bulk of turbidity is found to occur near the seafloor, close to the point of contact (Figure 5).

b. An additional impact may occur through direct burial of organisms. For fish this is a minimal problem as most could easily avoid or extricate themselves from the slug of sediment resulting from a single-barge discharge (which would not exceed a foot of depth at its deepest point of contact with the bottom -NYD, 1983). Benthic species, especially the less mobile infauna, would suffer greater adverse impacts. A given barge load would only affect a small part of the community, and be thin enough (less than 2 cm) for most organisms to dig out of within 200 feet of the disposal site (Mitre Corp, 1979). However, multiple burial episodes both expand the area of impact and make it more difficult for buried organisms to recover. The ability of disposal areas to recolonize benthic communities has been well documented in the literature. Estimates of recovery time vary considerably, but areas like the Lower Bay Complex that are relatively shallow and subject to natural perturbations are usually in lower order pioneering stages and therefore recover more quickly, often within a year or two (NYD, 1984; Rhodes et al., 1978; Cerrato and Scheier, 1983). The distinct fall increases in the Lower Bay benthic communities sampled by Cerrato and Scheier (1983) demonstrate an active capability for rapid recruitment once conditions stabilize (e.g. disposal ends). The nature of the final community will depend on the make-up of the final cap, with interim populations forming according to prevailing sediments during major reproductive peaks (generally spring and fall). It is important to note that the Mud Dump site is under continuous use, its biota are under constant stress conditions and the benthic community is therefore more impoverished than that of the Lower Bay Complex. Long-term impact to the community would thus represent a lesser loss than dredging an undisturbed shoal community or even filling an existing pit. Further, as disposal of dredged material passing the test criteria will still occur at the Mud Dump (without a cap), its community will be subject to adverse physical impacts regardless of its use for containing contaminated sediments. Therefore, the physical impacts from disposing category II and III sediments are not likely to cause any more marked effect to communities within the Mud Dump area beyond their present state.

c. Impacts of the contaminants within the dredged material to the biota have also been studied. Capping such deposits with cleaner sediments occurs now at the Mud Dump. Most current research indicates that uptake of contaminants at disposal sites is the exception, not the rule (Brannon et al., 1976; Hirsch et al., 1978; O'Connor and O'Connor, 1983; O'Connor, 1989). Little, if any, contaminants appear to migrate through a cap, even a small one as employed over the Duwamish deposit in Seattle harbor (Sumeri, 1988). The major threat of biota contamination is likely to be from burrowing organisms. Studies on the capacities of these benthic dweller shown the most active species being restricted to the upper 10-15 cm of substrate (Pratt and O"Connor, 1973; Germano, 1983), with some species burrowing to 60 cm (NYD, 1984). A proposed cap thickness of a minimum three feet (more in the center) would thus be sufficient to isolate the material of concern from the developing benthic fauna. Tests on material from Newtown Creek (Brannon, 1984; Brannon et al., 1985) showed no statistically significant uptake or bioaccumulation by clams from sediments capped with 50 cm of clean sediment. Large, deep burrowing polychaete worms (Nereis sp.) did show Bank uptake of one test parameter (a petroleum hydrocarbon) even with a 50 cm cap. A proposed final cap thickness of roughly three feet would be double the test thickness, thereby greatly reducing (and possibly eliminating) uptake by such organisms. To date, studies at the Mud Dump have been unable to show a correlation between disposal of dredged material at the Mud Dump, and the finding of contaminant levels in fish or benthics that are greater than ambient levels typically found in organisms throughout the Bight (O'Connor and O'Connor, 1983). This general area has been used as a disposal site for a very long time, and it is not unreasonable to expect its resident and long-term biota to show signs of degradation over that timeframe (50+ years). Fortunately, no impacts appear to extend outside the area.

4.3.2 Impacts from the use of Sub-Aqueous Borrow Pits.

a. Any assessment of impacts to the fish communities within existing pits would be long-term, as few would perish from short-term impacts such as direct burial. Sampling conducted during the first stage of the demonstration project at the CAC pit (4), found fish populations remaining relatively high throughout (Conover et al., 1983). An analysis of impacts would thus have to be qualitative, and based mostly on long-term loss of habitat. Sampling in borrow pits has shown fish populations to be as diverse and often more abundant than along the undisturbed shoals. Populations within the larger pits suitable for use appear to be similar to each other (Conover et al., 1983; Woodhead and McCafferty, 1986), though differences between those on the east and west banks were observed (generally higher abundances in the West Bank pits). The largest of the pits suitable for use (3) would represent over 40% of the large pit habitats in the Lower Bay Complex (or roughly one-third of all pit habitat, if the smaller pits, unsuitable for disposal, are included). Should one of the smaller acceptable pits be used (4 or 7), the portion of habitat lost would be substantially less. The preferred large East Bank pit (6), for example, represents roughly 25% of the large pit habitat in the Lower Bay Complex. If this habitat were critical to the survival or reproduction of a species. such a large habitat loss could be a substantial impact to a fishery. However, the borrow pit habitats have only existed for a brief period of time, while the fishery has existed considerably longer. Therefore, though the borrow pit habitat is somewhat limited in availability and tends to concentrate fish, its populations reflect the same seasonal changes and species composition found throughout the complex (Woodhead and McCafferty, 1986). The habitat is not functioning differently from the rest of the system and is therefore not playing a critical role in the survival or productivity of the fishery. Both NMFS and NJDEP concur with this interpretation (6.4; appendix F), which leads one to the further conclusion that any habitat loss by filling should be considered in comparison with the entire Lower Bay ecosystem, not just other pits. Further, as the filled pit provides replacement sandy shoal habitat for fish, the overall impact is thus negligible. In addition, as these pits are filling in rapidly (Bokuniewicz et al., 1986), their continued long-term availability as fishery habitats is itself not ensured.

b. Feeding studies on winter flounders failed to show any correlation between their diet and the dominant benthic species of the pits (Conover et al., 1985). Though fish caught in the borrow pits were feeding on different organisms than those caught at control areas outside the pits, this is probably a result of opportunistic feeding on the resources available and not as a result of actively seeking out of one food source in the pit. No positive correlation was found between the dominant benthic species at either habitat and the benthic resources fed on by the flounder. Total food resources available were always equal or greater at the control sites than within the pits, and no differences in growth rates (measured by weight/length comparisons) could be discerned between flounders caught at the two different habitats. During the Bay-wide MSRC sampling (Woodhead and McCafferty, 1986) temperature and DO were similar between deep and shallow areas, and biomass per capita was not any greater in either.

c. Bokuniewicz et al. (1986) statistically compared catches, oxygen, temperature, and salinity of the stations sampled by Pacheco (1983), NMFS (1984) and Conover et al. (1985). All the stations had statistically significant differences from each other, but none of the physical parameters grouped the stations similar to the grouping based on catch, indicating the differences in catches between pits and among pits and control stations on the shoals was not based on physical parameters. Benthic resources were more erratic and often less in the deeper habitats (where maintenance dredging continually disrupts channel populations). The preference for deeper water habitats thus apparently has no discernable basis in a physiochemical difference either. While the pits may attract more fish, the reason for the attraction does not appear to be critical to their survival or productivity, though it may provide some advantage to fishermen.

d. Several possible explanations may account for the attraction of the pit habitats. It has been demonstrated that currents are directed towards pits, slowing down over them and speeding up again once away from their influence (see section 3.2.1 above). It is likely that fish (especially the pelagic forms like the herrings, striped bass, bluefish, etc.) are moving in response to the currents and may thus tend to congregate in the pits once their stimulus is reduced.

This action may be in response to forage fish or planktonic forms that linger in the area because of the reduced current flow, providing a somewhat more efficiently harvested food source. This response would tend to help explain the similar presence of these species in channels, which are the main current conduits into and out of the nursery and spawning and nursery areas. This current reduction may also tend to settle out suspended food to the mid and lower water levels, especially around the pit edges, thereby attracting and enticing fish to remain longer. It is already known that pits accumulate fine-grained sediments faster than the surrounding areas (Bokuniewicz, 1979). The attraction may also represent an ecotone effect, where the boundary between two different habitat types (deep/shallow water) contains a more abundant/diverse community than either habitat alone. The pits do represent a major break in the otherwise uniform Bay floor, and such physical discontinuities often attract fish. Whatever the reason, the pits witness the same seasonal trends that occur in the shoals. Fish are thus not moving into an area primarily to get to the pits, but instead are visiting these artificial habitats during movements to and from spawning area in other parts of the estuary.

e. Though they may serve to concentrate some food resources (plankton and detritus) during migration, pits are not producing more of them. Average benthic levels in pits are no greater and are even more erratic, than in undisturbed Bay areas (Cerrato et al, 1989). Opportunistic organisms (pioneering species) likely take advantage of those pits with low benthic levels, expanding rapidly into these areas during recruitment periods (spring and fall). However, because of the adverse physical conditions in these pits (poor circulation/exchange rates, low DO, higher sedimentation) and the heavy competition among the few pioneer species that colonize pits, these opportunistic species suffer very high mortality rates (especially during summer), and their levels drop precipitously (which is likely why the pits had low benthic levels to begin with). The most recent MSRC survey (Cerrato et al., 1989) shows spring increases are common in the pits sampled, with low levels throughout the remainder of the year, in those pits whose size/depth is not conducive to adequate physical mixing (pits 4 and possibly 7). Filling these pits would thus have a positive impact to the benthos, in that it would create a better habitat by replacing the pits with the more productive/stable shoal habitat, while eventually isolating the finer-grained pit sediments beneath a protective cap away from even deep burrowing organisms and oxygen.

f. Productivity in the Bay as a whole is not nutrient-limited. Elimination of pit habitats would thus not likely result in a reduction of potential food resources (even the area of the largest pit would account for less than 0.1% of the total Bay area, as calculated from the map in Figure 1). The added food resources that may concentrate in the pits would most likely remain within the system, just more dispersed. While it is true that a concentrated food resource may reduce the energy consumption of a species used in locating it, it also makes the species more vulnerable to predation (natural and by man). It is conceivable that spreading the resource out may increase mortality by increasing energy expenditure. However, it is unreasonable to project that such an effect would be anything but minor, since the habitats are not critical to a species survival, are transient in use, and represent recent additions to the environment that are wholly artificial (do not replace a natural habitat that no longer exists). Indeed, the most likely attraction is the direction and/or reduction of current speed. Fish lingering to feed and/or taking advantage of reduced current flows (less energy expenditure) do so as part of their migratory passage, and may even be briefly delayed from it by the presence of the pits, possibly (as pointed out by NMFS) to their detriment (should DO levels become anoxic, or if a rapid temperature drop occurs). Similar questions are now being asked with regards to artificial reefs. Do pits actually increase a species' overall productivity or serve to concentrate that species for easier harvest? While a reef may ultimately produce its own indigenous community, a pit does not differ in its basic community structure from the surrounding shoals (Woodhead and McCafferty, 1986). The loss of one pit should thus minimally impact the overall estuarine fish community; its impact on recreational fishing however, could be greater (see section 4.7a below).

g. Long-term benthic impacts are likely to be of even less concern, as the filled and capped borrow pit would be similar in bathymetry, depth, and sediment to the adjacent Bay bottom from which it was dug. Consequently, it is reasonable to expect rapid recolonization from the undisturbed populations around the pit, perhaps in as short a time frame as one year (Cerrato and Scheir, 1983). The new community would then be similar to existing Bay communities, and more stable than the erratic pioneer-stage benthos that currently are found in these pits (See Section 3.4.1.). In the long-term, such a condition may be more desirable than the recolonized benthic populations that develop on the ocean disposal cap, as the completed borrow pit community would represent a return to pre-disturbance conditions while the ocean disposal site would represent an unatural feature (mound). While the latter does not necessarily mean a less desirable type of benthic community will evolve, it is not likely that it would be preferable to what was found before any disturbances occurred and the mound was created.

h. Studies used to assess chemical migration and uptake at caps deposited over surface disposal mounds are also directly related to caps over a borrow pit. Both alternatives rely on the same mechanism to minimize chemical contamination of their biota. Recent studies indicate that caps can be a stable means of isolating material, depending on their make-up and configuration (Bokuniewicz, 1984; NYD, 1984; Truit, 1986; Sumeri 1988; Parker and Valente, 1988). The cap over a pit is expected to be more stable than one over a surface mound, in that it is further away from the erosional sources of waves, ambient currents, and storms. In this fashion, a borrow pit disposal operation offers greater long-term protection of the biota of the entire NY Bight by providing a more secure containment facility. This protection is derived first from concentrating and isolating contaminated sediments now naturally occurring and available to the biota throughout the harbor. Protection would also be afforded to organisms now exposed to the fine-grained sediments naturally accumulating in the pits themselves. Isolating these sediments under a cap would reduce long-term uptake of contaminants more often associated with the finer-grained sediments . Even, in the unlikely event that the cap were breached by a massive natural event, the underlying deposits are in a zone of deposition, not subject to the normal scouring forces that would quickly act on an exposed surface deposit. Finally, since the chemical bond that holds the contaminant to the sediment would not be effected by such an event, any resuspended material would not readily result in increased contaminant levels in the water column (Burns and Schubel, 1983; Bokuniewicz et al., 1986).

i. Biological impacts from constructing new pits would be somewhat different from above. In digging the pit the benthic community within the construction site would be completely loss. As it is assumed the digging will be a continual process, and the subsequent disposal operations will similarly occur at regular (though perhaps lengthy) intervals, the site will be under a constant state of disturbance and stress, thereby precluding reestablishment of any stable benthic populations (as is the case at the continually used Mud Dump). Upon completion, the site would be capped with sediments similar to those originally removed and returned to its former bathymetry. In that case it is reasonable to expect a quick recolonization to its former benthic community, as would also be the case if an existing pit were filled. As construction and final capping will extend full implementation and closure of this alternative well beyond the timeframe for filling an existing pit, the recolonization process may take quite some time (over 20 years following start of construction), leaving the bay complex without that small portion of its benthic community during that time. Intermediate populations may reestablish themselves on interim caps, or during relatively long periods of no disposal, offering temporary reduction of resource loss. However, in view of the contaminated nature of sediments being deposited this may not be so positive. The location of the proposed disposal site thus becomes important because the degree of community loss could be minimized by selecting an area of low use. The site selection process recognizes this and used biological population data as one means of prioritizing potential sites, attempting to select an area with a low combination of benthic and fish use for a new pit (see 2.3.2.2).

j. During the course of new pit construction it is anticipated that turbidity levels in and around the immediate construction point will be increased by both the dredging and barge overflow. The turbidity plume so generated is restricted to a very limited area in the vicinity of the dredge, with 95-99% of the suspended material settling within a few hundred yards (Schubel et al., 1978). The remaining material will be dispersed as long narrow plumes (Figure 7) that will have little (if any) effect on fish. Because of the coarseness of the sand removed, (See 3.3.3 and 2.3.2.1) resuspension will be minimal, with too little suspended material to provide a real threat of burial to benthic communities outside the construction site (Brinkhuis, 1980). The confined aerial extent of the plumes prevents their acting as a barrier to fish movement within the open Bay, and in any event they only last for half the tidal cycle

(Schubel et al., 1978). Even a worst-case scenario could not project a build-up of sediments over time. Plume direction will never be constant, maintained channels will be dredged clear, and deposition would occur slowly, enabling most benthic organisms (including fish) to easily maintain their position relative to the ambient bottom. Even then, tide and currents would carry away any muds that settle out in areas where muds are not now naturally occurring. It is unlikely that the construction process would increase sedimentation in the Bight as the material would be mostly sand, and the new pit itself would serve as a sink for suspended muds. Though use of existing pits would avoid construction impacts altogether, the advantage would be minor at best, and then only short-term.

k. Creating a new pit, could also be negative impact in that it may create a physical environment that would produce conditions similar to those now existing in the small, deeper pits (2 and 4). This could be avoided by designing pits more similar to the larger ones (3 and 6), though it would necessitate taking even more shoal habitat out of production; the trade-off would probably not be worth it since even large pits have poorer benthic communities than the undredged shoal. In that the new pits would be dug with the intent to eventually fill them, the negative impact would only be temporary, though not brief (10-20 yrs). In the unlikely event that the monitoring program showed that the existing pit being filled was not functioning as predicted, and the pit alternative had to be dropped as infeasible, the newly dug, narrow and deep pit (the preferred design -See 2.3.3.2) could be expanded to a more suitable configuration, or refilled, to minimize adverse physical impacts, thereby reducing the potential for leaving a poor habitat in the bay.

l. All of the above dredging impacts could be considered minimal, with the possible exception of the relatively quick and long-lasting loss of the area's benthic community. Even such a loss would not represent a major impact since the area effected makes up only a small portion of the overall Bay bottom community. In addition, such loss would be temporary, as a similar community would reestablish itself on the final cap. Actually, the temporary benthic loss may be balanced by a reduced fishery impact. The locations selected for new pit construction (Figure 32 were chosen in large part because of relatively low fish/benthic use (section 2.3.2.3), and their loss would avoid impacting the higher use pit areas, thereby minimizing the degree of fishery impact. There is little evidence to suggest that the pits are providing some form of increased survival potential, at least sufficient to significantly increase fishery productivity. Avoiding use of such pits would bypass this unlikely eventuality at the expense of a potentially greater benthic loss. Thus each alternative has its own set of impacts and advantages, with the end result that neither has a clear-cut basis for being environmentally preferable. In the long-term, a new pit would result in no net habitat loss, but at the expense of possibly prolonging ocean disposal of contaminated sediments if construction drags on because of lack of Federal funds or a poor private market for sand.

4.3.3 Impacts from the use of Containment Areas/Islands

a. Short-term benthic impacts from the construction of containment structures are expected to be similar to that of digging new pits; long-term impacts may however, be greater. Both of these alternatives would result in a total loss of benthic community through burial, though the size of the benthic community effected by a narrow and deep new borrow pit could be substantially less than the roughly 500 acres that are currently being considered for containment islands. Once dikes are constructed, disposal operations are limited to within the containment area. Their resultant short-term impacts to the biota would be greatly reduced because all of the sediments will be retained on site (including the small portion of the total fine-grained sediment volume that might be lost during disposal). However, once built, the containment area will no longer be part of the estuarine habitat, where as the completely filled borrow pit would likely regenerate its lost benthic population. In the long-term, this alternative minimizes an already minor short-term borrow pit impact on water quality, while causing a permanent long-term impact that would have been only temporary if a borrow pit were used. Finally, an island would represent a loss of water column as well as bottom. Such a loss might be considered an adverse impact to the plankton habitat, resulting in a decrease in primary productivity. In reality, since the area loss would be an almost negligible loss of the overall water column area in the Bay complex, this impact is minimal.

b. Constructing a containment facility would permanently disrupt the fishery community without the potential for reestablishing that portion of the former Bay bottom fishery that its construction impacted. Filling an existing pit would replace a more abundant artificial habitat with the natural one that it originally disturbed. A new pit, on the other hand, would not result in a permanent loss of resource, as the habitat would be returned to previous conditions when it was filled. However, as with a new pit, the location of an island would be chosen to minimize this loss by selecting a site of low fish use. Further, because of their mobility and normal migratory patterns, fish would likely relocate to adjacent, undisturbed areas. The dikes surrounding the containment area would provide a different habitat that may attract a fish community quite unlike that which occupied the previous Bay bottom (or pit). This is not to say such a community would be less productive or undesirable, but it should be different, and may only reflect a concentration of species from other areas, as is likely the case in existing pits. Conceivably, the community that develops around the slopes and riprap of dikes may resemble that which occurs around the rocky areas and artificial reefs within the Bight. Examples of such communities (which could contain species such as rock gunnel, blackfish, searobin hake, pollack and tautog) have been discussed by Woodhead et al. (1985). Such communities should stabilize in time, as their environment would be under less flux than now occurs in an existing pit, or that is likely to be found in a pit being filled. Consequently, this habitat is more likely to represent a potential for an increase in local productivity, as well as an attraction to the typical Bay migrants (herring, striped bass, bluefish, flounder, etc.).

c. The ability of a containment facility to act as a fish habitat varies with a site's size and type of construction. This is due to the geometric relationship between the area of a site and the size of its periphery, whereby if a site's size (capacity) is doubled its periphery (dike) will only increase by 1.4 times. Therefore, the larger a site the relatively lower its potential reef area becomes in proportion. In addition, the type of dike also determines the potential resources value, with sheet piling being the least desirable in terms of habitat value. These types of dikes do not support as good an artificial reef-like community as may occur on sand or riprap lined dikes. Providing a site sufficiently large enough to serve a long-term solution to the disposal of contaminated sediments could therefore lead to a disproportionately lower amount of replacement habitat, especially if it meant using sheet-pile dikes. This could result in a productive fish community that represents only a small fraction of that which used the effected Bay area before. However, sheet-pile dikes do substantially increase overall site capacity at a relatively low cost (Table 5), and with less bay bottom being sacrificed. Such a method would thus provide a most efficient means of safely disposing of the greatest volume of contaminated sediment, though at a lower habitat replacement. The positive long-term impact could be viewed as justifying the loss.

d. In addition, the containment facility though better protected (in location and armoring) than a disposal mound, would still be within the regime of continual and episodic erosional forces, instead of the depositional regime characteristic of a submerged borrow pit storage facility. Thus the borrow pit alternative represents, in both habitat loss and potential for some site erosion or long-term degradation, a somewhat lesser long-term threat to fish and benthic communities than construction of containment facilities. In addition, its ability to isolate now exposed sediments also imparts a potentially note worthy benefit. However, since a well-planned facility could be expected to meet all environmental concerns, it does not represent an environmentally unacceptable alternative.

4.3.4 Impacts from use of Upland Disposal

a. Use of upland disposal areas would avoid essentially all the benthic and fishery impacts discussed above. About the only effect of any potential consequence to the aquatic community would be from effluent, either from the disposal site (if it is adjacent to a waterway) or the dewatering site (if the upland site is too far for hydraulic pumping). This impact is anticipated to be minor as the return flow would be treated, or other appropriate control measures taken. The site would also most likely be required to be monitored for contaminants and suspended sediment, with specific allowable levels for each component of concern. Since upland disposal sites, because of concerns regarding contaminants, are most often isolated from access by wildlife, they generally do not provide an opportunity to return previously disturbed portions of habitat (and their associated biota) to their former state. However, depending on the level and nature of contaminants, and given proper site management, they could provide such a beneficial use. Use of an upland site could serve to reduce the degradation of the estuary associated with continued ocean disposal. However, capping, borrow pits, and containment areas are also designed to reduce this degradation by isolating the sediments of greatest concern.

b. In terms of long-term threat of site failure, an upland site is not free from such concern. Sites situated close to waterways (a likely location) are still subject to rain and wind erosion, both of which can be controlled through appropriate engineering measures, with corresponding increases in cost. Though likely fenced and monitored, upland areas are still more accessible than aquatic sites, and would be more prone to trespass and vandalism. With respect to such potential for failure, a filled borrow pit (because of its depositional nature) still offers the greatest protection, though risk of failure of the other alternatives is highly unlikely, especially if constructed with appropriate care and safeguards. Another concern, raised also with new pits and containment facilities, is the potential for delays to obtain funds and acceptable sites. This later point is likely to even more difficult on land, especially with intense local opposition likely. Long delays would continue current ocean disposal or cripple port facilities because a lack of a suitable site might delay maintenance dredging. Neither of these options is desirable.

4.3.5 Effects on Plankton and Wildlife Communities

a. Plankton impacts are not considered to be of concern from any of the disposal alternatives. This is mostly because the alternatives affect such a minor portion of the Bay, and therefore overall productivity. In addition, because each alternative serves to reduce the level of contaminants that could be taken up by the planktonic community, the long-term impact is positive. Disposal itself has not been shown to release nutrients in sufficient quantities to significantly alter their levels in the water column (NMFS, 1977; Wright et al., 1978; O'Connor and O'Connor, 1983; NYD, 1983; 1984). Even if it did, the availability of light, not nutrients, is the limiting factor to phytoplankton production in the NY Bight (Yentsch, 1976), and therefore destructive blooms are not a real concern. Disposal-generated turbidity might reduce short-term productivity in the immediate area, but this represents a small portion of the whole disposal site, which itself is only a small fraction of a percent of the system's overall productivity. In addition, the impact is intermittent, and ends with the completion of the disposal project. Containment areas, and to a lesser extent, capping of ocean disposal sites and filling existing pits , do ultimately remove a portion of the water column from productivity. Again, however, the portion effected is of minimal consequence, especially in a non-nutrient limited estuarine community as exists in the Lower Bay.

b. Wildlife impacts are restricted to upland disposal sites. None of the current or proposed aquatic alternatives are used by birds or other animals. An upland site, on the other hand, could include undisturbed or abandoned and unclaimed habitats that are used by birds and small mammals. Use of such sites would deny that habitat to those animals, and destroy any that are residents within its boundary. Animals that might use an upland site as part of their overall foraging range would have part of that range reduced, and those with marginal territory could perish as a result. As such sites would likely be fenced to keep animals and humans out (thereby preventing their taking up of contaminants and/or disrupting the integrity of the site), the habitat loss would be permanent. Such would be more likely for mammals than birds. Providing such a site is carefully selected to avoid critical habitats (a major siting criteria), such loss would be minor and inconsequential to the overall populations of effected species. The two sites still under consideration are both disturbed and of minor wildlife value.

* *

4.4 Wetlands and Endangered/Threatened Species Impacts

a. None of the disposal alternatives considered would have an adverse impact on wetlands; the two upland sites can be laid out to avoid wetlands on their property (a regulatory site criteria). Additional site-specific work on acreage and values remains before a detailed assessment of impacts from either site is completed.

b. Federally endangered species that may occur in the project area include the shortnose sturgeon, bald eagle and peregrine falcon; the piping plover is currently on the Federal list of Threatened species, and the roseate tern is endangered. State Endangered/ Threatened species include the Rosette, Common, and Least terns, as well as the osprey, Northern Harrier, Black Skimmer, Great Blue Heron, and Atlantic Sturgeon. None of these species currently utilize borrow pits or Bay habitats being considered for new pits or containment areas, other than on a transient basis. None nest on any of the upland sites under consideration, though some upland sites and containment islands have been successfully utilized by shorebirds (Newling and Landin, 1985). None of the feasible disposal alternatives would negatively impact these species, though some (islands and upland sites) could be beneficial in creating new habitat or restoring degraded areas.

4.5 Cultural Resources Impacts

a. No intact cultural resources eligible for listing on the National Register of Historic Places (NRHP) are known or expected to remain in any of the existing borrow pits. These areas have been extensively disturbed by previous dredging. Therefore, utilizing an existing borrow pit for the disposal of dredged material would have no effect on any NRHP eligible properties.

b. No historic properties eligible for or listed on the NRHP are currently known to exist at any of the proposed new borrow areas. However, no systematic survey of the new borrow areas had been made prior to the preparation of this EIS. If intact historic properties eligible for listing on the NRHP were identified at a new borrow area, those properties could be adversely affected by project actions. In order to evaluate the potential for impacts, it was necessary to first locate possible cultural resources. Section 3.5 details the procedures used to make those determination. Impacts to cultural resources arising from the construction of a new borrow pit and measures which would avoid those impacts are discussed below.

c. Alternative disposal methods may also cause impacts to cultural resources. The construction of a containment facility could disturb and compact fragile sites as well as blocking access for future researches. Associated impacts would be evaluated as part of the planning and review process for a containment facility, if that alternative is pursued. If upland sites which have not received previous cultural resource review are selected as disposal areas, a site-specific analysis of cultural resource impacts will be required. Those studies would be undertaken when the site selection process is further advanced.

4.5.1 Impacts to Cultural Resources in Lower New York Bay

4.5.1.1 Impacts to Prehistoric Resources

a. The Corps assessment of the potential for prehistoric settlement of New York Harbor in general, and in Lower New York Bay bottom in particular, is discussed in Section 3.5.2.1. The assessment suggested that portions of Lower New York Bay have the potential to contain a post Pleistocene land surface that may have evidence of prehistoric human utilization (NYD, 1986b). It is very probable that any preserved prehistoric resources identified in Lower New York Bay would be found to be eligible for listing in the NRHP under Criterion D of 86 CFR part 60, due to their rarity and importance in advancing knowledge of life and culture of indigenous peoples before the advent of written records. The Corps assessment concluded that creation of a new borrow pit in the vicinity of Ambrose or Sandy Hook Channels is not expected to have any impact on such preserved prehistoric remains (Figure 8).

b. The screening process which identified the East Bank and Lower Bay Borrow Areas as potential new pit sites is discussed in Sections 2.3.2.4 and 4.5.2. A remote sensing survey of the East Bank and Lower Bay borrow areas was conducted for the Corps by OSI (1989). That study concluded that no prehistoric sites were preserved in the East Bank area. On the basis of that study the New York State Historic Preservation Officer (SHPO) and the Corps are of the opinion that the creation of a new borrow pit in the East Bank area will have no effect on prehistoric resources. In the Lower Bay area, geological features, interpreted as post-glacial river and stream channels, were identified in the southern third of the survey area. In their final report, OSI (1989) concluded that erosional processes associated with marine transgression during the inundation of Lower New York Bay could have destroyed most of the archaeological evidence associated with prehistoric utilization of the Lower Bay. However, additional core data would be needed to confirm this (OSI, 1989). On the basis of this study the Corps is of the opinion that of the areas surveyed for this EIS, only the southern half of the Lower Bay Area has any potential for prehistoric resources. Use of this area for a new pit site would therefore require (as mitigation) examination of core data to confirm the destruction of potential evidence or document such evidence if it still exists, before any pit is dug. Once such documentation is completed, a pit could be dug without further impact. This finding has been reviewed by SHPO's of both NY and NJ, who concur with its basic conclusion (appendix F). Therefore, pending review of the New York and New Jersey SHPOs, the Corps has recommended that core data be studied further if a borrow pit is sited in the southern half of the Lower Bay Area.

4.5.1.2 Impacts to Historic Resources

a. Historic resources potentially present in Lower New York Bay include shipwrecks and other isolated artifacts. As discussed in Section 3.5.2.2, a remote sensing survey of the two preferred new pit areas (Figure 32) was conducted to identify possible historic resources. For maximum coverage of the area and the variety of shipwrecks that could be present, this remote sensing survey combined side-scan sonar, magnetometer surveys, and subbottom profiling.

b. In the East Bank area 20 side-scan targets and 84 magnetometer anomalies were classified as being possible or probable cultural resources (PCR). Combined analysis of magnetometer, side scan, and subbottom profiling data led to the identification of twelve potential shipwreck sites. The northern half of the East Bank area contained greater number of targets than did the southern half (OSI. 1988). In the Lower Bay area 30 side scan targets and 58 magnetometer anomalies were classified PCRs. The interpretation of all remote sensing data indicates that fifteen possible shipwreck sites exist in the Lower Bay area. The PCRs were distributed fairly evenly across the survey area. If any of these are in the impact area of a proposed pit, underwater archaeological investigations would be needed to determine if any of these resources are eligible for listing on the NRHP.

c. The OSI data has been reviewed by Corps staff in order to assess the impacts that creation of a new borrow pit might have on PCRs. The purpose of this analysis was to ideally locate areas for pit construction that would avoid all PCRs and eliminate all impacts to cultural resources. As part of this process, it was decided that a buffer zone of approximately 200 feet would be necessary to protect PCRs from indirect impacts caused by sediment slumpage or shifting during construction. The size of the buffer zone may be adjusted on the basis of additional sedimentary data upon the selection of an actual pit. Possible pit sites were located by overlaying a borrow pit template with a diameter of 1900 feet (1500 feet, the minimum size of a circular borrow pit, plus a 200 foot buffer zone added to the pit's circumference). Using this method, it has been possible to locate four possible pits which will avoid all PCRs and potential shipwrecks. All four pit locations area in the southern half of the East Bank area (Figure 33).

d. On the basis of the analysis completed to date, the Corps is of the opinion that construction of a borrow pit 1500 feet in diameter with a buffer zone of 200 feet sited in any of the four locations shown on Figure 33 will have no effect on historic properties. The SHPOs of New York and New Jersey have been notified of this determination and furnished with the supporting documentation on which it is based, in compliance with Section 106 of the Historic Preservation Act, as amended, and 86 CFR Part 800.5(b) of the Advisory Council on Historic Preservation Regulations (March 22, 1990, a and b). The New York SHPO has concurred with this determination of No Effect for the four East Bank locations identified on Figure 33 (letter dated April 27, 1990).

e. If a decision is made to construct a borrow pit larger than 1500 feet, or to locate the borrow pit in another part of the East Bank area or in the Lower Bay area, then PCRs may be impacted. In that case, borrow pit site selection should give priority to avoiding those PCRs which have a strong likelihood of being shipwreck sites rather than isolated PCRs. This recommendation assumes that there is a greater likelihood that a shipwreck site will be found to be eligible for listing on the NRHP, than would an isolated artifact. However, all PCRs and possible shipwreck sites disturbed, either directly or indirectly, by the construction of the new borrow pit would have to be subjected to underwater archaeological investigation as a site-specific mitigation measure prior to the initiation of construction. The resources would be evaluated against the criteria for inclusion on the NRHP, and the SHPO consulted for a determination of eligibility. If the property is found to be eligible for listing and if it is determined that the project will have an adverse effect, further coordination with the SHPO and the Advisory Council on Historic Preservation would be required, pursuant to 36 CFR Part 800. Alternative measures for avoiding, minimizing, or mitigating for impacts would have to developed and evaluated. Use of any of the four identified sites, however, would not require additional study, as they have already been determined to have no impact on historical resources.

4.6 Air Quality Impacts

Alternatives that require construction are likely to result in increased air pollution from vessel and dredge emissions that would otherwise not occur without such extended use. Construction of a new borrow pit, however, would occur only if there were sufficient demand for the sand removed from the pit. As such a demand would likely still need to be met if the pit weren't dug, it is unlikely that such an action would significantly increase emissions over projected without-project conditions. Use of any alternative other than ocean disposal (mud dump or new site) would decrease the transit time of disposal barges, to and from the site, thereby potentially decreasing emissions over the life of the site. It is likely this would result in only minor, if any, overall improvement as the number of trips would increase, since most operations run 24 hours a day. The only extensive overall increases in emissions that could contribute to potential degradation of existing air quality standards might occur from the use of upland sites. Heavy equipment needed for site development would add to the existing traffic in areas like Elizabeth, thereby increasing overall congestion and vehicle emissions. This would be a short-term degradation, ending when the site was constructed.

4.7 Socioeconomic Impacts

a. The primary economic use of the study area is recreational and, to a lesser extent, commercial fishing. Use of the ocean disposal option would not impact such a resource, at least in the short term, as the area is already degraded and closed to shellfishing. Continued use of the Mud Dump for disposing of polluted sediments could however, result in maintaining the status quo with regard to the role of dredge material disposal on contaminant levels and uptake on the Bight. The Mud Dump site has not been implicated as the primary (or even a major) source of biologically available contaminants (USEPA, 1982; NYD, 1983), but obviously does contribute to the overall problem. The ability of its sediments to bind many of the contaminants (especially heavy metals) and the practice of isolating contaminated sediments under a cap of cleaner sediments reduces the magnitude of this contribution. However, some contaminants likely find their way into the food web during the act of disposal, or (perhaps to a lesser degree) after disposal. The potential harm of these contaminants can be increased by biomagnification. As the Mud Dump site is not a home to a stationary population of fish, the level of such uptake is minimized. However, as the released contaminants become part of the dynamic estuarine flow, their influence extends beyond the boundaries of the Mud Dump. Therefore, an alternative that reduces or eliminates placement of contaminated sediments at the Mud Dump site will help reduce such future sources of contamination (however small they may now be). Borrow pits, containment facilities, and upland disposal all offer such a potential improvement.

b. Use of a secure site like a borrow pit or containment facility would further reduce the already low contribution of disposal sediments to overall degradation of the Bight. This would then reduce the indirect long-term impact to the fishery. However, as a source of new impacts to the ecosystem, the short-term effects from these disposal alternatives are more detrimental than use of the Mud Dump. Each of these alternatives results in loss or alteration of fishery habitat. The existing borrow pits habitats are especially heavily used by fish, and loss could spread fish out and make them more difficult to catch. On the other hand, such a dispersion could also reduce their exposure to contaminants that are more likely to be found associated with the fine-grain sediments characteristically accumulating in borrow pits. The primary groups effected by such loss would be recreational fishermen and possibly commercial lobstering. While it is unlikely that such an impact would perceptibly alter recreational fishing, angler success in the immediate area might diminish by spreading their target species out. The effect on lobstering is unknown, since no records exist to show what portion of a lobster catch comes from such pits. Lobstering is known to occur throughout the Bay Complex and harbor. During the MSRC fishery sampling, lobsters were caught in equal or greater numbers at stations in eastern Raritan Bay, as well as Raritan and Chapel Hill channels (Woodhead and McCafferty, 1986). With only one pit being filled, the impact is likely to be minimal. Use of an upland site on the other hand would reduce the long-term degradation of the Bight without producing a noticeable short-term effect on catch. By careful selection of a low productivity site for a containment facility or new pit, short-term fishing impacts (including lobstering) could be substantially minimized. By filling an existing pit its resource would equal that of the surrounding shoals rather than being lost.

c. Though the NYD is not concerned with achieving a particular end use for a disposal site, there could be an economic advantage to using a containment facility, in that fast land would be created that could be developed for port facilities, power-generation, refuse incineration, parkland, wildlife refuge, or disposal uses away from residential impacts. An upland site, on the other hand, may have a negative impact by taking a potential development parcel out of use, or requiring extensive added work before anyone might use such a site. Aesthetically, neither the current Mud Dump site or a borrow pit would produce any noticeable impact, while a containment area and (even more likely) an upland site could be considered an adverse impact, depending on the site and how it is developed. Neither need be a serious impediment if properly built and landscaped to reduce any negative impact. If properly designed and landscaped, and sited in an area of abandoned or neglected use, an upland site could even be a positive visual improvement. A containment facility could be similarly treated if adjacent to a landmass, or serve as a pleasant visual stimuli in terms of an island in a bay system generally devoid of such features. Both could even serve as recreational areas in an urban climate whose current regional facilities are often strained.

d. Alternatives like existing or proposed new pits, or containment areas will be of special concern simply because of their proximity to residential, recreational areas (beaches and fishing) as well as wildlife refuges and nesting habitats. Because these alternatives are considerably nearer to shore than the ocean site, the public's perception of potential harm might be heightened by their proposed use. The public fear associated with the disposal of contaminated materials produces an environment that mistakenly favors solutions that are at least perceived as getting the material as far away from populated or heavily used areas as possible. Consequently, resistance to borrow pits or containment areas may be based more on their perceived danger than their actual potential for impacts. Though studies at the Mud Dump indicate it is an effective technique for disposing of dredged material (including some sediments not considered suitable for unrestricted ocean disposal, providing they are capped), borrow pits and containment facilities offer even greater protection from bioturbation and sediment loss. Thus, in reality, both alternatives offer a greater protection against slow/continual loss of contaminants or sudden release of contaminant-bound sediments, than the current ocean disposal practice. In view of their excellent potential for greater long-term securement of dredged material, they are more preferable than continued use of an ocean disposal mound for material judged unsuitable for unrestricted ocean disposal. In that filling a borrow pit removes an existing sources of contaminants while restoring natural habitat, it may be considered preferable.

4.8 Health Impacts

a. Impacts to human health revolve around potential for introducing a given contaminant to the human system. This can occur directly by contact/ingestion or indirectly by consuming organisms that contain such materials. Impacts from the former are directly proportional to the alternative's ability to sequester such substances from the marine environment. Tests on sediments from Newtown Creek have shown that an above surface cap less than two feet thick was able to prevent transfer of PCB's and heavy metals into the adjacent water column (Brannon et al., 1985). The borrow pit, containment area, and upland alternatives offer even greater potential isolation of contaminants, thus lessening such danger (see section 4.1 above). Escape of contaminants into the environment from pits and islands would be minor, considering the strength of the chemical bond to sediments and the sequestered nature of their environment (see 4.2.1); certainly no more (and most likely much less) than what might be lost from a capped ocean disposal site. Site failure, and the consequent loss of major portions of the disposal material, is a small likelihood from any of the alternatives, with the contained deposit in pits or upland sites having the greatest security (see 4.2.1). Leaching through rainwater runoff and/or percolation at an upland or containment area site, however, could conceivably result in a danger of groundwater pollution. Though neither of the two upland sites under consideration are in close proximity to aquifers that may become contaminated by such leachate, the confined and isolated nature of containment areas provides a more ideal environment in which to control such occurrences. While proper site selection has minimized the potential for loss of contaminants;

appropriate design and management procedures will reduce the threat of hazards even further (MPI, 1986).

b. Among the pit alternatives, existing pits do accumulate sediments most likely to contain contaminants and therefore offer a potential source of uptake and accumulation into fish and shellfish. Filling these instead of constructing new one could thus be considered a positive (though unquantifiable) impact in that it would minimize contamination of a food source.

4.9 Secondary and Cumulative Impacts

4.9.1 Cummulative Impacts from Use of Existing Pits

a. Filling of one of the acceptable pits identified in section 2.3.2.3 would remove up to one-third of such habitat from the Lower Bay complex. It would also replace a smaller percentage (but equal acreage) of original shoal habitat lost when the pit was dug. Filling in all four acceptable pits would increase this figure to roughly three-quarters of such habitat lost, while essentially restoring nearly all of the Lower Bay complex (outside the channels) to its original depth and sediment distribution. As these deep water areas are proven to contain some of the highest density and diversity of fish populations within the Lower Bay Complex, loss of such a large portion of deep-water habitat is a concern, especially to recreational (and a lesser extent commercial) fishermen. The validity of this concern depends on how the fish use the pits. Based on Woodhead and McAfferty's (1986) recent study the pits have an average annual catch of nearly 4,500 fish/station, while very similar deep channels have a 3,800 fish/station average. Both these habitats greatly exceed annual catches in the adjacent shoals (including the heavily fished Romer Shoal and Flyns Knoll). Based on the proportion of catches between deep and shallow water habitat, and eliminating the very shallow water areas that weren't sampled (under six foot depths), one could project that over half the Lower Bay Complex fish could be found in channels or borrow pits. Obviously, excluding the very shallow water habitats skewed this extrapolation toward higher estimates for deep water habitats than likely exist; exclusion of the productive Bight waters outside the Bay (to which most migrants go) also adds to this sizeable overestimate.

b. Even with the above exaggerations of estimated deep water use, the borrow pits still account for less than half the total deep-water habitat (by area). Taking into account their greater fish abundances, a rough, worst-case projection might predict that up to 20% of the Bay fishery could be within the pit habitats at any given time. In reality, this figure is likely a substantial overestimate. However, using this as a basis for a worst-case analysis of impacts, the large

East Bank pit (6), which encompasses an area equal to nearly one-quarter of the total borrow pit habitat, would therefore contain some 5% of the total fish population at any given time. Even if all these fish were lost if the pit were filled, it is unlikely that such an impact would be detectable. If the impact were compounded by losing a second pit (4), still less than 8% of the overall fishery would be effected. As more pits are filled the cumulative loss would increase, eventually reaching a point were the proportion of fish effected would impact substantially on harvest rates and productivity. Cumulative impacts would thus only be felt if multiple pits were filled as disposal sites, and then only if one assumed filling a pit killed the entire portion of fishery so effected.

c. Such a worst-case projection is, however, unreasonable. Based on the manner in which fish likely utilize the pit habitat (3.4.2), little, if any, loss of fish would actually be expected from filling a pit (4.3.2). The fish community is in a constant state of flux, no one population lives exclusively in the pits, and there is free exchange among the pit, channel and shoal habitats of the Lower Bay Complex. Most of the effected fish would thus be expected to occupy the remaining deep and shallow habitats of the bay, where ample habitat and food is available to compensate for the loss of a pit. Only if the ecosystem were at its carrying capacity now would there be no room to accommodate the portion of fish now utilizing the largest pit. Given historic accounts of a much greater fishery, along with the fact that the pits do not appear to play a major role as a critical food source, nor do they contain (as a whole) substantial portions of the benthic or planktonic communities (which do serve as a primary source of food for fish), such a condition is not likely. Loss of additional pits would progressively increase the strain on the remaining resources, but since they only represent a small portion of the overall available habitat, the strain is not likely to become a problem (if ever) only after several pits are filled. Such an action could only occur from future expansion of the present proposal, as there is no other activity that would result in filling a pit. Future expansion would only be considered after careful review of the impacts of filling the first pit, and then only if a need for a second pit could be established. If the review confirmed the predictions made in sections 4.3.2, then no cumulative impact would result from an expansion. If the impacts were considered too substantial then the expansion would not be proposed or approved, and again, no cumulative impacts would occur, as no additional pit would be filled. Under no scenario then, would a cumulative impact derived from loss of multiple pit habitats be likely.

4.9.2 Cummulative Impacts from Use of New Pits

a. Cummulative impacts could also be envisioned if a new pit were constructed, though under this alternative, the impact would arise from lose of shoal habitat, not pit habitat. Unlike filling existing pits, there are other activities (aside from constructing a disposal site) that might result in additional pits being dug. Sand mining and/or beach nourishment are two prominent actions that would also result in new pits. In conjunction with the construction of a disposal pit, there could be a cumulative impact from the overall loss of shoal habitat. The short-term impact would be minimized if pit sites were selected to reflect shoal areas of lowest productivity, thereby minimizing impacts to aquatic communities (see 4.3.2). The lower abundances of fish at the shoal sites also serves to reduce the overall impact on the fishery. Long-term cumulative impacts would be essentially nonexistent, as the disposal pits would be filled and returned to ambient conditions (no permanent habitat loss), with rapid recolonization (4.3.2).

b. Since the areas proposed for new pit sites were chosen for their presence of construction grade sand (2.3.2), the need for additional sand mining activities occurring simultaneously with the construction of a new pit is unlikely. Even if NYOGS historical mining areas on the East Bank are again proposed (and approved) for use, only the NYOGS site is likely to represent a long-term loss of shoal habitat. Sand from the disposal site would satisfy market needs, at least during its construction. If demand remained high while the disposal site were being used, then some short-term increase in the loss of shoal habitats would likely occur from the resumption of sand mining. However, the cumulative loss would be reversed once the disposal site were filled, leaving only the impact of shoal habitat lost from sand mining. The sole source of long-term impacts (permanent habitat loss) would thus only result from sand mining. Such impacts (along with measures to mitigate and/or minimize losses) will be addressed during the environmental review of any proposed sand mining activity by either New York or New Jersey. For this project (borrow pits) it is reasonable to conclude that there will be no cumulative impacts from aditional shoal habitat lost, as all such losses will be short-term.

c. Digging sand as a source of material to nourish nearby beaches is a well established practise throughout the NYD. To the extent practicable, such sand is obtained from routine maintenance dredging of authorized channels. Major actions involving large reaches of beach, often require volumes of sand much greater than routine dredging can provide. Within the Bight Transect, only one such potential large-scale beach nourishment job is being studied. The proposed nourishment of Coney Island beach, along the southwestern shore of New York city's boro of Brooklyn, would require the borrowing and pumping of millions of cys of sand from a source within Lower New York Bay (Jamaica Bay sediments being unsuitable and Raritan/Sandy Hook Bays too far). The project is still under design, so that final plans have not been completed, let alone approved. However, the primary candidate site for the borrow source is the East Bank. In conjunction with a new disposal pit, this could result in an increased short-term loss of shoal habitat in the eastern portion of the Lower Bay complex. Again, as with sand mining, the cumulative loss would be reversed when the disposal pit site was filled and returned to its former shoal conditions. The short-term impact would be minimized further by the lower fish abundances along this shoal, and the screening process that pinpoints and selects for the least productive benthic areas within it.

Any long-term impacts remaining after closure of the disposal pit would be limited to those resulting from excavating the final borrow site for Coney Island, which will be addressed separately during the NEPA review for that project. With respect to borrow pits then, cumulative impacts derived from their construction occurring in conjunction with sand mining and/or beach nourishment would be temporary, and not result in the permanent compounding of shoal habitat losses.

d. A potential environmental benefit might, however, be derived from considering sand mining and disposal needs as closely linked. If an established need for additional disposal sites were to be determined, consideration might be made to using pits created by the sand miners. Besides returning the mining pit to its natural state, additional mining pits might now be permitted without fear of increasing long-term (permanent) loss of shoal habitats. Close coordination of the two programs could then essentially eliminate the need for separate pits, thereby minimizing or eliminating potentially adverse cumulative impacts that an aggressive sand mining program might produce on its own. Unfortunately, there is little opportunity to similarly consider linking beach nourishment and disposal goals. Since any beach nourishment project includes long-term maintenance needs (50 years) in its identification of borrow areas, placing contaminated material in or near such sites would represent a danger of pumping such material onto the beach. Because of such conflicting needs, the two sites should be well buffered from each other; in fact, close coordination within the NYD is occurring to provide sufficient safety margins as to preclude such an occurrence.

e. An interesting aside exists in considering these non-disposal pits (mining and nourishment) in conjunction with the immediate use of an existing pit. Should any of the monitoring programs lead to new data that might suggest a more important role of pits to the overall fishery, then the pits created by either of these independent actions (sand mining or beach nourishment) might be viewed as restoration or new habitat creation. Consequently, precautions discussed above regarding potential short-term cumulative habitat loss would no longer be valid. Under this scenario, the additional pits so created would provide a long-term benefit to the fishery that would continue to aid that resource after any disposal pit were filled.

4.9.3 Cummulative Impacts From Use of Other Alternatives

a. The cumulative impact from the use of a containment area/island would likely be the most noticeable to the fishery. This is because each such facility (assuming more are needed) would remove a portion of Bay habitat that would never be replaced. Though undoubtedly some community would develop around the dikes, the Bay floor area would be permanently lost, and not eventually replaced (at least partially) as a filled borrow pit would. Further, as each facility is built and filled, the next would result in a further loss of habitat that would continue for as long as new such structures are built and filled. The recommended 500 acres facility represents less than 1% of the Bay bottom (based on total Bay area). Even the original 1,000 acre island would not even effect 2% of the bottom, and therefore hardly cause an adverse impact to the fishery from its loss. In fact, if the deeper water habitats are indeed more productive (as assumed above) such a loss of shallows would be virtually beyond detection within the overall fishery. Multiple facilities would have to be built before even so much as 5% of the fishery population (on a worst-case) could be effected, and then only if all the fish perish, which is not even a reasonable worst-case projection (most would likely occupy the remaining habitat). Therefore, though most subject to cumulative impacts in terms of increasing habitat permanently lost, this alternative would still not likely produce serious negative environmental impacts unless its use/construction were continued for an extended long-term time frame approaching or exceeding 100 years (assuming 20-25 years of use per site). With respect to wildlife, as a potential source of new (and protected) shorebird habitat, their ability to substantially increase nesting areas for endangered species would be an environmental plus of potentially great importance.

b. Upland disposal, if sited properly, offers little in the realm of negative cumulative impacts. Habitat loss, restricted to disturbed areas, would be of minimal consequence. Groundwater contamination could be a problem, but can be controlled and minimized with good siting. The two sites still under consideration do not represent a problem in this respect. Of even greater concern would be the increasing difficulty of obtaining sufficient vacant land beyond the two parcels currently under consideration (2.2.2.4). Use of both sites (unlikely) would provide sufficient contained storage for approximately 25 years (or more) of disposal needs with minimal adverse environmental impacts.

c. The cumulative impact resulting from continued use of the Mud Dump would be to accelerate its eventual closure date by not reducing the volume of dredged material currently disposed there. At this rate the Mud Dump is scheduled for closure in the mid-1990's, and selection of another alternative for dredge material not meeting criteria for unrestricted ocean disposal could extend that life by perhaps a year. Regardless of the alternative used, the Mud Dump will eventually be closed and another ocean disposal site selected. Therefore, the continued use of the ocean disposal alternative would have little effect on cumulative habitat loss. The more important cumulative impact arising from continued ocean disposal of sediment would be the continued exposure (perhaps increase) in the level of contaminants available to the biotic community of the Bight. In contrast, the other alternatives, each of which would result in greater long-term confinement of the sediments most likely to contain contaminants, would result in a potential reduction in impacts to the Bight.

4.9.4 Secondary Impacts

Secondary impacts of all the alternatives are basically the same. By providing an approved disposal site for the sediments of greatest concern, a major impediment to their dredging is essentially removed. Providing need is established, this means projects will proceed quicker, fewer uncertainties or delays will occur, and projects previously in abeyance (Newtown Creek) would likely now go forward. Under this scenario one could envision increased private development actions and potentially greater expansion of port facilities; increased dredging volume (yearly) might also result. Some caution is however required in attempting to predict the rate of this increase. Most projects requesting ocean disposal are now authorized, possibly with some modification and delay. Few actions have been prevented because of disposal concerns. Furthermore, since all projects will still have to justify their need, it is unlikely that there would be a sudden avalanche of projects coincidental with the approval of any of the four disposal alternatives discussed above. Instead, it is more likely for there to be a modest increase in annual volume as the processing time for permit approval (especially for projects currently under review/development) is reduced. This will likely level off as the vital factors of need and funding take precedence, and the existing backlog is reduced. Little, if any, added disposal volume is thus expected, outside of any major new civil works projects (which will not likely hinge on the availability of disposal sites).

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5.0 List of Preparers

Name	Position/Experience	Role in EIS
Len Houston	Biologist, NYD	EIS coordinator and primary author.
Jan Ferguson	Archaeologist, NYD	Initial analysis of cultural resources and impacts. Literature review and baseline archaeological assessment of resource potential (NYD, 1986).
Roselle Henn	Archaeologist, NYD	Analysis of cultural resources survey for location of new pit sites. Final description of cultural resources and impact sections of FSEIS.
Mario Paula	Oceanographer, NYD	Initial Project manager. Data on pit sites disposal techniques, alternatives, history, sediment testing. Review of DEIS. Author of draft mgmt plan (appendix D)
Patricia Pechko	Oceanographer	Current Project manager. Review FSEIS, revised sediment testing and final mgmt plan
John Tavolaro	Assistant Chief Operations Division	Review of FSEIS, final mgmt plan and comment responses.
Henry Bokuniewicz	Prof. Marine Sci, SUNY at Stonybrook	Disposal procedures and monitoring techniques, physical site screening for old/new pits. Author of Appendix C.
Robert Cerrato	Prof. Marine Sci SUNY at Stonybrook	Current Benthic survey of Lower Bay (Cerrató & Scheier, 1983; Cerrato et al, 1989)
Peter Woodhead	Prof. Marine Sci, SUNY at Stonybrook	Current fishery survey of Lower Bay habitats (Woodhead & McAfferty, 1988).

6.0 Public Involvement

6.1 Past Coordination

a. The concept of using borrow pits arose from a 1977 workshop held by the NYD for the purpose of developing alternatives to continued use of ocean disposal. Upon careful evaluation of all the alternatives developed by the workshop, borrow pits, along with upland disposal, were the only two deemed feasible for large volumes of material (Mitre, 1979). This conclusion was sustained by the more recent EIS on disposal alternatives (NYD, 1983), which concluded that the borrow pit alternative was the environmentally preferable means of disposing of dredged material, including contaminated sediments.

b. To investigate the feasible alternatives more thoroughly, the Dredged Material Disposal Management Plan (DMP) was developed, and an Interagency Steering Committee (SC) set up to administer it. The SC is composed of Federal and State agencies that review and comment on proposed dredged material disposal (see Section 1 for members). To supplement the agency's role a Public Involvement Coordination Group (PICG) was created to give a voice to private and public groups, officials, state/local agencies not represented on the SC, and concerned individuals.

c. During a March 1981 meeting the SC unanimously agreed to carry out a small-scale pilot project to fill a portion of the CAC pit (4), using fine-grained but non-toxic sediments. A Public Notice was released in April 1981, announcing the Corps pilot-project plans. A Public Hearing was held on the subject in June, 1981. Both generated many responses, most of which were opposed to the project because of perceived hazards to Staten Island beaches, and impacts to commercial lobstering and recreational fishing. In October, 1981 the PICG held a meeting on borrow pits, inviting all opponents to express their views. After that, most of the PICG and all of the SC voted to begin the project. In November 1981 DEC issued the necessary water quality certificate to begin the pilot project. The first stage berm construction was completed in December, 1981. However, before any disposal could occur DEC was sued in NY State Court by the Natural Resources Protective Association (NRPA) of Staten Island. The operation was then suspended pending the outcome of the suit against DEC. In May 1982 the court enjoined the project until the existing data could be evaluated with respect to its adequacy in assessing project impacts, especially to the fishery. The order was not appealable and in November 1983 DEC withdrew its water quality certification, requiring that an EIS be prepared to document impacts and alternatives before any new application could be processed. A draft was prepared (NYD, 1984) but the SC subsequently decided enough information now existed, from the results of more recent studies, to obviate the need for a demonstration project, and so recommended that a fully operational program be proposed. This SEIS addresses that operational proposal.

6.2 SEIS Scoping

In Dec. 1985 the NYD issued a Public Information Announcement of their intention to prepare an EIS for use of subaqueous borrow pits to dispose of dredged material not meeting EPA criteria for unrestricted ocean disposal. The announcement included a preliminary scope of work (SOW) for the EIS. The Notice of Intent to prepare an EIS was published in the December 12, 1985 Federal Register, and a public scoping meeting was held at the NYD later that month. Eleven speakers at the public meeting brought up topics as follows: 1) identifying criteria to classify what sediments are eligible for placement into a pit 2) degree of consideration of alternatives 3) Need for an approved disposal method 4) Use of new versus existing pits 5) Ability of a pit to contain all types of disposal material. In addition, fifteen letters were received: 8 favored use of borrow pits (one of the letters restricted its approval to new pits only), two voiced concern about interference with future sand mining operations in NY, another requested sites in the Jamaica Bay Wildlife Sanctuary be removed from consideration, one favored consideration of upland sites, one approved of the SOW, and two provided specific concerns they felt should be addressed. In response to the detailed comments by DEC, meetings were held with their regulatory and marine resources branches. In addition, during the scoping process NYD met with representatives of the original plaintiff (in the lawsuit against DEC) and with elected officials of Staten Island; meetings also were held with NJ-DEP, NY-DEC, and environmental groups and elected officials from the New Jersey shore areas. Partially in response to concerns at the public meeting and from EPA, NYD decided to release the borrow pit analysis as a supplemental EIS, as it actually elaborates on a disposal alternative identified and discussed in the 1983 FEIS on ocean disposal (NYD, 1983). In the April 10, 1986 issue of the Federal Register the NYD announced this intention to issue the document as a Supplemental EIS to the 1983 Dredged Material Disposal EIS.

6.3 Agency and Public Coordination for SEIS

a. After inviting each agency of the SC to serve as a cooperating agency in the preparation of the SEIS, letters of agreement were received from NMFS, EPA, DEP, NYDOS (see appendix F). When filed with EPA, the DSEIS had been reviewed and endorsed by each cooperating agency. During the preparation of the DSEIS the SC and PICG were continually informed of progress, and provided feed-back via their regular meetings. A special meeting of the SC was held to separately discuss important working draft sections of the document concerning material to be placed in a pit, screening criteria, and monitoring/ management plans for operating a site. The PICG was also provided copies of these same sections to review, as where all other interested parties. Meetings on these subjects were also held with the same groups that had met to go over the scoping process (See 6.2 above). The entire completed document was reviewed and commented on by both SC and PICG, and then revised to address their concerns before being transmitted to EPA for formal filing, in a letter dated June 24, 1988.

b. Agencies with specific review/coordination responsibilities were closely consulted during the preparation of the DSEIS. The state agencies charged with coastal zone management (NJDEP and NYDOS) are both represented on the SC, and reviewed and commented on all major elements of the DSEIS, including the full document. Draft CZM consistency determinations were prepared under both NY and NJ policies, (see appendix E) and forwarded to the appropriate state agency for review. Though formal determination of the consistency of a project with CZM policy is not made until the final NEPA documents are filed, both state agencies did review the draft determinations and neither identified any potential inconsistenicies with the NYD conclusion that use of the recommended alternative, as indicated in the DSEIS, was in full compliance with all pertinent state policies. The state agencies charged with review and issuance of Water Quality Certifications (WQC) under section 401 of the Clean Water Act (NJDEP and NYDEC) were similarly consulted. Both are represented on the SC and therefore reviewed and commented on all major portions of the DSEIS, including the full document. On several occasions NYD met separately with staff from DEC and DEP to discuss specific review comments; no major unresolved issues were identified that might hamper issuance of WQC by either state, though both required review of the FSEIS and more detailed site management/monitoring plans before making their formal decision (the latter could be provided after this FSEIS was filed and a specific alternative selected for use). The NY and NJ State Historic Preservation Officers (SHPO) were also consulted, and provided with copies of the NYD analysis of cultural impacts. Both supported the finding that use of existing pits would not adversely impact cultural resources on or eligible for inclusion in the National Register of Historic Sites (see appendix F). SHPO from both states also concurred with the NYD recommendation to conduct a remote sensing survey of potential new pit sites.

c. The Notice of Availability of the DSEIS was published in the July 1, 1988 Federal Register (appendix F). Copies of the DSEIS were sent directly to the SC, PICG, elected officials, and all known interested parties, in a letter dated 24 June 1988. Additional copies of the DSEIS were immediately mailed to all others requesting them. The initial comment period was to end September 9, 1988. At the request of EPA and DEC, a two week extension to the comment period was granted. Three Public Hearings were held on the DSEIS: Jamaica Bay, NY; Staten Island, NY; Middletwon, NJ. The last of these meetings was held on August 24, 1988, with written comments due 15 days later (subsequently extended to thirty days in response to the requests for extension).

6.3.1 Review of DSEIS

a. A total of 105 separate letters and written statements were received in response to the DSEIS and hearings. Of these, 65 objected to all or part of the project (most often to use of a particular pit), 24 supported all or part of the recommended alternatives, with the remainder either limiting comments to portions of the document or asking questions or raising concerns without support/opposition. All letters with substantive comments directed at the DSEIS are reproduced in their entirety in section 6.4, with specific responses to each point made in the letter. Quite a number of written comments were directed at supporting or objecting to the use of borrow pits, without addressing the DSEIS itself. These letters are also reproduced in their entirety in section 6.4, but here the response is essentially an acknowledgment the point of view, with a general response to the whole letter when appropriate. In some cases enclosures would accompany a statement. If the enclosure(s) were not referenced in the text of the statement they are not reproduced or responded to in section 6.4, though they can be found in a supplemental volume (see paragraph b below). For ease of identification, every written comment letter or statement carries a unique number that corresponds to its response number. For those substantive letters/statements addressing multiple points, each point is identified by a lower case letter in the margin of the text, and responded to separately (see 6.4 for examples). Letters are grouped into categories and presented in the following order: first Federal elected officials/agencies; state elected officials/agencies; local, elected officials/agencies; organizations; individuals. Within each group letters are presented in chronological order. All the letters of each group are presented together, followed by their responses.

b. Petitions objecting to the use of specific pits were received. A single example of the petition (along with the total number of signatures received) is as an attachment to comment letter 27 6.4.5.1). Repetitive form letters objecting to the project were also received. The text of one such form letter is reproduced as comment letter 97. Acknowledgment and a response to the petition and form letter can be found in section 6.4.5.2, keyed to the comment number. Copies of all signed petitions and form letters can be found in volume 2. This volume is not included with transmittals of the text of the FSEIS (volume 1), but is available for review at the NYD offices and upon separate request. Also found in volume 2 are the enclosures that were not included with comment letters in section 6.4.

c. During the Public hearings testimony from 108 people was heard. Of these, 11 supported the DSEIS recommendations on the use of borrow pits, 11 supported only a portion of the recommendations (most often the use of new pits rather than existing ones), 39 opposed the entire concept of borrow pit disposal, 38 opposed disposal into specific pits, and 9 commented on other aspects of the project without opposing or supporting it. Testimony at each hearing was essentially limited to objecting or supporting the project, not addressing specific issues of the DSEIS. As no new substantive issues or information were raised beyond those points already made in written comments, the major concerns have been summarized below, without responding to each individual statement. However, transcripts for all three hearings can be found in volume 2. Any written testimony presented at the hearings or during the subsequent comment period has been included with all other written comments in section 6.4, along with appropriate responses. The major issues raised at the hearings centered around fears that the proposed action would adversely impact the bays in which pits were located, reversing current trends of improvement and rendering the area unfit for recreation and human enjoyment. Most speakers cited the absence of similar projects on which to judge the accuracy of projections, claiming the potential damage to the marine system was not worth the risk that the DSEIS conclusions might be proven wrong. Points most often made by opponents included:

(1) Much of the material intended for the pit would be lost during disposal, dispersed by currents and/or inaccurate dumping.

(2) The act of disposal would stir up sediments already in the pit, exposing them to distribution throughout the bay systems.

(3) Once in the pit material would be continually displaced by currents, storms, and nearby deep-draft ship traffic.

(4) Filling pits would result in the loss of a primary fish spawning/nursery area, thereby reducing productivity.

(5) Filling pits would displace large numbers of fish and shellfish, substantially reducing recreational/commercial catches.

(6) Filling pits would expose resident organisms to bioaccumulation and subsequent health risks from consumption.

(7) Perception of "toxic" waste sites in the bay would further aggravate public fears and result in even more loss of recreational business (hard on the heels of a disastrous summer of beach closings and warnings about consumption of fish/shellfish).

(8) Use of one pit is only a short-term solution, and would set precedence for filling other pits later.

d. Other, more specific concerns included adversely impacting the Jamaica Bay wildlife sanctuary, use of filled pits 14 or 15 for extending JKF airport, uniqueness of biological fauna in pit 4, insufficient distribution and/or review time for DSEIS, inability to trace material that might be lost from the pits. A number of speakers that conditionally supported use of new pits only did call for doing so as a small-scale pilot project before committing to a full scale operation. Each of these points has been raised in written comments, and will be addressed in section 6.4, as detailed responses to specific comments.

e. Amongst those supporting the recommendations the major point raised was that dredging is essential to the survival of the port, and the myriad jobs that depend on it, and that borrow pits were clearly demonstrated to be an environmentally acceptable alternative that was also economically viable. Most speakers cited the extensive analysis of alternatives, and the support of the SC and most members of the PICG as a sound basis for implementing the use of borrow pits. Several supporters did recommend initiating the proposal as a demonstration project, filling one pit (new or old), preferably only with category II material, and carefully monitoring to be certain it functioned as predicted, before implementing a full-scale use of the alternative for category II and III material. Some of the specific points raised include:

(1) Pits are now accumulating the fine-grained sediments most associated with contaminants on their own, exposing resident fish and shellfish to a potentially unhealthy environment, and one with no provisions for capping to isolate contaminants and prevent material loss in the future.

(2) Pits are artificial, and do not represent a critical spawning or nursery habitat.

(3) An extensive alternative analysis, updated at least twice since the original conclusion, continues to identify borrow pits as an environmentally preferred alternative to ocean disposal.

(4) Sediments to be placed into the borrow pit are already contaminated. The proposed action would simply move them to a more secure containment area, where they would be less susceptible to resuspension, distribution, and/or bioaccumulation.

(5) The sands in the bay complex are suitable for many construction uses and have an excellent market; mining to create new pits would be desirable to many private contractors.

f. In the October 7, 1988 Federal Register EPA rated the project as LO (appendix F); indicating a lack of objections to the use of subaqueous borrow pits for the disposal of dredged material from NY/NJ harbor. EPA did however, request the program be implemented as a demonstration project, and that land-based alternatives continue to be investigated. None of the other cooperating agencies (NMFS, NYDOS, NJDEP) objected to the overall project either, though they had specific comments with regards to portions of the DSEIS (see comment letters in section 6.4). In fact, no member of the SC disagreed with the use of subaqueous borrow pits for disposal of contaminated dredged material, though there was some disagreement with respect to whether existing or new pits should be used, or if the full project should be implemented without demonstrating the effectiveness of the operation at one site first (see comment letters in 6.4 for specifics).

6.3.2 Finalizing the SEIS

a. Partly in response to the many concerns raised with respect use of pits requiring substantial modifications and new dredging (2,14,15), the NYD discussed this issue at length at meetings with the SC and PICG. Members of both committees responded in writing to this point (see appendix F). The majority of comments recommended removal of the Jamaica Bay pits (14 and 15) from the SEIS as viable alternatives. While the NYD still considers these pits meet the technical criteria for use (as stated in section 2.3.1.2), the three have been reexamined in light of concerns regarding potentially adverse dredging impacts and incompatibility with established wildlife and recreation goals (see 2.3.1.3). Consequently, the FSEIS was modified to reflect a three-tier evaluation of alternatives that first identified technically suitable pits and then assessed their potential for adverse impacts and availability for immediate use. This revised evaluation resulted in the FSEIS recommending against further consideration of pits 2, 14, and 15 as viable alternatives for the disposal of contaminated dredge material. As a result, four pits (3, 4, 6, 7) now remain as viable alternatives for implementing the use of existing pits, and the FSEIS limits its subsequent assessments to these.

b. The revised FSEIS, which included updated information from the most recent study reports, comments received during the review period, and subsequent meetings of the SC and PICG, was transmitted to the North Atlantic Division (NAD) of the Corps for formal filling with EPA (see appendix F). Once filled the FSEIS will be published in the Federal Register with a 30-day review period for receipt of written comments. Copies of the FSEIS will be forwarded to all members of the SC, review agencies, chairpersons of the PICG, all those commenting to the DSEIS, known interested parties, and all others who request same. Public hearings will be scheduled only if sufficient interest or new information warrants. Hearings would most likely in the same geographical areas as those held for the DSEIS; a subsequent PN would be sent to the full mailing list to notify the public of any such hearings in ample time for any testimony to be considered in the decision making process. On completion of the comment period the Corps will assess the comments received and prepare a Record of Decision (ROD) that will outline its final decision, including responses to pertinent comments.

6.4 Response to Written Public Comments

In this section all written comments are reproduced in their entirety, except that any enclosures, unless specifically referred to in a substantive comment, have not be included. The full text of all letters and statements received, including enclosures, is reproduced in a separate volume (2), that is available for review at the district offices, or upon separate request. Comments containing very generalized statements and/or objections or support of the recommended action are responded to in general, often only requiring an acknowledgment of the commenter's position and/or a reference to an particular section of the FSEIS for more details. When appropriate, specific comments within a given letter/statement will be answered individually. In that case each specific comment will be identified in the text by a lower case code letter, with responses keyed to the same lower case letter. Previous responses and pertinent sections of the FSEIS will be referenced to the maximum extent appropriate to avoid duplication of effort. Unless otherwise stated, all references to specific sections of text are to the FSEIS. Comments received are grouped into Federal, state, local, organization, and individual categories. Each category will be responded to separately; all letters within a given category will be presented first, followed by the responses to those letters. For ease in identification, every written comment will carry its own specific numerical designation, and all responses will be keyed by letter number and, if appropriate, specific comment letter (for example: response 5c refers to the third designated comment (c) of comment letter number 5).

6.4.1 Federal Elected Officials and Agencies

6.4.1.1 Federal Comments Received:

(see full text of Federal comment letters beginning on page 6-9; responses to these letters are in section 6.4.1.2 beginning on page 6-32, immediately following the text of all written Federal comments)

BANKING, FINANCE AND URBAN AFFAIRS
HOUSING AND COMMUNITY DEVELOPMENT
GENERAL OVERSIGHT AND INVESTIGATIONS
ECONOMIC STABILIZATION
SMALL BUSINESS
PROCUREMENT, INNOVATION, AND MINORITY ENTERPRISE DEVELOPMENT
REGULATION AND BUSINESS OPPORTUNITIES
SELECT COMMITTEE ON HUNGER

Congress of the United States
House of Representatives
FLOYD H. FLAKE
6TH DISTRICT, NEW YORK

EDWIN C. REED
EXECUTIVE STAFF DIRECTOR
WASHINGTON OFFICE:
1427 LONGWORTH BUILDING
WASHINGTON, DC 20515-3206
(202) 225-3461
JAMAICA OFFICE:
114-60 MERRICK BLVD.
JAMAICA, NY 11434
(718) 657-2968
ROCKAWAY OFFICE:
20-08 SEAGIRT BLVD.
FAR ROCKAWAY, NY 11691
(718) 327-9791

August 18, 1988

STATEMENT BY CONGRESSMAN FLOYD H. FLAKE TO ARMY CORPS OF ENGINEERS ON SUBAQUEOUS BORROW PITS IN JAMAICA BAY/LOWER NEW YORK HARBOR KINGSBORO COLLEGE, BROOKLYN, NEW YORK

As we near the close of this century and look forward to the dawning of a new one, we must move toward the fulfillment of our potential as a nation unsurpassed in technological, humanitarian and economic wealth and ability.

Gov. Cuomo has declared 1988 to be "The Year Of The Child" - in keeping with this pronouncement, we must ensure that our children inherit a world of clean oceans, safe and pollution-free air, pure drinking water and an earth that brings forth, rather than threatens the many forms of life we are blessed with. We can and must use our wealth, talent and technological superiority towards the achievement of those goals if future generations are to live in health and decency on this planet.

The past months have illustrated clearly enough just how badly we have polluted our oceans and coastlines. Hardly a day has gone by since the beginning of summer that has not seen beaches closed because waters were unfit for swimming because of sewage spills, medical waste and high bacteria counts. The eastern seaboard has witnessed huge washes of dead fish and poisoned shellfish beds, as well as the death of countless marine mammals from pollution-related diseases. It is quite obvious, as New York City Health a sending us the message that there is a line beyond which we cannot go." As we look at the long-term impacts of various types of wastes polluting our land and waters, and destroying one of our most precious resources, this plan in terms of long-term impact makes less and less sense, especially in view of the hard lessons we have learned. This plan to excavate for the storage of hazardous and toxic waste in Jamaica Bay and Lower New York Harbor would not only push us over that line, but lead us to a point of no return.

According to the National Oceanic and Atmospheric Administration the chemicals proposed for storage within these pits are dangerous and pose considerable hazards to human and marine life. PCB's are listed as carcinogenic by the EPA, and cause contamination of fish and shellfish; petroleum hydrocarbons are known to cause ecosystem destruction as do heavy metals such as cadmium and lead. New York's waters are already environmentally damaged, and to even consider the placement and storage of these highly toxic materials within it, particularly within Jamaica Bay, which is home to a federally protected wetland and wildlife area, is unthinkable in the least. b

Today we teeter on the brink of an environmental explosion in this area as a result of our short-sightedness. For example the proposed location is in the proximity of the Edgemere landfill, another sanitary and environmental hazard that sits perched on Jamaica Bay, whose real levels of toxicity have yet to be determined. Unless the Army Corps of Engineers can guarantee me

that this project will have absolutely no detrimental or hazardous impact of human, animal and plant life for the next 1 million years, I can not in good conscience support this proposal.

As a federal representative, many long hours were spent to assure the passage of the Water Quality Act of 1987 to ensure clean oceans and drinkable water for today and the tomorrows to come. According to the Water Quality Act of 1987 , New York Harbor would be eligible for federal clean-up under its national estuaries program; this should be the only type of environmental plan available for New York and its waters - a program that focuses on a positive solution to the problem of past pollution We must not seriously entertain any project which could compound our already critical pollution problem.

We must look to new methods of disposal of these chemicals, and we should also refrain from the manufacture and use of compounds that are toxic. One should consider minimal incineration of these materials, with proper safeguards in place to ensure public and environmental safety. In addition, we should enact an

The federal government has been doing its part to counteract the exploitation of our environment through legislation such as the Superfund for toxic clean-up. The real problem exists with the lack of a comprehensive and coordinated policy that would attach a cost for disposal and clean-up of hazardous waste as part of the cost of doing business.

Currently this cost is borne by the federal government with too few incentives for private industry to be an equal partner in this effort. The proposal to use borrow pits is representative of the problem, but is not the real issue. The real issue is that our society has a policy that encourages us to be a highly wasteful society. Our environment has served notice that it can not digest out waste and now we must move aggressively toward eliminating the problem rather than bury the results in and underwater pit to harm future generations.

I vehemently oppose the project for the construction of subaqueous borrow pits in New York Harbor on the grounds that it is unsafe to all living things, and I urge the Army Corps of Engineers to abandon it immediately. Jamaica Bay and New York Harbor need healing not hurting. I am in favor of positive solutions to this problem that do not threaten to turn our bay

CHARLES E. SCHUMER
10TH DISTRICT, NEW YORK

COMMITTEES
BUDGET
BANKING, FINANCE AND URBAN AFFAIRS
JUDICIARY

NEW YORK CITY DEMOCRATIC WHIP

Comment Letter 2

128 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6616

1628 KINGS HIGHWAY
BROOKLYN, NY 11229
(718) 965-5400

1663 10TH AVENUE
BROOKLYN, NY 11215
(718) 965-5055

Congress of the United States
House of Representatives
Washington, DC 20515

Statement of Rep. Charles E. Schumer

Public Hearing on Army Corps of Engineers for Waste Disposal in Jamaica Bay

August 18, 1988

I AM HERE TO STRONGLY OPPOSE THE ARMY CORPS OF ENGINEERS' PROPOSAL FOR JAMAICA BAY. IT IS DANGEROUS, AND-- COMING AFTER THE LESSON OF THIS SUMMER'S CLOSED BEACHES-- REMARKABLY SHORT-SIGHTED.

THE IDEA OF DUMPING 4 MILLION CUBIC YARDS OF TOXIC MATERIAL INTO JAMAICA BAY IS A RIDICULOUS EXPERIMENT THAT PUTS THE HEALTH OF THE CITIZENS OF NEW YORK CITY AT RISK.

I KNOW THAT THERE ARE A VARIETY OF SITES FOR DUMPING UNDER CONSIDERATION, I HAVE NOT VISITED THEM ALL. I DO KNOW THAT THE PLAN FOR JAMAICA BAY IS POORLY THOUGHT OUT AND DANGEROUS. IF THE OTHER SITES ARE AS ILL-CONCEIVED AS THIS ONE, THEN I BELIEVE THE ARMY CORPS OF ENGINEERS MUST GO BACK TO THE DRAWING BOARD AND FIND A SOLUTION THAT DOES NOT ENDANGER OUR WATERS, AND THE PUBLIC'S HEALTH. a

INDEED, THE ARMY CORPS OF ENGINEERS ADMITS THAT IT COULD BE PLAYING DICE WITH NEW YORKERS' FUTURE. THE CORPS OF ENGINEERS' ENVIRONMENTAL IMPACT STATEMENT STATES "THE REMAINING UNRESOLVED ISSUES CENTER AROUND THE SECURITY OF THE BORROW PIT CONTAINMENT SITE....(THE PROCEDURE) HAS YET TO BE VERIFIED IN A FULL SCALE OPERATION." b

THE REPORT CONCLUDES "...THE ISSUE OF ITS ACTUAL ABILITY TO AVOID ADVERSE IMPACTS TO FISHERY, WHILE ALSO CONTAINING POLLUTANTS IN THE FACE OF BIOLOGICAL AND PHYSICAL EROSIONAL PROCESSES, MUST AWAIT THE IMPLEMENTATION OF THE PROJECT."

WE CANNOT TAKE A WAIT AND SEE ATTITUDE WITH TOXIC DUMPING. HEAVY METALS, LEAD AND PCB'S ARE JUST SOME OF THE DEADLY CONTAINMENTS THAT WOULD BE DUMPED, RIGHT INTO THE BAY. PCB'S ALONE ARE ONE OF THE MOST DANGEROUS AND LONG-LIVED COMPOUNDS. BECAUSE THEY ARE ALMOST IMPOSSIBLE TO DESTROY, PCB'S WHEN INGESTED BY FISH, WILL LATER BE INGESTED BY THE PEOPLE WHO EAT THE FISH. THIS IS CALLED BIO-ACCUMULATION, AND IT MEANS THAT WHAT HAPPENS AT ONE END OF THE FOOD CHAIN WILL SURELY COME BACK TO HAUNT US. c

WHEN PCB'S GOT INTO THE FOOD CHAIN IN MICHIGAN THEY COST MILLIONS OF DOLLARS, FORCED THE SLAUGHTER OF THOUSANDS OF COWS, AND THREATENED PUBLIC HEALTH.

WHAT MAKES THE PROPOSED DUMPING EVEN MORE TRAGIC IS THAT IT WOULD UNDO ALL THE PREVIOUS WORK THAT HAS BEEN DONE. AT LEAST $300 MILLION HAS BEEN SPENT IN THE LAST FEW YEARS CLEANING UP THE BAY. MAKING IT SOMETHING NEW YORKERS COULD BE PROUD OF. WHY DO WE NOW WANT TO BACKTRACK? WHAT WE SHOULD BE DOING IS PLANNING WAYS TO MAKE THE BAY CLEANER. d

TO THE PEOPLE WHO LIVE AROUND THE BAY, THE FISHERMEN WHO WORK IN IT, THE NEIGHBORS WHO VISIT ITS SHORE OR SAIL IN ITS WATERS, ENVIRONMENT IS NOT ABSTRACT PROBLEM. WE WILL NOT TOLERATE A BAY THAT IS GETTING DIRTIER.

STEPHEN J. SOLARZ
13TH DISTRICT, NEW YORK

COMMITTEES:
FOREIGN AFFAIRS
CHAIRMAN, SUBCOMMITTEE ON ASIAN AND PACIFIC AFFAIRS
JOINT ECONOMIC COMMITTEE
EDUCATION AND LABOR
POST OFFICE AND CIVIL SERVICE

Congress of the United States
House of Representatives
Washington, DC

WASHINGTON OFFICE:
1536 LONGWORTH HOUSE OFFICE BUILDING
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532 NEPTUNE AVENUE
BROOKLYN, NY 11224
(718) 372-8600

619 LORIMER STREET
BROOKLYN, NY 11211
(718) 706-6603

356 COURT STREET
BROOKLYN, NY 11231
(718) 802-1400

Hearing date: August 18

Location: Kingsboro Community College

Time: 7pm

Dear Chairman:

Congressman Stephen J. Solarz would like to submit the following statement:

It has been impossible to turn on the television or read the newspapers this summer without coming across some reference to the serious pollution problems plaguing New York's shoreline. This area of Brooklyn alone has closed its beaches several times for health reasons.

It is understandable, therefore, that Brooklyn residents are extremely concerned about any new project that might cause additional environmental damage. The Army Corps of Engineers, who have an excellent record for carefully implementing complex and delicate environmental projects, might be running into serious opposition to the proposed dredging of material project because of the unrelated environmental problems. The project to use borrow pits for the disposal of dredged material must, however, a be carefully examined on its own merits.

After examining the draft Environmental Impact Statement (EIS), I reached some relucant conclusions. First, the Army Corp must proceed with extreme caution in implementing this complicated and difficult underwater operation given the toxic nature of the material. Second, the federal government must go several extra miles to guarantee New York Harbor's safety for residents and vistors.

Several established, highly respected environmental groups have raised profound, serious objections about the entire project. The fact that PCB, one of the most toxic chemicals known, must be transplanted raises immediate safety concerns. This summer's tragic events have shown how fragile and senstitive our Shorefront beaches really are to manmade hazards.

I wish the actual details of the proposed diggings would alleviate these obvious environmental concerns. Unfortunately, the EIS only raises additional questions about the project. Why, for instance, must the Army Corp relocate PCB toxic matter <u>closer</u> to the shoreline? b Why does the plan call for additional use of borrow pits located in the Jamacia Bay area, one of the last remaining areas where aquatic life flourishes? c The selection of the CAC pit, already full of toxic material, also appears a serious potential public health risk. d

Several environmentalists warn that the project threathens to both destroy rare aquatic life and threathen the health and safety of beachgoers. I know the possiblity of Rockaway Beach, Coney Island, Brighton Beach, and Manhattan Beach actually being destroyed by released PCBs appears very, very remote. Worst case scenarios and environmental nightmares seldom come true. Still, the possiblity does give me reason to pause. I ask myself, "is this project absolutely neccessary?"

e

f

An almost identical plan was rejected by the Army Corps seven years ago for these same reasons. I see no compelling reason why this project must go forward today, and no evidence that any of the sensitive environmental conditions that led to the project's cancellation seven years have changed. It seems mildly ironic that just as the general public is becoming genuinely concerned about the health of our rivers and oceans that the Army Corps would decide to push for this highly controversial proposal.

g

Perhaps I am overly senstive to environmental problems on Brooklyn's southern shore. It has been a rough summer for Brooklyn's beach lovers. We have watched medical syringes, dead rats, and raw sewage wash up on our favorite beaches. The City, out of genuine fear for the public's safety, has continually closed Coney Island, Brighton Beach, and Manhattan Beach to swimmers while temperatures soared over 90 degrees. New environmental dangers and fears haunt the Brooklyn community.

I admire and trust the Army Corps to design, plan, and implement the most environmentally delicate projects. But, given the serious questions about the site selection of the borrow pit areas and a summer of continual environmental alerts, I think it is better to err on the side of safety. The risks are just too great.

I understand the desire- perhaps even the need- to dredge the New York Harbor to help revitalize our shipping industry. I do hope we can reconcile our desire for economic growth with those of environmental safety. But, sometimes, we have to make tough decisions between unpleasant alternatives. New York City suffers from enough environmental hazards already. Our air violates the Clean Air Act standards. Our sewage treatment plants violate federal health standards. Our beaches make national headlines with horror stories. We have paid a terrible price for occasionally overlooking longterm environmental problems while expanding our business sectors.

I remain confident that the Army Corps of Engineers can implement an environmentally safe and sound project that balances the competing needs of the shipping industry and the public safety. Unfortunately, this proposal fails to alleviate the serious questions about environmental safety.

Thank you for your time and attention.

Sincerely,

STEPHEN J. SOLARZ
Member of Congress

SJS/er:a:a

U.S. Department of Housing and Urban Development
New York Regional Office, Region II
Jacob K. Javits Federal Building
New York, New York 10278-0068

Comment Letter 4

JUN 27 1988

District Engineer
Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, NY 10278

Dear Sir:

SUBJECT: Draft Supplemental Environmental Impact Statement
Use of Subaqueous Borrow Pits for Disposal of Dredged Material
Port of New York - New Jersey

We have reviewed the subject document and have no comment to offer concerning the subject proposal described therein.

Thank you for the opportunity to comment on the captioned draft supplemental environmental impact statement.

Sincerely,

Marvin H. Krotenberg
Regional Environmental Officer

Comment Letter 5

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE
ROOM 729, LEO W. O'BRIEN FEDERAL BUILDING
ALBANY, NEW YORK 12207

July 7, 1988

IN REPLY REFER TO:

HEP-01

Colonel Marion C. Caldwell
District Engineer
U.S. Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York City, New York 10278

Dear Colonel Caldwell:

This is in reply to Mr. Richard Maraldo's June 24, 1988 letter which requested comments on the Draft Supplemental Environmental Impact Statement for the proposed use of subaqueous borrow pits for disposal of dredged material from the Port of New York and New Jersey.

Based upon our review of this document, we have no specific comments to offer. However, we have forwarded a copy to our New York and New Jersey Division Offices for their further review. Any comments which they may have will be sent directly to you.

We appreciate the opportunity to review and comment on this proposed action.

Sincerely,

C. D. Reagan, Director
Office of Planning and Program Development

Comment Letter 6

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
BOSTON FEDERAL OFFICE BUILDING
ROOM 1022
10 CAUSEWAY STREET
BOSTON, MASSACHUSETTS 02222—1035

ER 88/577

August 2, 1987

Richard Maraldo, P.E.
Acting Chief, Planning Division
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Maraldo:

This responds to your letter of June 24, 1988 requesting that the Department of the Interior review and comment on the Draft Supplemental Environmental Impact Statement on the proposed use of subaqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey.

General Comments

The review document adequately addresses Departmental interests concerning recreational, cultural, mineral and fish and wildlife resources.

Specific Comments

Fish and Wildlife Coordination Act

The Fish and Wildlife Service (Service), pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, 16 U.S.C. 661 et seq.), will have no objection to issuance of a Section 404 permit to individual applicants for use of the designated borrow pit disposal site, provided all monitoring and management procedures as specified in the review document are followed. We note that each dredging project will require a permit under Section 10 of the Rivers and Harbor Act of 1899, and most will need a Section 404 permit for barge overflow. Accordingly, this comment on the proposed use of the designated borrow pit disposal site does not preclude further evaluation by the Service pursuant to the Fish and Wildlife Coordination Act during the federal permit review process.

Threatened and Endangered Species

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

Summary Comments

The Department of the Interior has no objection to the project as proposed, provided all decision criteria and monitoring and management procedures specified in the review document are followed.

Thank you for the opportunity to review this document.

Sincerely,

William Patterson

William Patterson
Regional Environmental Officer

United States Department of the Interior

NATIONAL PARK SERVICE
Gateway National Recreation Area
Headquarters Building 69
Floyd Bennett Field
Brooklyn, N.Y. 11234

BREEZY POINT UNIT, N.Y.
JAMAICA BAY UNIT, N.Y.
STATEN ISLAND UNIT, N.Y.
SANDY HOOK UNIT, N.J.

IN REPLY REFER TO:

N22(GATE-RM)

August 16, 1988

Mr. Richard Maraldo, P.E.
Acting Chief, Planning Division
Department of the Army
New York District Corps of Engineers
Jacob K. Javits Federal Building
New York, New York 102-0090

Dear Mr. Maraldo:

This is in response to your Draft Environmental Impact Statement (DEIS) on the proposed use of subaqueous borrow pits for the disposal of contaminated dredged materials from the Port of New York and New Jersey. Review of this DEIS by the National Park Service reveals that Jamaica Bay has been placed as a "high priority" for such contaminated material disposal. We are opposed to this proposal for the following reasons:

1. The DEIS addresses a total of 20 potential sites throughout the lower New York Harbor. These sites were all investigated through the use of computer simulations and field investigations. The Jamaica Bay sites, #14-17 were selected primarily on the fact that they were previous borrow pit sites, not on any investigative results. a

2. The sites in Jamaica Bay are integral parts of the Jamaica Bay Wildlife Refuge under the jurisdiction of the National Park Service and are protected in perpetuity through Federal legislation, 86 Stat. 1308. This legislation requires that "the Secretary (of the Interior) shall administer and protect the islands and waters within the Jamaica Bay Unit with the primary aim of conserving the natural resources, fish, and wildlife located therein and shall permit no development or use of this area which is incompatible with this purpose." b

3. The Grassy Bay subaqueous borrow pit has been investigated be the National Park Service over the last five years and has been shown to contain a significant level and abundance of an amphipod species critical to the support of food web dynamics of the Bay and possibly the estuary. c

4. The National Park Service has consistently participated in planning sessions, citizens advisory meetings, public information sessions and has provided input and opinions to the use of specific pits. As we have stated many times before, the impacts to the natural regenerative processes on-going in Jamaica Bay would be seriously and significantly compromised by the dumping of contaminated dredged materials at the proposed sites in Jamaica Bay. This regenerative process comes as a result of considerable time and hundreds of millions of dollars expenditure by the City of New York, The Environmental Protection Agency, and The Port Authority of New York/New Jersey to reduce or eliminate inputs of sewage and contaminants into Jamaica Bay. The proposed dumping in Jamaica Bay would result in the input of additional toxic contaminants into the waters of Jamaica Bay, both during the dumping process and for many years after. These contaminants will enter into the food chains and through bioaccumulation end up in the tissues of Jamaica Bay's wildlife and recreational fisheries. d

Moreover, in the course of dumping the contaminated dredge materials, bottom substrate from Grassy Bay will be stirred up and reintroduced into the waters of Jamaica Bay. This substrate contains a large proportion of organic matter (i.e., sewage sludge which, when resuspended in the waters of Jamaica Bay will increase pollution loads, contribute to low dissolved oxygen levels, and possible fish kills. This has been communicated to the Army Corps through the Department of the Interior's Official spokesperson, the U.S. Fish and Wildlife Service (USFWS), at all meetings on this subject. e

In summary the National Park Service is required by legislative intent to oppose the use of any subaqueous borrow pits in Jamaica Bay under any circumstances for the disposal of contaminated (or "clean") dredged materials. f

Should there be specific question on this, please contact Dr. John T. Tanacredi, at FTS 665-3796/3869. By copy of this letter, we are advising the USFWS of our concerns. This letter should be considered supplemental to their official response.

Sincerely,

Robert W. McIntosh, Jr.
General Superintendent

Comment Letter 8

UNITED ST ES DEPARTMENT OF COMMERCE
The Chief Scientist
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

August 26, 1988

Colonel Marion E. Caldwell
District Engineer
Army Corps of Engineers, New York District
New York, New York 10278-0090

Dear Colonel Caldwell:

This is in reference to your Draft Supplemental Environmental Impact Statement on the Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey. Enclosed are comments from the National Oceanic and Atmospheric Administration.

We hope our comments will assist you. Thank you for giving us an opportunity to review the document.

Please note the change in our address for future environmental impact statements:

Director
Department of Commerce
NOAA/CS/EC/Room 6222
14th & Constitution Avenue, N.W.
Washington, D.C. 20230

Sincerely,

David Cottingham

David Cottingham
Ecology and Environmental
Conservation Office

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Branch
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

August 19, 1988

Colonel Marion E. Caldwell
District Engineer
Army Corps of Engineers, New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Col. Caldwell:

We have reviewed the draft Supplemental Environmental Impact Statement regarding the use of subaqueous borrow pits for the disposal of dredged material from the Port of New York - New Jersey. As you know, we are a cooperating Agency and helped develop the supplemental document, and we support borrow pit filling to permanently isolate polluted dredged material.

The Corps has developed a thorough and accurate assessment. There are, however, a few statements which require clarification.

SPECIFIC COMMENTS

Page 2-3, Paragraph (h.)

The steering committee (SC) does not provide case-by-case review of dredging projects. While the majority of the member agencies review regulatory projects, the specific task of individual project review is not a charge assigned to the SC. The separate functions and responsibilities of the SC and its members need clarification. a

Page 2-20, Paragraph (5)

The statement is made that "As 18 feet is the extent of wave effects along the bottom,...". Without benefit of why that depth is the limit, the statement appears incomplete. This should be corrected by explaining the bathymetric restrictions of the surrounding area and how it effects the distribution of waves and wave energy. b

Page 2-42, The end of paragraph (f)

If supplementing the "cap" of a filled borrow pit is deemed necessary, it should be done with the coarsest sediment available. This would help prevent washouts and promote sediment accumulation rather than the winnowing of the least stable "fines" within the cap. c

Page 4-22, Paragraph (c). d

The use of a 200 foot buffer around the proposed 1500 foot borrow pit yields a 1900 foot operation area, not a 1700 foot diameter operation area as reported here.

Several typographical errors were also found and have been reported directly to your staff. We note this action only to complete our records regarding Agency action on the document.

Should you wish to discuss this matter further, please contact either Mike Ludwig at 212 Rogers Avenue, Milford Laboratory, Milford, Connecticut, 06460, or me at the Sandy Hook address.

Sincerely,

Stanley W. Gorski
Assistant Branch Chief

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
BOSTON FEDERAL OFFICE BUILDING
ROOM 1022
10 CAUSEWAY STREET
BOSTON, MASSACHUSETTS 02222—1035

TAKE PRIDE IN AMERICA

August 22, 1988

Richard Maraldo, P.E.
Acting Chief, Planning Division
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Maraldo:

Your June 28, 1988, letter provided the Department of the Interior with the opportunity to review and comment on the Draft Supplemental Environmental Impact Statement on the proposed use of subaqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey. Comments were provided to you in my August 2, 1988, letter, which concluded that the Department had no objection to the project as proposed, provided all decision criteria and monitoring and management procedures specified in the review document are followed. This letter amends that conclusion to reflect information included in the August 16, 1988, letter to you from the General Superintendant of the Gateway National Recreation Area, a copy of which is enclosed.

For reasons stated in the Superintendent's letter, the Department cannot support the disposal of contaminated dredged materials in any of the subaqueous borrow pits in Jamaica Bay. We recommend the Final Supplemental Environmental Impact Statement be modified by removing sites 14 through 17 from consideration as possible locations for the disposal of these materials.

We apologize for any inconvenience caused by the submittal of these revised comments. I can be contacted at FTS 835-6856 if you have any questions.

Sincerely,

William Patterson

William Patterson
Regional Environmental Officer

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

SEP 23 1988

Mr. Richard Maraldo, Acting Chief
Planning Division
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Class: LO

Dear Mr. Maraldo:

The Environmental Protection Agency (EPA) has reviewed the draft supplemental environmental impact statement (EIS) for the use of subaqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey. This review was conducted in accordance with Section 309 of the Clean Air Act, as amended (42 U.S.C. 7609, PL 91-604 12(a) 85 Stat.1709) and the National Environmental Policy Act.

This document was prepared to supplement the 1983 final EIS on the disposal of dredged material from the Port of New York and New Jersey. Specifically, it incorporates new information from a small-scale demonstration project, more recent area-wide surveys of the fish and benthic communities, and new surveys of the current ocean disposal site. As you know, EPA served as a cooperating agency for the preparation of the draft supplemental EIS.

The proposed project involves the use of artificially dug holes (resulting from sand mining activites) in the Lower Bay complex of New York Harbor for the disposal of dredged material that is unsuitable for unrestricted ocean disposal (i.e., potentially contaminated material that does not pass the testing criteria). As part of the disposal operations, these borrow pits will be covered with a sand cap of at least three foot thickness. The construction of a new pit would take place concurrently with the filling of an existing pit to meet the needs of additional dredging in the navigation channels of the Port of New York and New Jersey.

Based upon our review of the draft supplemental EIS, we believe that there would be no significant adverse impacts to the benthic community, invertebrate or fisheries resources, or threatened or endangered species. Short-term adverse impacts on water quality may be experienced, but the impacts should be minor and transient. The overall long-term impact should be beneficial provided potentially contaminated dredged materials are adequately contained in secure borrow pits. Accordingly, EPA generally supports the use of subaqueous borrow pits for disposal of dredged material that is unsuitable for unrestricted ocean disposal. We request, however, that the final supplemental EIS detail a a progression for the use of specific borrow pits. Similarly, the final supplemental EIS should specify locations for new pit construction.

In keeping with EPA's policy of eliminating or minimizing adverse environmental impacts to marine waters, EPA recommends that a specific monitoring program be developed by the U.S. Army Corps of Engineers (COE), in conjunction with EPA, along the general guidelines suggested in the draft supplemental EIS. This program would be implemented with the initial borrow pit disposal project as a demonstration project. The intent of the demonstration project would be to verify the environmental acceptability of this type of disposal scheme prior to full scale implementation. b

We also reiterate our position that throughout the continued planning and implementation of upcoming dredged material disposal activities, land based disposal alternatives must be given full and continued consideration. c Land based alternatives are being evaluated through the COE's ongoing studies of alternatives to the ocean disposal of dredged material. Further, as you know, the potential impacts of specific disposal/capping operations, as well as land-based alternatives, will continue to be evaluated as part of the permit processes for individual dredging projects. d

Based on our review, EPA believes that no significant environmental impacts will result from implementation of the proposed project. In accordance with EPA policy, we have rated this draft supplemental EIS as LO, indicating our lack of objections to the proposed project.

Thank you for the opportunity to comment. Should you have any questions regarding our comments, please call Robert Hargrove, Chief, Federal Activities Section, at (212) 264-6723.

Sincerely yours,

Robert W. Hargrove
for Barbara Pastalove, Acting Chief
Environmental Impacts Branch

6.4.1.2 Responses to Federal Officials/Agencies

(1) Floyd H. Flake. US House of Representatives, 6th District, NY (Aug 18, 1988)

response a: The incidents of beach closings you refer to are all the results of sewage sludge, garbage, and/or medical waste. Dredge material does not fit into this category and was not the cause of any of the closings and health advisories issued over the past few years. The dredge material proposed for disposal into the pit is not hazardous, but is the natural by product of sedimentation in the harbor. The action is not intended to create a waste storage facility, but instead to act as a repository of sediments that must be removed to maintain the navigation channels and berthing areas critical to the economic viability of the Port.

b: The sediments proposed for placement into a pit are already present within the waters of the harbor. While some are contaminated, they are not present at levels considered highly toxic, or hazardous (2.1). Further, by placing these sediments (most of which pass Ocean Disposal Criteria) into the secure environment of a pit, and isolating them under a sand cap, they are no longer available for uptake by the organisms now exposed to them (either at the dredge site or inside the existing pit). In addition, because of concerns related to dredging and water quality impacts (some of which were raised during the Public Hearings), the existing pits in Jamaica Bay are no longer being considered for use as a disposal site.

c: While no one can guarantee any project to the level of protection you feel most comfortable with, all the data, from both lab and field studies, as well as what we know about the physical nature of the estuary and sediments, leads us to conclude that the borrow pits offer a sound environmental alternative for the disposal of the types of sediments under consideration (2.2.3). This conclusion is endorsed by all three Federal resource agencies that advise the Corps on the Steering Committee for ocean disposal. It should also be noted that borrow pit disposal has been successfully implemented in Seattle (see 4.2.1b).

d: While it is true that programs to clean-up New York waters are the extremely important and worthwhile endeavors, this does not deal with the existing problem of how best to dispose of dredge material that must be removed now. Rather than exasperating an already existing problem, the proposed action would work to immediately isolate contaminated sediments from the food chain in a secure site, while maintaining the viability of the Port until the clean-up programs effectively render the harbor clean enough to no longer warrant special handling of those sediments.

e: A fully comprehensive analysis of alternative disposal methods was undertaken for the Mitre (1977) report and the ocean disposal EIS (NYD, 1983 - see section 1.3 and 2.2). Both studies concluded that sub-aqueous borrow pits was a preferred environmental alternative for large volumes of contaminated dredge material. Do to the huge volumes and high water content of dredge material (up to 90%) incineration is not a viable option, nor is it necessary. The material is not classified as hazardous waste and does not require the high level of security associated with superfund sites.

(2) Charles E. Schumer. US House of Representatives; 10th District, NY (Aug 18, 1988)

response a: None of the beach closings you refer to were caused by dredge material; sewage sludge, garbage, and medical waste are the primary culprits with respect to all the health hazards observed in the area over the past few years. However, concerns with respect to potential dredging impacts to water quality and related environmental areas, as well as conflicts with existing and planned uses of Jamaica Bay have lead to The NYD dropping the two pits in that Bay from further consideration as disposal sites for dredged material (2.3.1.3). It needs to be pointed out though, that the great majority of the material proposed for disposal is not toxic, having passed the Ocean Disposal Criteria. Consequently, several sites in Lower New York Bay still remain as environmentally preferable locations for the proposed disposal site.

b: The DSEIS (and FSEIS) considers the pit security an unresolved issue only because opponents continue to challenge the document's conclusion with regard to the safety of the proposed action. It will take the hard data derived from the monitoring program to confirm what all existing research and field work point to; the proposed action is not only free of long-term adverse impacts, but also offers added environmental protection to the already exposed biological community now inhabiting the potential dredging areas and the pits. It should be noted that disposal into a subaqueous pit is not strictly experimental, having already been implemented in Seattle. Long-term monitoring of that operation continues to demonstrate its success in containing both sediments and the contaminants bound to them (4.2.1b,d).

c: The material to be placed in the pit already exists in the harbor. It has to be removed to maintain navigation and the commercial viability of the Port. Fish are now freely exposed to these contaminants, including those already associated with the fine-grain sediments that accumulate in the pits. By isolating these materials under a thick sand cap they are no longer available to fish or their food sources, thereby reducing the potential for their bioaccumulation.

d: By providing a secure containment area that reduces the possibility of sediment-bound contaminants being lost while isolating them from the aquatic community, the action accomplishes an essential economic goal in an environmentally sound and beneficial manner.

(3) Stephen J. Solarz. US House of Representatives; 13th District, NY (Aug 18, 1988)

response a: You are correct to distinguish dredge material from the sewage sludge, garbage, and medical waste that have been so prominent in the news and the real causes of the beach closings and other health advisories. You are correct in your assumption that much of the public opposition to our proposal for dredge material disposal stems from the misconception that dredge material is some how related to the recent disastrous events along our shoreline. It is clearly not. We firmly believe that if one examines the proposal carefully on its own, it will become clear that the action truly does provide a sound environmental alternative for the disposal of category II and III sediments, and that the Corps intends to implement this project with the same care for environmental safety that you so graciously credit to our past efforts.

b: The sediments are being dredged to maintain navigation and berthing areas critical to the continued economic viability of the Port. It is true that some of these areas, through natural accumulation, now contain sediments contaminated with low, non-hazardous levels of PCBs (among other compounds). By placing them into a secure disposal site within the sheltered waters of a bay, they are effectively removed from exposure to the food chain (see 2.3.2 and 4.2.1).

c: As indicated in section 2.3.1.3 of the FSEIS, because of concerns for potential water quality and dredging impacts (many raised during the public review of the DSEIS), as well as conflicts with existing and planned usage of the Bay, the Jamaica Bay pits will no longer be considered as potential sites for the disposal of dredge material.

d: By filling and capping a pit such as the CAC, the fish and shellfish (along with the food organisms they depend on) will no longer be exposed to the fine-grain, contaminant-prone sediments that are now present in such natural sediment sinks. In addition, the capped deposit would return the bay bottom to its natural configuration. Both these factos represent a long-term environmental benefit to the ecosystem as a whole.

e: By providing a secure disposal site for isolating contaminants and thereby removing them from exposure to aquatic life, the project offers increased protection of the rare and valued organisms found within the estuary, while posing no threat to the surrounding beaches.

f: The project is necessary to ensure the continued viability of the Port in an environmentally sound manner.

g: The Corps did not reject or cancel the project in the past. The New York Supreme Court issued an injunction against DEC issuance of a water quality certification for the proposed action, requiring that the existing information be reexamined to determine its adequacy in assessing potential impacts to the fishery (1.3c). Since that time, the NYD has conducted extensive fish and benthic surveys, undertaken detailed examination of the current mud dump disposal site, and analyzed substantial new information related to disposal, including an actual pit disposal project in Seattle. All the existing information substantiates our past findings; the proposed action provides for an environmentally sound means of disposing category II and III dredge material, providing substantial benefits to the ecosystem through isolation of now exposed contaminated sediments, without adverse impacts to the fishery. This finding is concurred with by the Federal resource agencies, all of which support the proposed action.

h: We firmly believe that the proposal is a sound environmental response to a serious problem, and hope that this FSEIS answers your questions.

(4) Department of Housing and Urban Development (June 27, 1988)

response: Receipt of no comment reply acknowledged.

(5) Department of Transportation (July 7, 1988)

response: Receipt of no comment reply acknowledged.

(6) Department of Interior; Fish and Wildlife Service (August 2, 1988)

response: The Corps acknowledges that all proposed dredging projects require a separate permit application, each of which will be subject to its own review and evaluation. This FSEIS is restricted to identifying a disposal site only for category II and III sediments (see 2.1) from projects that have gone through the normal review process and been granted permits. All monitoring and management procedures outlined in this FSEIS, including subsequently more detailed procedures designated in the Water Quality Certifications for use of a given pit, will be the responsibility of the Corps.

(7) Department of the Interior; National Park Service, Gateway National Recreation Area (August 16, 1988)

response a: This is not true, the Jamaica Bay sites (pits 14 and 15) were evaluated on the basis of their physical characteristics meeting minimum criteria for safe containment of the projected ten year volume of material being considered for disposal (2.3.1.2). All sites meeting this first screening criteria were then ranked relative to each other in terms of their projected physical and biological constraints. The former set of constraints was based specifically on the location and physical parameters of all pits, including 14 and 15. Though the latter constraints were largely based on data from selected pits, extrapolated to account for the known parameters in those pits not sampled, the results represent a valid scientific interpretation. It should be pointed out, however, that some data from the Jamaica Bay pits was included in the ranking (see 2.3.1.4g of DSEIS). Other factors concerning the use of the two Jamaica Bay pits did arise during the review of the DSEIS. These concerned potential impacts to hydrology and water quality and conflicts with current Federal management goals for wildlife and recreation (2.3.1.3). As a result, the two Jamaica Bay pits (as well as pit 2) are no longer being considered as viable disposal alternatives.

b: While acknowledging your mandate, at no time did the Parks Service or Interior chose to exercise any authority to ban the action. On the other hand, the DSEIS concluded that use of appropriate pits would not adversely impact natural resources. However, as indicated in response a above, the FSEIS, having factored in concerns raised during the DSEIS review, no longer considers the two Jamaica Bay pits as viable alternatives.

c: Your point is acknowledged. Though the pits are no longer considered viable disposal sites, information concerning this species' value and distribution would be of value.

d: The Corps disagrees with this conclusion with regards to subaqueous borrow pit disposal in general. We believe that the loss of material during disposal will be minimal because the nature of proposed dredging (clam-shell) produces the most compact disposal mass, and the sides of the pit further contain dispersal. Further, because of their depositional and chemically reductive environment, made even more secure by placement of appropriate interim and final caps, a borrow pit offers a containment alternative safe from dispersal, contaminant loss, and bioaccumulation (see section 2.2.2.2; 4.2; 4.3 for more detail).

e: Fine-grained material is found in all the borrow pits sampled. Indeed, it is this accumulation that makes pits a suitable disposal site. By meeting minimum criteria with respect to size and depth, such a resuspension of pit sediments will be avoided. In the event such an unanticipated action occurs, it would be detected by the physical monitoring program (2.3.4.2.1), and further use suspended, pending correction of the condition or abandoning further use of the pit (after capping).

f: We acknowledge your opposition, but, in responses a - e above outlined our disagreement with your conclusions as to the dire consequences that use of a borrow pit disposal site would have on the Bay's natural resources. In responses a and b above we also acknowledge sufficient concern with respect to indirect impacts and existing management goals such that these two pits are no longer considered viable alternatives.

(8) Department of Commerce; National Marine Fisheries service (August 26, 1988)

response a: We acknowledge this correction and have revised the FSEIS to clarify this point.

b: A simplified explanation has been added to expand non-biological constraint (5).

c: Coarse cap material will be employed. However, the physical monitoring described in paragraph f of the DSEIS (note: correct page is 2-41 and not 2-42) was intended to determine if the selected grain size was appropriate, or if it had to be supplemented with coarser material excavated for that specific purpose.

d: Error is noted, the FSEIS has been revised to reflect the need for a 1900 foot site (4.5.1.2c).

(9) Department of Interior (August 22, 1988)

response: We acknowledge your opposition to the use of pits 14 - 17, and your recommendation to remove them from the FSEIS. By separate response (see comment letter 7 above) we have addressed the comments of Gateway National Recreation Area, and have informed them of the decision to no longer consider pits 14 and 15 as viable alternatives (16 and 17 never were so considered in the DSEIS).

(10) Environmental Protection Agency (September 23, 1988)

response a: We thank you for your agency's concurrence with the findings and recommendations in the DSEIS. However, we do not feel it is appropriate at this time to identify a progression with respect to the use of individual pits as we have concluded that they are essentially similar in their impacts (2.3.1.6) A decision on which pit to designate as the initial candidate is best left until the full NEPA review is completed. Four potential new pit sites were identified in the DSEIS (see figure 33). All four are considered equal in terms of environmental and cultural impacts, so that the final decision on which to dig can be based on a contractor's economic evaluation of costs and resources, which must await award of sand mining license and further detailed site surveys. No specific site in the Lower Bay area can be identified without further evaluation of potential cultural resources identified during the remote sensing survey (see 3.5.2.2d). As there is no environmental preference for selecting the Lower Bay over the East Bank areas, there was no impelling reason to undertake to perform this timely and expensive cultural evaluation now, when specific sites on the East Bank free of potential cultural resources could be identified without such further study.

b: We concur with this recommendation, and have worked toward this end in modifying the monitoring plan in the FSEIS (2.3.4.2) to address certain concerns made during review of the DSEIS. We intend to develop a more detailed plan during the application phase for Water quality certification. This plan would be tailored to be most suitable to the specific alternative pit (new or old) selected for implementation, but also retain a degree of flexibility to allow alterations based on actual field conditions and the data collected. This plan will be developed in conjunction with all the expert advice of the SC, and implemented by the NYD even before any disposal into the designated pit occurs. Though we do not consider this a demonstration project, the intent certainly is to confirm the environmental acceptability of the action while guarding against any unforeseen circumstances. We further expect that some monitoring format will be employed throughout the life of this disposal option, though its intensity and goals may be more limited as greater insight into the operation enhances confidence in the security of the operation.

c: Land based disposal alternatives will continue to be explored, as indicated in the recently completed update of the management plan (Appendix D). Availability of such sites still remains in doubt. In addition, upland sites are not necessarily more desirable than a pit, especially when concerns regarding potential ground water and contaminant mobility impacts are considered. All analyses to date still continue to identify subaqueous borrow pits as the environmentally preferred alternative (Mitre,1979; NYD 1983; 1990)

d: It is our understanding (so stated in the project goals of both DSEIS and FSEIS; sections 1.4) that each individual dredging project will continue to be reviewed and evaluated under existing permit programs. Once a project has been approved, and assuming that the sediment meets the criteria for category II or III, then disposal at the designated borrow pit will be automatic, and not subject to separate review (much as ocean disposal at the designated Mud Dump site occurs now).

6.4.2 State Elected Officials and Agencies

6.4.2.1 State Comments Received:

(see full text of State comment letters beginning on page 6-39; responses to these letters are in section 6.4.2.2 beginning on page 6-68, immediaterly following the text of all written state comments).

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

AUDREY I. PHEFFER
Assemblywoman 23rd District

DISTRICT OFFICE
19-31 Mott Avenue
Room 305
Far Rockaway, New York 11691
(718) 471-8800

ALBANY OFFICE
Room 549
Legislative Office Building
Albany, New York 12248
(518) 455-4292

CHAIRPERSON
Subcommittee on Outreach and Oversight
of Senior Citizen Programs

COMMITTEES
Aging
Alcoholism & Drug Abuse
Governmental Employees
Higher Education
Social Services
Veterans Affairs

August 1, 1988

Colonel Marion L. Caldwell, Jr.
District Engineer
U.S. Army Corp. of Engineers
New York District
26 Federal Plaza
New York, New York 10278

Dear Colonel Caldwell:

I am writing to voice my opposition to the U.S. Army Corps of Engineers Draft Supplemental Environmental Impact Statement Use of Subaqueous Borrow Pits for Disposal of Dredged material containing high levels of PCB's in and around Jamaica Bay and portions of Rockaway Point.

Regardless of the safeguards and studies the Army Corp of Engineers have completed there are no guarantees that the Dredged material will not be released. The idea that all the material will sink into the Borrow Pit without any seepage worries many community residents. Recent accounts of infectious waste washing up on our shores and the track record of environmental agencies does little to quell our fears. a

We must remember that this area is used for fishing and swimming and is adjacent to a major marina. Having Borrow Pits so close to the shoreline simply seems inappropiate. The environment and health and well being of local residents should be our paramount concern.

The potential for increasing levels of contaminates in the tissues of animals as they pass through the food chain makes this proposal even more dangerous. According to the New York State Coastal Zone Management Program we must "preserve and protect tidal and freshwater wetlands and preserve the benefits derived from this area". To preserve and protect our marine system and wildlife sanctuary, which could be b contaminated as a result of this activity, we must stop this proposal now.

For the betterment of the community I urge you to reconsider and stop this plan.

I thank you in advance for your assistance and look forward to your supportive response.

Sincerely,

AUDREY I. PHEFFER
Member of Assembly

AIP:law
cc: Leonard Houston, Environmental Impact Statement Coordinator
Senator Daniel P. Moynihan
Senator Alphonse M. D'Amato
Congressman Floyd H. Flake
Neal MacCormick, Assistant Director, Division of Coastal Resources and Waterfront Revitalization
Borough President Claire Schulman
Councilman Walter Ward
Senator Andrew Jenkins
Senator Jeremy S. Weinstein
Jay Steingold, District Manager, Community Board #14
Kevin Callaghan, Chairperson, Community Board #14
Environmental Committee

Comment Letter 12

THE SENATE
STATE OF NEW YORK

JEREMY S. WEINSTEIN
SENATOR 16TH DISTRICT

MINORITY WHIP

RANKING MINORITY MEMBER
COMMITTEE ON ALCOHOLISM & DRUG ABUSE

PLEASE REPLY TO
☐ ALBANY OFFICE
ROOM 513 L.O.B
ALBANY, N Y 12247

☐ DISTRICT OFFICE
82-17 153RD AVENUE
HOWARD BEACH, N. Y. 11414
(718) 835-2991

August 5, 1988

Colonel Marion L. Caldwell, Jr.
District Engineer
U.S. Army Corp of Engineers
New York District
26 Federal Plaza
New York, New York 10278

Dear Colonel Caldwell:

I wish to join with other area elected officials and community leaders to voice my opposition to the use of sub-aqueous borrow pits for the disposal of dredged material, including toxic waste contaminates. It is an outrage that the U.S. Army Corps of Engineers would even consider such a proposal.

This past summer we have witnessed a vicious attack on our environment, most evident in the illegal dumping which has polluted our beaches. We cannot tolerate this assault, and the proposal before us only serves to exacerbate the situation.

There was a time when we spoke of preserving our oceans and rivers for our children and grandchildren. The crisis has accelerated to the point that it is we who are challenged to respond to the crisis. Now is the time that we must put an end to the violence perpetrated against our environment.

This proposal must not be given consideration.

Very truly yours,

Jeremy S. Weinstein

JEREMY S. WEINSTEIN
Member of Senate

JSW:ldc

cc: The Wave
cc: The Rockaway Journal

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

AUDREY I PHEFFER
Assemblywoman 23rd District

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Room 305
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ALBANY OFFICE
☐ Room 549
Legislative Office Building
Albany, New York 12248
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CHAIRPERSON
Subcommittee on Outreach and Oversight
of Senior Citizen Programs

COMMITTEES
Aging
Alcoholism & Drug Abuse
Governmental Employees
Higher Education
Social Services
Veterans Affairs

STATEMENT

BY

<u>ASSEMBLYWOMAN AUDREY PHEFFER</u>

(DEMOCRAT - LIBERAL 23 A.D.)

BEFORE THE

UNITED STATES

ARMY CORPS OF ENGINEERS

NEW YORK DISTRICT

AUGUST 18, 1988

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

AUDREY I. PHEFFER
Assemblywoman 23rd District

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CHAIRPERSON
Subcommittee on Outreach and Oversight
of Senior Citizen Programs

COMMITTEES
Aging
Alcoholism & Drug Abuse
Governmental Employees
Higher Education
Social Services
Veterans Affairs

STATMENT BY ASSEMBLYWOMAN AUDREY PHEFFER

Good evening. As the Assemblywoman representing the 23 Assembly District, Queens which includes the Rockaway Peninsula, Broad Channel, Rockwood Park/Spring Park and Rosedale, I am outraged that the Army Corp of Engineers would consider dumping millions of cubic yards of toxic sediment directly off our coast line.

Over the years, countless mistakes and miscalculations have been made regarding our environment. This plan, if approved, seems destined to be listed as just one more ecological disaster for our City and State.

The toxic sediment which is dredged from New York harbor contains a variety of dangerous components including PCB's and heavy metal. The Federal Government has recognized the danger of dumping this material and has banned any such dumping in the ocean. Now the Army Corp of Engineers want to bury this same dangerous material, PCB's and all, as close as 500 yards off our

a

beaches and in a natural wildlife preserve. There is no justification for this action.

The hope is that the sediment will sink to the bottom of the Bay. The hope is that the borrow pits will receive the full load of toxic material without any mishaps

I ask you, how many cases did we see during wartime when precision military bombing raids missed their targets by b

thousands of feet with devestating results. I am told this analogy is wrong because this is not a war. However this is a war. We are fighting for the lives our grandchildren's grandchildren.

Does anyone know how much of these toxins will never reach the bottom? Does anyone know how much will dissipate into the surrounding waters? Does anyone know how this will effect our fish? Our beaches? Our people? c

The answer to all of these questions is -- WE DO NOT KNOW!

The Government contends that after 10 days of study, sealife and the surrounding environment were not negatively effected. I believe the idea of dumping toxic material in Jamaica Bay deserves more then a 10 day study.

This type of dumping has only been tried once -- At a small site in Seattle. There is no comparable track record. There is no past experience to draw upon.

We simply do not know the long term effect of having several million cubic yards of toxic sediment dumped just off of our shore line.

Last week I along with Dr. Drucker of Kingsbourgh Community

College and biologists from Brooklyn College met with the Army Corps of Engineers. The Army Corp stated that they would not use the borrow pits located in Jamaica Bay because accessing these pits will cost too much money. However we must not use ANY borrow pits because you can not put a price tag on our environment. The biologists have questioned this plan and feel it will be detrimental to our environment. When you hear their testimony you too will see the many problems with the Army Corps proposal.

We have been told that dredging is necessary for economic development but a better solution must be found for disposing of this toxic sediment. Common sense dictates a no vote on this proposal. For the future of our environment I respectfully urge you to find a better solution.

Infectious waste has already ruined one summer, this proposal would ruin our summers for decades.

THANK YOU.

DONALD M. HALPERIN
18TH DISTRICT

600 SHEEPSHEAD BAY ROAD
BROOKLYN NEW YORK 11235
(718) 646-6620

LEGISLATIVE OFFICE BUILDING
ALBANY NEW YORK 12247
(518) 455-3241

THE SENATE
STATE OF NEW YORK

RANKING MEMBER
SENATE FINANCE COMMITTEE-MINORITY

COMMITTEES:
CODES
HIGHER EDUCATION
ETHICS
INSURANCE
RULES

September 7, 1988

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

Attention: Mario A. Paula
Water Quality Compliance Branch

Dear Mr. Paula:

It has recently come to my attention that the Army Corps. of Engineers is considering a proposal to dump toxic dredged material into existing and new "borrow pits" within lower New York harbor. I stongly oppose this proposal.

The waterfront areas surrounding the district I represent are of critical importance to all New Yorkers and must receive our closest attention. The criteria for evaluation can not be limited to damage control. It is not enough that the proposal merely does not make matters worse. Unless the proposal constitutes an improvement, it is unacceptable. a

The Federal Government will no longer permit the dumping of this toxic dredged material into the oceans. The proposal is to stir up and dump it right back in the harbor. Ludicrous.

If this toxic dredge sediment is becoming a source of ocean contamination which must be stopped, then the only logical answer is that our harbor receive the same protection.

Your Public Notice 13374, at page 5, contains a very disturbing statement: "Preferred new pit sites were chosen in areas of lower New York Bay that were shown to be of low biological use and productivity". In other words, the place is already a cesspool and the proposal can't make it worse. b

We cannot subject our already troubled ecology to this dangerous experiment. No public hearing or series of public hearings can or should be used to justify further legally sanctioned contamination of the inner Coastal Zone areas of New York. We owe our children and grandchildren the clean environment we have not been left. c

The contamination of our harbor has already reached alarming proportions. The percolating contaminants from the Fountain Avenue landfill and other city landfills, the still unchecked dumping of raw sewage into the Bay, as well as the industrial waste dumping and decades of neglect all cry out for correction. The images of hospital waste washing upon our beaches has shaken us into facing the ugly reality of the inheritance of our Bay.

I strongly oppose any plan which would relocate concentrated contaminated toxic waste anywhere in the Bay. The Corps will have to find another way of disposing of dredged toxic sediment from both the Federal Government and the private dredged materials dumpers. Any other project which does not guarantee the improvement and cleaning up of our waterways and Beach areas is unacceptable. d

As far as I can recall this is the first time I am diametrically opposed to a Corps project. In the past your organization has always appeared to be on the side of good judgement, economic and commercial expansion while maintaining also ecologically soundness. I hope this does not mean a change in that policy.

Sincerely,

DONALD M. HALPERIN
Member of the Senate

DMH:cb

THE ASSEMBLY
STATE OF NEW JERSEY
TRENTON

JOSEPH M. KYRILLOS, JR.
ASSEMBLYMAN 13TH DISTRICT
MONMOUTH-MIDDLESEX COUNTIES

ONE ARIN PARK BUILDING
1715 STATE HIGHWAY 35
MIDDLETOWN, NJ 07748
201-671-3206

COMMITTEES
VICE-CHAIRMAN
CONSERVATION, NATURAL
RESOURCES AND ENERGY
MEMBER, EDUCATION
MEMBER, OCEAN AND
BEACH PROTECTION

September 9, 1988

Department of the Army
New York District
Corps of Engineers
Jacob K. Javits Federal Building
New York, N.Y. 10278-0090

Attention: Water Quality Compliance Branch

Dear Sirs,

I am writing to express my opposition to an Army Corps of Engineers' proposal to bury contaminated dredge spoils in subaqueous burrow pits in the New York Bight area.

As a N.J. Assemblyman representing eight communities along the Raritan Bay, I am deeply concerned about the environmental impact that such a proposal could have on the bay and on the exsisting marine life there.

By the Army Corps' own admission, the proposal is based on reasonable assumptions and projections, and has yet to be verified in a full-scale operation.

Therefore I must register my objection to any effort by the Army Corps to proceed with this plan as proposed. a

Instead, I support an alternative proposal calling for the the creation of a new narrow pit that can be filled with marginally contaminated spoils, capped with a layer of clean sand, and monitored closely to determine its impact on the marine environment.

I am opposed to the use of exsisting pits which have become a spawning ground for a variety marine life. b

I would appreciate it if my statements could be included in the official record of public comment about this proposal. If you have any questions or require additional information, please do not hesitate to contact my office at (201) 671-3206.

Sincerely,

Joseph M. Kyrillos, Jr.
Member, NJ General Assembly

Comment Letter 16

THE ASSEMBLY
STATE OF NEW JERSEY
TRENTON

JOSEPH M. KYRILLOS, JR.
ASSEMBLYMAN 13TH DISTRICT
MONMOUTH-MIDDLESEX COUNTIES

ONE ARIN PARK BUILDING
1715 STATE HIGHWAY 35
MIDDLETOWN, NJ 07748
201-671-3206

COMMITTEES
VICE-CHAIRMAN
CONSERVATION, NATURAL
RESOURCES AND ENERGY
MEMBER, EDUCATION
MEMBER, OCEAN AND
BEACH PROTECTION

October 14, 1988

Mr. John Travolaro
Chief, Water Quality Compliance
Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, N.Y. 10278

Dear Mr. Travolaro,

I am writing to express my opposition to a proposal by the Army Corps of Engineers to store contaminated dredge spoils at an upland site in the Belford section of Middletown Township, N.J.

According to the Army Corps' Supplemental Environmental Impact Statement, the proposal calls for storing the dredge materials on a 32-acre site east of Shoal Harbor and Comptons Creeks in Belford.

I understand the site is one of many options being considered, and that the Belford site poses several problems involving cost and the impact on the nearby wetlands. Nonetheless, I felt compelled to write and voice my opposition.

The entire Bayshore currently is experiencing a rebirth, and has become the focus of a renewed effort by Governor Thomas H. Kean and state, county and local officials to revitalize the waterfront.

Belford in particular is the site of a proposed 77-acre bayfront park - a project of particular interest to me since legislation that I sponsored will provide partial funding for its purchase and development.

In addition the Armys Corps site is located in a predominantly residential area adjacent to the wetlands, and could pose a number of environmental concerns to the area and its people.

It is for these reasons that I urge the Army Corps to abandon the Belford site as an upland disposal option.

I thank you for your consideration. If you have any questions or need any additional information, please do not hesitate to contact my office.

Sincerely,

Joseph M. Kyrillos, Jr.
Member of the General Assembly

JMK:kgf

Comment Letter 17

IN REPLY PLEASE REFER TO

State of New Jersey
DEPARTMENT OF TRANSPORTATION
1035 PARKWAY AVENUE
CN 600
TRENTON, NEW JERSEY 08625

HAZEL FRANK GLUCK
COMMISSIONER

Route 147
Realignment
Cape May Co.

August 8, 1988

Len Houston, EIS Coordinator
Dept. of the Army, NY District Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Houston:

This letter is in response to your invitation for comments on the use of Sub-Aqueous Borrow Pits (SABPs) in the NY-NJ Harbor for the disposal of dredge spoils.

Currently the New Jersey Department of Transportation is involved in the selection of a final disposal site for 700,000 cubic yards of salt marsh sediments to be excavated from the Route 147 realignment project in Cape May County. The sediments are expected to meet the criteria for open ocean disposal at the "Mud Dump" site 6 miles off the coast of Sea Bright, NJ.

Information as to whether there is a dump site (open ocean area, subaqueous, or otherwise) closer to the project and whether SABPs could be used to dispose of this kind of dredged material would be appreciated. Attached is a map of the project area. No other comments on your proposal are offered at this time, however, a representative from the Bureau of Environmental Analysis will attend the public hearing to be held on August 24, 1988 in Middletown Township, NJ at 3:30 PM.

If you have any questions concerning these issues please contact Ken Conrow at: (609) 530-5466.

Sincerely:

Bruce Hawkinson

Bruce Hawkinson,
Principal Environmental Specialist
Bureau of Environmental Analysis

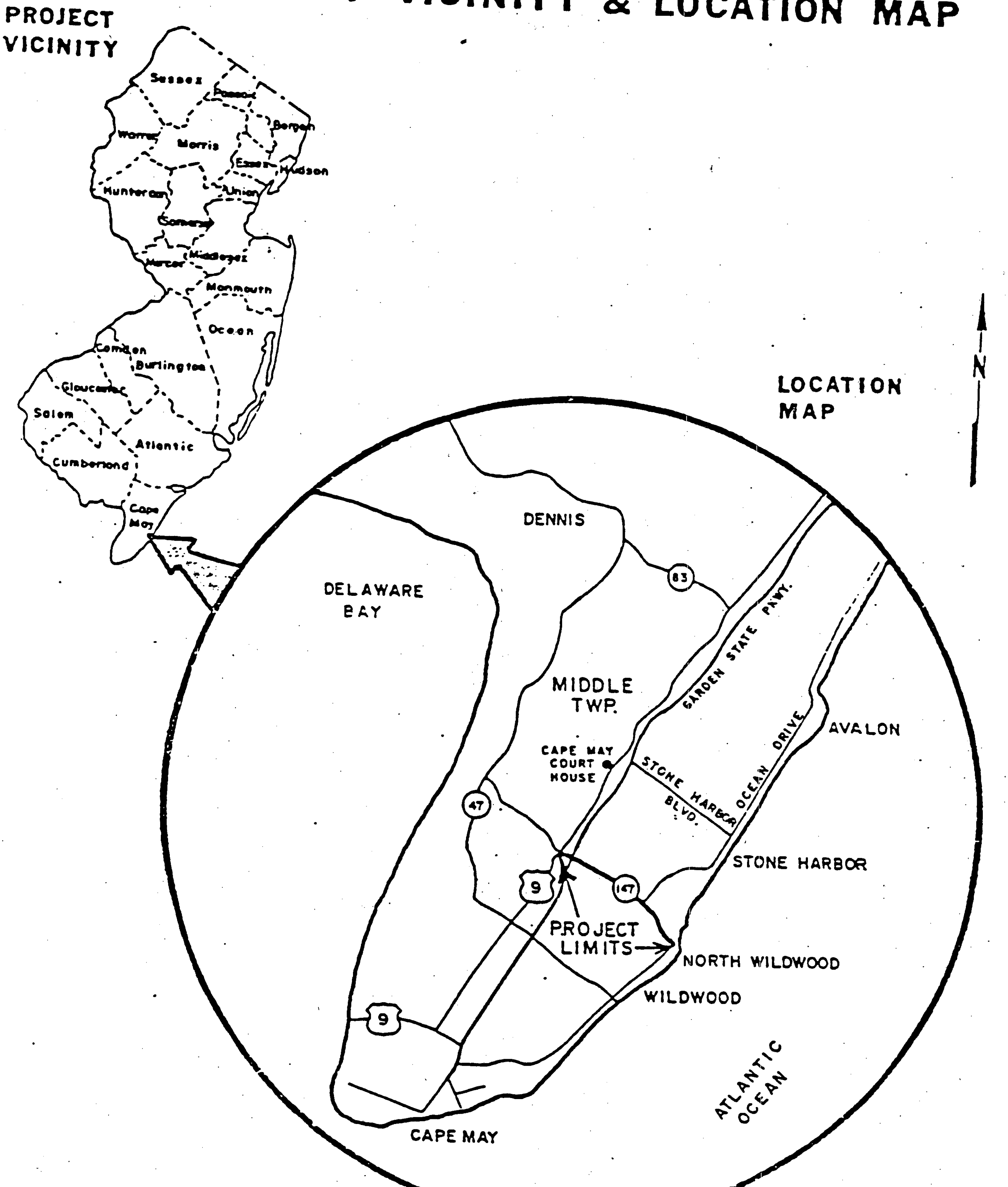
New Jersey Is An Equal Opportunity Employer

KC

NJ 147, SEC. 1C

NORTH WILDWOOD CITY, MIDDLE TWP., CAPE MAY CO., NEW JERSEY

PROJECT VICINITY & LOCATION MAP



SCALE: 1" = 4 miles

FIGURE 1

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
ALBANY, N.Y. 12232

FRANKLIN E. WHITE
COMMISSIONER

AUG 26 1988

Mr. Richard Maraldo, P.E.
Acting Chief, Planning Division
Environmental Analysis Branch
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Maraldo:

Re: Use of Sub-Aqueous Borrow Pits
Dredged Material from Port of New York & New Jersey

This Department has reviewed your Draft Environmental Impact Statement and remarks from our Regional Office indicate that they do not foresee a problem with the location of the pits because of their distance from the New York Port area.

Please continue to advise us as the project develops.

Sincerely,

C.K. Fosdick for

ROBERT BREUER
Director
Planning and Research Bureau

cc: P. King, Regional Planning and Development Supervisor, Region 11

Comment Letter 19

STATE OF NEW YORK
DEPARTMENT OF STATE
ALBANY, N.Y. 12231-0001

GAIL S. SHAFFER
SECRETARY OF STATE

September 7, 1988

District Engineer
U.S. Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278

ATTENTION: Len Houston

Re: F-88-456
Subaqueous Borrow Pits DSEIS

Dear Sir:

Thank you for providing the above-referenced document for review by New York's Coastal Management Program. I offer the following comments on the main body of the Statement:

(a) 2.2.2.2.2 This section should clearly indicate that all of the identified borrow pit locations involve underwater lands which are owned by the State of New York. Digging and disposal activities at these locations will require licenses from NYS Office of General Services and may, in addition, require the payment of royalty fees. The ultimate selection of a specific site for a new pit, or indeed, use of a existing pit, will require close coordination with OGS. a

(b) 2.3.4.2.2(c) - This section establishes a relatively insensitive decision-making framework in which two conditions must be met prior to initiating extensive sampling and testing for bioaccumulation of toxics. As proposed there must be significant differences between both the disposal and control pit locations and between the innermost and outermost disposal pit transect stations. In order to increase the ability to detect and localize the uptake of toxics I suggest that the wording of this section be modified to indicate that testing would be expanded due to either significant differences between test and control sites or between inner and outer-most transect stations. b

(c) 2.3.4.2.2(d) - In order to provide assurances as to the uniformity and homogeneity of the final cap as a preventative for the uptake of toxics by benthic organisms I suggest that a small grid of perhaps 6 stations be established on the cap. These stations should be sampled twice in the first year following the capping event. Should no significant result be found, the sampling scheme described in this section would then be followed. c

(d) 4.2.3(a) - The recurring theme that borrow pit habitat is relatively new to the Bay and therefore cannot be of unique importance should be removed. The lack of borrow pit habitat may conceivably have been a limiting factor on fish populations in the area. Statements on the worth of pit habitat to the ecosystem should be based only on the results of the appropriate scientific studies. d

(e) Appendix D - This section should include a consideration of managing the disposal pit in highly regulated seasonal increments. The site manager could maximize disposal capacity by reviewing permit applications with associated sediment test data and establishing a hierarchy for disposal events such that in any given season the most contaminated material is placed first, followed by successively cleaner sediments. Thus, capacity would rarely, if ever, be taken up with clean cap material since the more highly contaminated sediments would quickly be followed by less contaminated material. e

Implementing such a management scheme would, in many cases, require a significant delay between applying for permits and having the borrow pit made available for disposal. This is because the site manager would require adequate lead time to formulate the precise sequence of dredging events for the upcoming dredging season. The dredging season would be established based upon environmental concerns and would likely consist of the cool autumn months. While this proposal would place some hardships on applicants due to the built-in delay and need to dredge according to an established schedule, it should be infinitely preferable to the present situation in which much needed dredging cannot occur at all.

(f) Appendix E - Draft Consistency Determination. Policy 7 refers to Significant Coastal Fish and Wildlife Habitats. At present there are no such habitats officially designated in the New York City area. However, since designation is anticipated for the near future I suggest that this policy and explanation be kept but with a statement to the effect that it is being considered in expectation of such designation. In addition, please conclude the document with a statement asserting that upon consideration of the applicable policies, this project has been determined to be consistent with New York's Coastal Management Program. f

If you have any comments on the above, please contact me at (518) 474-3642.

Sincerely,

Larry S. Enoch

Larry S. Enoch
Environmental Analyst

LE:dlb
cc: DEC Region II - B. Rinaldi
NYCLWRP - B. Seymour
NYSOGS - A. Bauder

Comment Letter 20

JOHN C. EGAN
COMMISSIONER

STATE OF NEW YORK
EXECUTIVE DEPARTMENT
OFFICE OF GENERAL SERVICES
MAYOR ERASTUS CORNING 2ND TOWER
THE GOVERNOR NELSON A. ROCKEFELLER EMPIRE STATE PLAZA
ALBANY, N.Y. 12242

ROBERT B. ADAMS
FIRST DEPUTY COMMISSIONER
JAMES M. GALLAGHER
DIRECTOR
REAL PROPERTY PLANNING
AND UTILIZATION GROUP
JOSEPH F. STELLATO
DIRECTOR OF
DIVISION OF LAND
UTILIZATION

September 13, 1988

Mr. David Berkovits, Co-Chariman
Public Involvement Coodination Group
Port Authority of New York & New Jersey
One World Trade Center
Room 64S
New York, New York 10048

RE: DSEIS - Use of Subaqueous Borrow Pits for Disposal of Dredged Material

Dear Mr. Berkovits:

The Office of General Services has been an active member of the Steering Committee of the New York Bight for five of the seven years. Re-organization efforts by the Army Corps of Engineers, determined that OGS, as landlord of New York State-owned submerged lands, could serve on the committee; however, we were not invited to sit and discuss the program at the main table. Therefore, as a member of the Public Involvement Coordination Group, we will try to express our opinions.

First, the disposal program utilizes State-owned submerged land within the 3 mile limit. Therefore, it will be necessary for the U.S. Army Corps of Engineers to apply for a "License to Excavate and Remove" sand and gravel or other material from State-owned lands. a

Secondly, the same procedure must be adhered to for disposal of material on State-owned lands. Although we see no major objection to ocean disposal of dredged material as presented in the DEIS, it is clearly the responsibility of New York State's Environmental Agency to review and comment on specific environmental impacts. The removal of sand from the identified area will augment the OGS sand mining program. b

Our main concern is the timing between removal of material to create a borrow area and the time allocated to dispose. We request that the entire area as identified in the OGS sand mining proposal be dredged to a depth of 60' MSL. Once the entire area is depleted of the usable resource material, then the disposal of dredged material can occur placing dredged materials in the borrow pits to be capped. Through a structured time-management plan, there will not be a conflict of responsibilities. This methodology will also circumvent any potential degradation to existing resources near or in the vicinity of the disposal site. c

As for royalties, the State of New York will charge a fee for the removal of the resource and also for the disposal of material in the borrow areas. The funds received from these resources could (subject to legislative approval) be used to offset the costs of monitoring and protecting the estuary. d

As part of the disposal, it is planned to have the deposited dredged material capped with good quality sand. We question where the capping material will come from within the bight and recommend that dredged maintenance material be taken from the navigational channels as opposed to the utilization of saleable material in the Lower Bay. e

We believe that these issues can be resolved through the continued working relationship between State and Federal agencies. This agency is looking forward to working with the US Army Corps of Engineers to resolve the dredge disposal problem.

Thank you for the opportunity to comment on the proposal.

Sincerely,

Joseph F. Stellato

ACB/cam

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF THE COMMISSIONER
CN 402
TRENTON, N.J. 08625
609-292-2885

September 30, 1988

Mr. John Tavolaro, Chief
Water Quality Compliance Branch
New York District Corps of Engineers
26 Federal Plaza
New York, NY 10278

Dear Mr. Tavolaro:

Re: DSEIS: Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey.

The New Jersey Department of Environmental Protection has completed its review of the Draft Supplemental Environmental Impact Statement: Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey. The Department supports the utilization of subaqueous borrow pits as a preferred disposal option for category II dredged material or dredged material unsuitable for unrestricted ocean disposal. The data presented in the DSEIS supports the conclusion that subaqueous borrow pits offer the most environmentally and economically preferred alternative of sequestering contaminated dredged material over all other methods proposed to date.

The Department recommends that the New York District of the Corps of Engineers utilize a single existing borrow pit as a demonstration project similar to the ill-fated CAC pit demonstration project of the early 1980's. Only category II sediments should be used initially until the monitoring studies indicate sufficient containment of contaminants to allow the disposal of category III sediments. We do not support the use of multiple pits or excavating new pits before the results of the comprehensive monitoring study for the demonstration project are presented and are favorable. Our reasons for this approach are two fold. a

First, the Department concurs with the DSEIS suggestion that the relationship between the existing pits and enhanced fin fish congregations occurs due to lower current velocities which allows fin fish to expend less energy and better avoid predation. Accordingly, these pits do not offer advantageous feeding opportunities or a unique physio/chemical water quality preferable to fin fish or benthos survival. Hence, the data indicate that the existing borrow pits do not provide critical habitats necessary for proliferation of estuarine organisms. b

Secondly, the expenditures of time, money and physical resources associated with the construction of a new pit would be substantial and would prolong the final evaluation of the project's success. Conversely, filling an existing pit would require a fraction of the effort necessary to commence the disposal operation. In the event that the final evaluation was not favorable, a lesser amount of valuable time and resource would have been expended on an existing pit. Therefore, creating a new pit at this time would be premature. Once the demonstration pit is completed (and if deemed successful) the creation of a new pit in one of the areas of low biological productivity identified in the DSEIS could be pursued. c

It is paramount that the New York District of the Corps of Engineers improve the proposed comprehensive monitoring program to insure an accurate analysis of the ecological impacts and benefits of this practice. Though the proposed physical monitoring program appears adequate, the proposed biological monitoring program will collect insufficient information for a proper analysis.

The use of a line-transect for sampling locations oriented in the direction of net tidal flow is too simplistic and does not take into account the current variability and wind induced flows associated with these relatively shallow waters. A grid design may be more appropriate. (d) Secondly, restricting sampling to infaunal filter and deposit feeders is fine as long as the organisms chosen reflect medium to high levels of lipid content. (e) Third, keying the chemical uptake results to a significantly higher level (above ambient) compared to the test criteria of the bioassay results may be a poor indicator of environmental impact. More relevant ecological break points should be chosen. (f) Fourth, the monitoring is only proposed for twice a year and may miss much of the variability and deleterious effects. Monitoring should occur quarterly if not bimonthly. (g) Lastly, other dredge spoil contaminants common to the harbor area, such as dioxin, should be looked for routinely as specified by the ACOE Interim Guidance Matrix Committee for Dioxin. (h)

Another critical shortcoming of the DSEIS is the open-ended nature with which the biological monitoring data is to be interpreted. Upon the finding of a contaminant gradient away from the pit, the project will stop and all data will be supplied to the Interagency Steering Committee to assess the impacts on a case-by case basis. It might be argued that because of the spatio-temporal limitations of the sampling plan (eg. only two organisms, twice a year, in the direction of net tidal flow) coupled with the lack of biologically based levels of effect for determining impacts on resident fauna, this determination may be somewhat subjective.

The Department suggests that the Corps of Engineers utilize some of the scientists from the Interagency Steering Committee on Dredged Material Management to develop a more comprehensive sampling strategy with technically defensible endpoints. At minimum, a comprehensive outline of an improved biological monitoring program should be included in the final SEIS.

On behalf of the Department of Environmental Protection, I would like to thank the New York District of the Corps of Engineers for the opportunity to comment on the DSEIS. If you have any questions regarding the above comments, please feel free to call me at (609) 292-2662.

Sincerely,

Lawrence Schmidt
Director,
Planning Group

LS/VJA

New York State Department of Environmental Conservation
47-40 21st Street, Long Island City, New York 11101

Thomas C. Jorling
Commissioner

October 3, 1988

Mr. Len Houston
US Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278

Re: SDEIS- Use of Subaqueous Borrow Pits for
the Disposal of Dredged Material

Dear Mr. Houston:

The New York State Department of Environmental Conservation has reviewed the Draft Supplemental Environmental Impact Statement for the Disposal of Dredged Material in Subaqueous Borrow Pits. While the report is well written and comprehensive, the following comments, questions, and recommendations are submitted for your consideration. The comments will follow the format set up in the report.

<u>S.1 (c) Pg. S-2</u>

Capping is summarized; a description of source material acceptable for capping would be helpful with a reference to more specific criteria for the interim capping material. What are projected sources for this material, if the construction of a new pit is not approved? Would the Army Corps of Engineers, New York District, recommend sites where capping material is available? If not, who would? Perhaps, a log of some sort could be kept designating acceptable capping material sites. a

S.2 (a) Pg. S-2 b

How long have the pits been in existence? Did the NMFS publish data with regard to their conclusions, that the c "artificial pit habitat presents potential adverse impacts to fish"? If so, the citation should be included here.

It appears that the fishery habitat, because of its artificial status, is being compromised and devalued. The fact is that these areas are, at worst, useful and productive fish habitat in their present condition. This SDEIS should simply acknowledge that fact, and document the fishery impacts. d

This paragraph implies that since the reason for the high density of fish is unknown, its loss is inconsequential and little impact will occur to fish habitat or overall population. What about the fishery however? While the fish may disperse, an active fishery will experience both economic loss and loss of creel, due to increased travel distance, time and reduced catch.

(b) Pg. S-3 While programs have been set up to detect various areas of failure, the responsibility factor is not addressed. For example; if several disposal operations were conducted and tests revealed bioaccumulation occurring, who would be responsible for further capping or further e investigation into the problem?

What if the cap fails? What is the possibility and what are the mitigation procedures?

S.4 (b) Pg. S-5

Second to last sentence; a NYSDEC approval will also be necessary for example: 401 certification, coastal f consistency and possibly others. This should be stated here.

(c) In the first sentence, second line after "a draft consistancy determination of" it appears a word has been omitted.

S.1 Table Pg. S-7

Resource Economics, under the No Action category. Wouldn't impacts be those stated in section 2.2.1.5 (d)? That is increase in transportation costs, loss of revenue g due to loss of berth use, use of alternative docking in other harbors and increase in transportation costs.

Fishery - Borrow Pits category. The word "natural" implies that the pit is an unnatural environmental condition. In fact the pits while man-made, like the shoal, function as a productive and integral part of the ecosystem. The term "short term" should be defined. h

Air Quality - Ocean Disposal category. Wouldn't the increase in emissions from dumping at the site be an impact? In fact, a greater impact because of the greater distance. i

The table concept is a good idea, careful cataloging and detailing impacts and language should be used however. The examples above are some errors encountered in the table. It should be reviewed and refined.

1.4 (d) Pg. 1-3

What are the reasons for not allowing category III material in the ocean with capping? Cap stability reports indicate little to no problem. A brief explanation or reference to the report would be helpful. j What are the differences in impact between disposal at the Mud Dump site, deep ocean disposal and borrow pits in the bay. In this section as well as section 2.2.2.1.1 (b) and the other sections referenced within the letter, the impacts would appear the same. In fact reviewing table S-2 it appears that there may be less impact using the mud dump site since it is already disturbed. k

1.4 (b) Pg. 1-5

Is there coordination with OGS regarding new pit construction? If so, it should be noted. If not, they should be contacted. Are they using the same methods of site selection? l

1.5 (a) Pg. 1-5

A section citation should be used after the third sentence mentioning the construction of a "new, specially-designed pit,"

2.1 (j) Pg. 2-4

In the third sentence after "2,475,000 cys" the word "over" should be changed to "of."

2.3.3.1 General Comments

While it's understood that whoever is dredging material requiring an interim cap will be responsible for costs incurred, who will be responsible for final cap installation cost and management? m

(d) Proposed standards for interim capping should be discussed in this report. If a permit were issued, these standards could be incorporated as permit conditions.

(e) Interim cap thickness standards need to be discussed and outlined in the report; so that if approved, the interim cap thickness can be reflected as a permit condition. n

If an interim cap is necessary the material must be available before the project is considered, otherwise it should be put on hold until additional capping material is available.

2.3.3.22 Pg. 2037 (f)

If the borrow pit disposal concept is accepted and a permit issued the capacity of a specific pit, while compromised, will only delay the inevitable, that is the need for another pit. o

If by maintaining a minimum acceptable depression, the fisheries'values are maintained then it should be attempted. p

Leaving a depression, while minimizing pit capacity, may reduce conflicts and objections from commercial and sport fisherman, expedite the permit process and maintain fishery habitat. Albeit of "unknown parameters."

Because of the age of the pits, they have become an integral part of the bay's ecosystem, and are considered by NYSDEC as reliable benthic and fishery habitat despite their "artificial" beginning. Unknowns may still exist if the pits were filled, for example, sand may be a different size according to 2.3.3.1 (h). p

2.3.3.3 Pg. 2-37

How large a designated area? If capping were required, how would it be accurately dumped? q

2.3.4.1 Pg. 2-37 (a)

This proposal is conversion of marine habitat. This will not completely compensate for lost fishery habitat. These pits have become productive environmental entities that support a fishery and will be lost if the pits are filled. r

2.3.4.1 Pg. 2-38 (b)

Who would be responsible for artificial reef construction and maintenance? Who would pay for the reef? DEC has not expressed interest in artificial reefs with regard to borrow pits. s

(c) A net loss of habitat would occur, since the area of the east bank does contain surf clam habitat according to Section 2.3.2.3 with limited benthic and fishery habitat. While diversity and productivity are reflected by a "low benthic richness," the potential exists for high values in the future. Cerrato 1988 in his report noted "The most striking feature of this study concerns the state of the benthic fauna in the Lower Bay ..." He futher states "The average number of species per grab is more than a factor of two higher." Given these substantial differences, it is clear that considerable changes have taken place in the Lower Bay since 1973. t

2.3.4.2.1 (b) Pg. 2-39

Who will be site manager? Who will control the disposal area and its direct operations? Would the dredger hire a consulting group to manage the site during his disposal activities or is the manager the dredger himself? u

2.3.4.2.3 Pg. 2-42

While testing the water may be unwarranted, as the water column is influenced by tides, currents, etc., NYSDEC recommends, that background chemical testing of the sediments be done. Sampling would help substantiate the movement of disposed material before it was detected as bioaccumulative in benthic indicator organisms. v

2.3.5 (g) Pg. 2-45

Further information is needed with regard to pit construction, exact location, configuration, depth, etc. This information should be included under this Environmental Impact Statement since you are proposing concurrent operations. What is the length of the monitoring study?

Thank you for this opportunity to comment on the report. If you have any questions with regard to these comments, please do not hesitate to contact me.

Sincerely Yours,

Raymond J. Fordich for BBR

Barbara Rinaldi
Regional Permit Administrator

cc: Lou Concra
Gordon Colvin
Roberta Weisbrod
Rich Newman

6.4.2.2 Responses to State Officials/Agencies

(11) Audrey I. Pheffer, NY State Assembly (August 1, 1988)

response a: The medical waste, trash, and similar garbage that has plagued the metropolitan region this summer is totally unrelated to dredged material. Unlike the "floatables" that were so often in the news, dredged material sinks. As detailed in section 4.2.1, only 1 - 2% of the material is generally lost, and the borrow pit alternative is even more restrictive than most, as the required method of dredging (mechanical) produces the most compact deposits, and the shallow water above the pits provides the least opportunity for material to escape; once the deposit is within the confines of the pit walls they themselves act as a trap to prevent further loss. As further detailed in that same section, once within the pit its depositional nature will tend to accumulate a natural cover over the deposit, rather than scour it out; this natural cover would be augmented by interim deposits and caps (as detailed in section 2.3.3), and a full monitoring program conducted to be certain no loss of sediment or contaminants were occurring (see section 2.3.4.2).

b: Isolation of the deposits through interim and final caps would both immobilize the contaminants in a chemically reduced state (as detailed in section 4.2.1c,d) and effectively remove them from uptake by benthic organisms and upper food chain members (see section 4.3.2 for details). The sediments to be deposited in the pits are already contaminated and therefore freely exposed before they are dredged to uptake and bioaccumulation. Their transfer would serve to both remove them from availability to the biota and a more dispersal-prone environment, while enabling these commercial navigation facilities to remain in operation. It should be noted that the draft SEIS concluded that the project as proposed was in full compliance with New York's Coastal Zone Management (CZM) policy. Though New York Department of State has reserved its formal ruling on CZM concurrence until they review the final SEIS, staff review of the draft SEIS and consistency determination essentially supported the project (see comment letter (19) below).

(12) Jeremy S. Weinstein, NY State Senate (August 5, 1988)

response: The use of subaqueous borrow pits to dispose of dredged material is unrelated to the illegal dumping that caused so much public furor, see responses to comment letter 11 above.

(13) Audrey Pheffer. NY State Assembly (August 18, 1988)

response a: All category II material, which makes up the vast majority of the dredged material being considered in this FSEIS, passes the Ocean Disposal Criteria, and is currently allowed to be disposed in the ocean mud dump site if it is capped to rapidly render it harmless. The NYD is proposing to place this material, along with a smaller volume of category III material that exhibits acute (short-term) toxicity and/or bioaccumulation potential, into the safer confines of a capped borrow pit. If the alternative is not exercised, it is likely that the category II sediments will continue to be disposed of in the ocean. For reasons outlined in the response to comment letter 7, the existing pits in the Jamaica Bay wildlife refuge are no longer being considered for use.

<u>b:</u> Your analogy is in error because disposal in a pit involves the material moving through a lesser depth of water (than ocean disposal) to reach its target, with calmer sea conditions during its descent and the pit walls to contain its spread on arrival. Additional control measures, such as requiring the use of clam shell dredges to maximize compactness of the material (thereby speeding up its descent and reducing its spread), disposal at taut-moored buoys to ensure on-site disposal, and monitoring of each disposal to ensure no loss of material, provide further checks against loss of material (see also response a to your preceeding August 1 letter)

<u>c:</u> Field monitoring of past disposal operations provide a wealth of data on which to base conclusions of minimal material loss during and after disposal; use of a pit would further reduce these levels (see also response a to your preceeding August 1 letter).

<u>d:</u> The ten day period you refer to is the time in which test organisms are exposed to the solid phase bioassay. The bioassay itself measures toxicity, while tissue from the test organisms is analyzed to determine if bioaccumulation has taken place. This time is based on past scientific studies that enable one to project long-term survival based on ten day exposure (2.1h). Consideration is now being given, under the proposed changes to testing procedures (2.1.2), to expanding this time to 28 days.

<u>e:</u> The Seattle site was a much smaller pit than proposed here (more like a depression). Tests five years after disposal show everything working as predicted; the cap is intact and no contaminant loss or migration has been observed (4.2.1b-d). A deeper pit in a stronger depositional area, as proposed in this FSEIS, would afford even greater protection to the material placed within. In addition to the Seattle experience, other field monitoring of disposal sites in open water (4.2.1) demonstrate little loss of sediment and essentially intact caps in an environment much less protective than inside a pit.

(14) Donald M. Halperin, NY State Senate
(Septmber 7, 1988)

<u>response</u> <u>a:</u> As detailed in the no action alternative (section 2.2.1.5). The use of subaqueous borrow pits does represent a safer means of containing contaminated sediments now freely

exposed to uptake by the biota or redistribution throughout the system. It also provides an economic benefit in maintaining commercial deep-draft access to the channels and berthing areas possessing such sediments. The Federal government has not abolished the disposal of dredged material. The designated subaqueous borrow pit sites being considered here for use (Figure 32) are alternatives to the current ocean disposal site, and, as well documented by past studies described in sections 1.3 and 2.2.3, represent an environmentally preferred means of disposing of the material in question.

b: Your interpretation of the selection process is mistaken. The criteria detailed in section 2.3.2 were employed to locate an area having the greatest potential for safe containment with the least loss of resources; the low biological use and productivity is more likely a result of unfavorable natural conditions (sediment, currents, etc) than an indictment of the area's pollution.

c. The borrow pit alternative represents an environmentally preferable alternative to current practise, as discussed in response to comment letter 11 above.

d. By removing already exposed contaminated sediments and securing them in contained and monitored pit site potential impacts from uptake and/or redistribution of those sediments would be avoided, resulting in an overall improvement to the Bay.

(15) Joseph M. Kyrillos, NJ State Assembly (Sept 9, 1988)

response a: The reasonable assumptions are based on the best scientific evaluation of past operations and existing physical and biological conditions, as well documented in sections 2.2.2.2, 4.2.1a-e, 4.2.2b, 4.3.2, and 4.8.

b: We acknowledge your support for use of a new borrow pit, indeed this opinion is held by a number of others responding to the DSEIS. Among those that support the use of existing pits (including your own NJDEP and all the Federal review agencies) the reasons most often cited are its ability to immediately implement safer containment of contaminated sediments, and its ability to return an artificial feature to the bay's natural condition (instead of altering a natural habitat by digging a new pit). These differences are compared in section 2.3.5, and discussed in detail in sections 4.2.2 and 4.3.2. It should be noted, that there is no evidence that the existing pits are serving as spawning habitats (see section 3.4.2). Indeed, your own state fishery agency (NJDEP, see comment letter 21) and the NMFS (see comment letter 8) do not feel that borrow pits represent any form of critical habitat for the bay's fisheries.

(16) Joseph M. Kyrillos, NJ State Assembly (Oct 14, 1988)

<u>response:</u> The site you identify is one of the two upland sites currently still considered viable alternatives for the disposal of dredged material. As you indicated, and as detailed in section 2.2.2.4, there are still active concerns with this site that question its availability for use, incorporation into a proposed park would add to those concerns. Realization of the difficulties surrounding use of large upland parcels, in conjunction with concerns surrounding containment and mobilization of contaminants, make this alternative less preferable to use of borrow pits.

(17) NJ Department of Transportation (August 8, 1988)

<u>response:</u> If your material meets testing criteria for category II or III dredged material, and providing you are able to demonstrate there are no alternatives to ocean disposal available, then the subaqueous borrow pit alternative would be applicable. As the most optimistic projection would not make such a site approved for use until 1991 (later if a new site were to be used) its suitability for your needs would depend on your schedule.

(18) NY Department of Transportation (August 20, 1988)

<u>response:</u> We concur with your observation that distance from Port of NY is not a detriment to implementation. In fact, due to greater transportation costs for barging to the Mud Dump, it is anticipated that the NYD will have to be strict on limiting the pit site only to material warranting more stringent containment.

(19) NY Department of State (September 7, 1988)

<u>response</u> <u>a:</u> NY OGS is an observer to the Steering Committee, and has been following and reviewing all borrow pit findings with a full understanding of their potential role, especially (but not limited) to new pits and sand mining (reference section 2.3.2.1a,e and of DSEIS and comment letter 20 below). The FSEIS section 2.3.1.1 now acknowledges NY ownership and corresponding licenses for use of the lands in question (except part of the Lower Bay site) and the document has been expanded to more clearly specify the role of OGS with regards to land use and potential fees (2.3.2). However, as Federally authorized and funded projects have been exempt from royalties in the past, no fees would be paid to the state by the Corps should the construction of a new pit be authorized and funded by Congress.

<u>b:</u> In order to be most successful, the monitoring program had to be simple, flexible,

relatively inexpensive, and have specific goals. For this reason a tiered system was proposed to minimize cost and maximize resources; and basically all reviewers have accepted those premises. Your comment does bring up a valid point, since detectable differences between either experimental and control or inner and outer stations could be indicative of a different set of problems. Consequently, the monitoring plan has been revised to recommend expansion of testing if there are statistically significant differences in either case (see section 2.3.4.2.2).

<u>c:</u> The revised biological sampling plan (as outlined in 2.3.4.2.2) has replaced transects with random grid sampling, and now includes such samples from the final cap as well.

<u>d:</u> Fishery experts from the NMFS and NJDEP have also concurred with our conclusion that these artificial features cannot reasonably be expected to play a critical role in the fishery. If the lack of borrow pit habitat was a limiting factor on fish populations then it was a natural one. The potentially stressful conditions that mark pit habitat (as detailed in 3.4.1 and 3.4.2) and the accumulation of fine-grained material that historically is most prone to having absorbed contaminants, do not suggest a habitat warranting preservation. Historical accounts picture a thriving fishery before and during early European settlement, prior to the creation of borrow pits. This strongly indicates that deprived of pits, fish would distribute themselves more within historical patterns, and therefore not suffer an adverse impact to their community. It is precisely on the basis of what information that we have on the physical and biological conditions in those pits sampled that the SEIS arrives at its conclusions (as detailed in section 4.3.2).

<u>e:</u> To the extent possible this type of planning will be utilized for precisely the reason you enumerate; maximization of pit capacity. However, NYD does not envision borrow pit disposal restricting dredging to one particular season; this would have to be evaluated on a case-by-case basis, as now occurs. Certainly, by requiring some advanced notification the manager can expeditiously schedule disposal events within a limited season.

<u>f:</u> Our revised consistency determination (appendix E) includes an updated consideration of critical habitat designation and concluding statement as you requested.

(20) NY Office of General Services
(September 13, 1988)

<u>response</u> <u>a:</u> The NYD does not pay royalties to the state of New York for removal of sand to construct or maintain Federal projects, since such actions provide direct benefits to the public and the state. Under existing Federal statutes, the NYD would apply for a WQ certification and CZM authorization for the proposed action. Application for a "License to Excavate and Remove" sand and

gravel is not appropriate, as the intent of the project is to create a disposal site for the safe containment of dredge material removed form the Port of New York/New Jersey, and not to sell the resource. However, as indicated in section 2.3.2.1, if a private contractor undertakes to dig a disposal pit under their own responsibility, as a means of obtaining marketable sand, it is assumed they will apply for such a license and negotiate a royalty fee with the state, as has been the custom for past private enterprise sand mining operations.

b: DEC is a member of the Steering Committee and the agency responsible for review and issuance of the water quality certification for use of the designated site. As such they have had considerable input in the past (see 6.2 and 6.3b) and have commented in detail to the DSEIS (see comment letter 22).

c: We feel that this request is premature, pending public review and finalization of your sand mining EIS and subsequent permit review. The Corps will work closely with your office to maximize our respective goals to the extent possible, within environmentally acceptable parameters. However, as a major goal of this action is to reduce degradation of the marine environment, this would best be accomplished through expeditious use of pits. If the area you propose is not continuously mined, or if approval itself is not forthcoming, then a substantial delay in implementing this alternative will result, which would not be in the best interests of the environment or the Port.

d: As indicated in the text (2.3.2.1) and in response a above, the NYD does not pay royalties to the state for sands excavated in the construction or maintenance of Federal projects. Similarly, NYD does not pay fees for the use of disposal sites for such projects, irrespective of their location inside state waters. In fact, it is most often the state's responsibility (as a local sponsor) to provide such sites free and clear to the Federal government. However, private companies seeking to mine and/or utilize state resources for their private needs have historically been subject to such royalties and/or fees as may be set by your agency. Consequently, your suggestion that such fees may be utilized as a means of cost-sharing the monitoring program is most interesting. This will be followed up formally when the management plan detail is worked out, after the FSEIS has completed its review and candidate sites are chosen for formal application as disposal sites.

e: This recommendation will be taken into account when it can be accommodated with no danger of material loss or uptake from the site. As an aside, it is interesting to note that private contractors have recently sought permission to dredge the main navigation channels for the sole benefit of marketing the sands removed.

(21) NJ Department of Environmental Protection
(Sept 3, 1988)

response a: The NYD does not intend to utilize any additional pits until the procedure has satisfactorily been show to be as safe and efficient as all existing data and analyses now indicate it will be (see summary in 2.2.2.2 and details in 4.2; 4.3.1). We hesitate to refer to the operation as a demonstration project in that implies a degree of uncertainty that we do not feel is warranted. While we acknowledge the need to allay agency and public fears and to provide environmental safeguards, we reserve the right to continue utilizing this alternative after the pit is filled and those fears are demonstrated to be unfounded. Therefore we are applying for a full-scale implementation as an open display of our intentions to develop this alternative as a full-scale disposal practise. With regards to limiting use to category II, we believe this is both unnecessary and unwise. Unnecessary because the types of sediment containing both categories II and III are basically the same, and therefore will react to containment in the same manner. Unwise because in the unlikely event that there is loss of sediment-bound contaminants, it would most likely be detected only at the higher levels present in category III. The monitoring program would detect this and provide a warning to cease operations before any long-term damage is done.

b: We concur with your conclusion (and that of NMFS as well) that existing pits do not provide critical fishery habitat necessary to maintain productivity.

c: We concur with your rationale for preference of an existing pit over a new one, and have consistently stated that utilizing an existing pit will the provide for the earliest meeting of the goal for reducing ocean disposal. It will also provide for the quickest containment of contaminated sediments now exposed to the environment and its biota.

d: We have altered our monitoring plan to include quadrants around the pit instead of a transect (see 2.3.4.2.2a)

e: While we will select target species to maximize contaminant uptake and bioaccumulation (see 2.3.4.2.2a), the final choice will depend on what organisms are present in and adjacent to the pit, and how many are required to provide a sufficient amount of tissue to analyze. In the past insufficient catches of some species did necessitate testing at the general level, to get enough tissue mass to analyze.

f: The concern is to determine that the use of pits will not impact the biological system. The best way to measure this is directly, through analysis of the tissues of organisms most likely to uptake such contaminants, and comparisons of those tissue analyses to tissue analyses from organisms not subjected to the potential exposure (control). If there is a more relevant ecological break point we would welcome your identifying it; though we would stipulate that to be relevant it would have to provide a comparison to conditions outside the influence of a pit. It should be noted that the system proposed stops disposal when there is a statistically significant increase in uptake, irregardless if this change is actually deleterious to the organism. Incidental changes in uptake are unlikely to be harmful.

g: We disagree. The monitoring program is intended to identify potential problems, not measure effects of population variability. By testing during the peak spring growth (and therefore metabolic activity) season and the highest stress conditions of summer anoxia, potential problems will be most likely identified without an exorbitant expenditure of resources or continual disruption of the very biota the program intends to monitor.

h: We agree, as suggested in the revised monitoring proposal (2.3.4.2.2) the criteria on which impacts at the disposal site would be evaluated will be based on Ocean Disposal Criteria in effect at the start of the program. However, review agencies would have an opportunity to recommend (and justify) additional contaminants they feel may be appropriate to test for.

i: At this point, without any monitoring results or other studies to go by, we feel such determinations are unwarranted. Unless your agency or others can identify (and defend) specific quantitative levels for various contaminants that would be appropriate go/no-go decision points, we see no other alternative than to pursue the plan as outlined in section 2.3.4.2, relying on best professional judgement. Rather than being subjective, it utilizes the expertise of the various members of the SC to interpret findings whenever is a measured level of change, irrespective of any previously demonstrably harmful effects. The program is therefore conservative, in that disposal stops (or is delayed) before an established adverse effect is observed.

j. At the April 4, 1990 meeting of the SC the Corps described its revised monitoring plan and mailed written versions to all members (including PICG chairpersons). Based on verbal and written comments received, the finalized outline presented in section 2.3.4.2 was completed.

(22) NY Department of Environmental Conservation (Oct 3, 1988)

response a: Capping was discussed in more detail in section 2.3.3.1 of the DSEIS, and is outlined in the same section in the FSEIS. Capping material could come from any source providing it meets category I criteria. Private applicants disposing of material of special concern (category III) would have to identify an immediately available capping source if there was no scheduled pit disposal within two weeks of the end of their disposal. The availability and acceptability of the capping material would have to be approved before any disposal begins.

b: The youngest is probably the CAC pit (4), last mined in the early 1970s. Narrow, limited portions of the East Bank pits (6/7) were mined into the late 1970s, though both were created and/or expanded between 1950 - 1973 (Bokuniewicz, 1986). The other pits are somewhat older, though it is likely that they have all been mined on and off even longer.

c: This opinion was made at several meetings of the SC, and in their written response to the DSEIS (see comment letter 8 above).

d: This is not true. Statements in the DSEIS are not meant to devalue the fishery habitat potential of borrow pits, but rather place them into true ecological perspective. The value of such habitat with regards to the productivity of the fishery is still very much in question, a point that has been made by the NMFS (see comment letter 8) and NJDEP (see comment letter 21), as well as in the SEIS. The usefulness of the habitat with respect to concentration of the resource is primarily an fishing benefit, and is appropriately discussed in section 4.7 (socioeconomic impacts).

e. Management and ultimate responsibility for capping and other site modifications would rest with the Corps, with advice and guidance from the SC.

f. Preliminary coastal consistency determination was summarized here. The state 401 certification requirement was identified in section 6.3 of the DSEIS, and has been included in the summary for the FSEIS.

g. We concur, the table has been revised in the FSEIS to reflect economic impacts of no action alternative.

h. Pits are unnatural. In the context of the detailed text (which this table only summarizes) this distinction is important in that loss of such a feature in reality is a restoration of normal conditions. Therefore, though the pits function as a part of the existing ecosystem, there is all the reason to assume that system will continue or improve once restored to its pre-development state. In this context, the short term refers to the time needed to dig and fill the pit.

i. The table reflects impacts relative to existing conditions. Therefore ocean disposal would mean no impacts over current practise, which is predominantly ocean disposal.

j. The Corps believes that such material can be safely capped at the Mud Dump. However, because of the potential for bioaccumulation and toxicity review agencies have been reluctant to place this material at the Mud Dump when, in their opinion, a safer repository (such as borrow pits) is feasible.

k. The differences are primarily a matter of confinement. A borrow pit accumulates material and is therefore less likely to lose sediments to the marine system than a surface site at which material is in more susceptible to movement (especially the deep ocean where dispersal is common). This distinction is the primary basis for recommending borrow pits over the other two, and was discussed in more detail in section 4.2 of the DSEIS (and of the FSEIS). Based solely on impacts to the biological resources, use of the already impacted Mud Dump might be construed a lesser impact. However, this does not take into consideration the addition of category III material that has not been allowed at the mud dump. Nor does it consider the isolation of the anoxic and potentially more contaminated nature of some of the pit environments now freely exposed to the biota (see 3.2.3b, 3.3.3d and 3.4). Together these latter points provide potential protection to the biota that make using the pits for disposal of contaminated sediments an attractive alternative.

l. OGS has been an invited observer to all meetings of the SC, and have commented frequently on discussion topics and the DSEIS (see comment letter 20). Precisely what basis for selecting sand mining sites they will ultimately chose is unknown to us. However, they are carefully watching our process and it is expected that their application will closely reflect its conclusions.

m. The Corps will manage the site, including final capping and monitoring.

n. As indicated in section 2.3.3.1e, conditions governing interim caps are based on a multiplicity of factors, and can therefore not be rigidly set out in advance. The objective of the interim cap is to isolate material from the biota before it is covered by another project. A secondary consideration is to preclude loss of material from the pit (directly by sediment resuspension, or indirectly be chemical migration). Toward this end all decisions regarding specifics will be made on a case by case basis. Once the type and volume of interim cap is determined no disposal will be permitted until the applicant has conclusively demonstrated that the cap material, and alternative source, is immediately available.

o. This assumption overlooks the real potential for alternative actions coming available in the future, and/or the volume of category II and III diminishing in time, as current Bight and estuary clean up programs take effect. By maximizing the capacity at a site and extending its life, the need for additional sites is minimized, and possibly avoided. Further, based on the Corp's (as well as NMFS and NJDEP) belief that the pits are not serving a critical role with respect to the productivity of the fishery, we feel it is unnecessary to recommend reducing site capacity to offset impacts, as no adverse fishery impacts are anticipated (4.3.2).

p. While the pits are an integral part of the present ecosystem, they would be replaced (in the longterm) by the normal habitat on which the system was originally based. In effect, this would be a restoration of a degraded natural ecosytem, and the elimination of an artificial condition that risks exposing the fishery to the very contaminants that are a current health concern. While the size of the sand grains within the restored shoals over the pit might vary initially, they would soon be subject to the same equilibrium conditions that determine the grain size at the undisturbed shoals, and become indistinguishable from the adjoining bottom.

q. A designated area would be some portion of the pit's surface area. However, the recommended disposal technique in the section you are commenting on (2.3.3.3 of the DSEIS) is for pinpoint dumping at a taut-moored buoy, not disposal within a designated area. Capping material would be discharged in the same manner as the dredge material.

r. On an ecological basis we disagree. The restored shoal habitat will be identical to the natural fishery habitat, whose historical status has always been described in the most glowing terms, especially by the fishing community. In the past, DEC has strongly opposed conversion of natural habitat, yet now balks when there is a real opportunity to reclaim some of that lost habitat; it is this apparent inconsistency that seems strange to us. We do agree that the loss of this habitat might result in making the resource more difficult to harvest, by spreading it out more naturally. On the other hand, the potential added difficulty in harvesting might be attributed to a general decline in the fishery overall. To the extent that this is brought about by human disturbances, restoring a portion of the bay bottom would seem a laudable goal. Similarly, to the extent that filling a pit removes one potential source of fishery exposure to contaminants, the borrow pit alternative also benefits the long term fishery.

s. Initially the Corps would take responsibility for construction of the reef, in close coordination with the resource agencies (including DEC) on the SC. It is hoped that once the reef is in place and functioning its maintenance and monitoring would be turned over to either a state or Federal agency with specific fishery responsibilities (NYDEC/NJDEP or NMFS, respectively).

t. Granted that considerable change has taken place in the estuary since 1973, the survey on which sites for new pits were selected reflects present conditions. Assuming that the trend toward improvement continues, when the new pit is filled and capped, a benthic community will form that should be equal to that then present in adjacent areas. In the short term, during construction and use of the new pit, there could be a net loss of preferred shellfish habitat only if a pit on the West Bank (3 or 4) was filled.

u. As indicated in the management plan (appendix D), the Corps would be responsible for managing the site, including decisions on placement of material, changes in buoy locations, capping success. Use of inspectors or remote electronic systems to track each barge would ensure direct compliance with management decisions (see 2.3.4.2.1).

v. As indicated in section

2.3.4.2.3, chemical testing might miss small levels of contaminants that would be bioaccumulated and more readily detected from tissue analysis. Since the concern is based on contamination of the biotic community, the monitoring plan proposes to use that as a direct measurement. This will serve to make the plan as simple and therefore more reliable and feasible, while avoiding overburdening the already substantial investment in effort and costs.

w. The SEIS identifies and compares alternatives, but is not a Corps decision document. After the SEIS process is completed an alternative for implementation will be identified in the Record of Decision, which will also include public comments to the FSEIS. More specific information can then be provided as part of the permit review process when the NYD applies for section 401 water quality certification from New York or New Jersey.

6.4.3 Local Elected Officials and Agencies

6.4.3.1 Local Comments Received:

(see full text of Local comment letters beginning on page 6-80; responses to these letters are in section 6.4.3.2 beginning on page 6-103, immediately following the text of all written local comments).

Comment Letter 23

THE COUNCIL
OF
THE CITY OF NEW YORK
CITY HALL
NEW YORK. N. Y. 10007

WALTER WARD
COUNCILMAN, 15TH DISTRICT, QUEENS
82-17 153RD AVENUE
HOWARD BEACH, N. Y. 11414
845-0808

CHAIRMAN:
COMMITTEE ON PARKS, RECREATION
AND CULTURAL AFFAIRS

COMMITTEE MEMBER:
FINANCE
EDUCATION
YOUTH SERVICES

July 19, 1988

Colonel Marion L. Caldwell, Jr.
District Engineer
U.S. Army Corps. of Engineers
New York District
26 Federal Plaza
New York, New York 10278

Dear Colonel Caldwell:

This is being written to voice my serious concern and opposition to the U.S. Army Corps. of Engineers Draft Supplemental Environmental Impact Statement Use of Subaqueous Borrow Pits for Disposal of Dredged Material containing high levels of PCB's (cadmium lead and petroleum hydrocarbons) in and around Jamaica Bay and proposed sites off Rockaway Point.

Material which is brought to the site of the borrow pit and is dumped into the water expecting for it to fall into the pit, does not necessarily follow the predetermined path. a

This plan would place the well-being and physical health of our people in serious jeopardy. The possibility exists that our marine system would become contaminated as a result of the aforementioned proposal because of the potential for increasing levels of contaminates in the tissues of animals as they pass through the food chain. The wildlife sanctuary and ecology in and around Jamaica Bay must not be threatened. It is important that these natural resources be preserved. b

Moreover this area is used for recreation by an innumerable amount of people who enjoy fishing and swimming. It is adjacent to the major marina in the area.

THE COUNCIL
OF
THE CITY OF NEW YORK
CITY HALL
NEW YORK, N. Y. 10007

WALTER WARD
COUNCILMAN, 15TH DISTRICT, QUEENS
82-17 153RD AVENUE
HOWARD BEACH, N. Y. 11414
845-0808

CHAIRMAN:
COMMITTEE ON PARKS, RECREATION
AND CULTURAL AFFAIRS

COMMITTEE MEMBER:
FINANCE
EDUCATION
YOUTH SERVICES

This proposal to dump in an around Jamaica Bay is illogical and ill-advised. It is in direct violation of the NY State Coastal Zone Management Program which states in Policy #44 "to preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas." c

Above all, our people must be protected. We must not set off a chain reaction which will adversely affect our people and those of generations to come.

I urge you to use your good offices in an effort to eliminate the aforementioned proposal. Your consideration in this matter would be greatly appreciated.

Very truly yours,

Walter Ward

WALTER WARD
WW:lw
a

cc: Leonard Houston,
Environmental Impact Statement Coordinator
Senator Daniel P. Moynihan
Senator Alfonse M. D'Amato
Congressman Floyd H. Flake

PRESIDENT OF THE BOROUGH OF BROOKLYN
CITY OF NEW YORK

HOWARD GOLDEN
PRESIDENT

August 17, 1988

Colonel Marion Caldwell
United States Corps of Army Engineers
New York District
26 Federal Plaza
New York, New York 10278

Dear Colonel Caldwell:

I was extremely concerned to learn of the Army Corps of Engineers proposal to use "borrow" pits off the coast of Coney Island as disposal sites for contaminated waste dredged from the New York Harbor.

If this plan is carried out, the possible adverse effects on our marine life, recreational waters and beachfront communities could be significant. Public hearings conducted by your office on this plan are now underway. Little advance notice was given for these hearings and many elected officials, environmental experts and community organizations have not had an adequate opportunity to examine the proposal. Their input and expertise is necessary to thoroughly understand the complexity and possible dangers of disposing four hundred thousand cubic yards of contaminated and possibly toxic sediment near our shoreline.

a

As an example, Kingsborough Community College and Brooklyn College, two outstanding Brooklyn institutions, staffed with marine experts qualified to research this plan, were alerted to this proposal only two weeks in advance of the hearings. Marine experts at both schools have raised serious questions about the degree of erosion of material stored in these "borrow"pits, the toxic content of the dredged material and its affects on the marine life and beaches. Two weeks notice allows only time for speculation, and not time for the serious and broad scientific investigation which this issue requires. The Army Corps of Engineers has, in effect, eliminated their participation and their experience.

BOROUGH HALL, 209 JORALEMON STREET, BROOKLYN, N.Y. 11201 1-718/643-2051

Additionally, I must express my dissatisfaction with the timing of these public hearings. During summer months, many ocean experts are not available to review the material and participate in the hearings. Their testimony is vital! b

To date, there are too many unanswered questions. It is important that the Army Corps of Engineers move ahead cautiously in this area. Your own research does not fully assess the possible effects of this plan on ocean life and on the hundreds of thousands of people who swim in the waters of Coney Island. And it is absolutely necessary that we explore all the alternative options to the disposal of such toxic materials. Anything less would be short sighted. To that end, I call upon the Army Corps of Engineers to significantly broaden the participation of representatives from the academic, scientific, medical and engineering communities as well as New York City's elected officials. c d e

Our experience this summer with closed beaches, medical waste floating ashore and the loss of business to our seaside communities, has demonstrated most clearly that before we embark on a proposal that would dump four hundred thousand cubic yards of potentially toxic sediment within 500 yards of Coney Island, we need to take a very thorough look at the hazards we face and the options available to us.

Sincerely,

Howard Golden

Comment Letter 25

THE COUNCIL
OF
THE CITY OF NEW YORK
CITY HALL
NEW YORK, N. Y. 10007

WALTER WARD
COUNCILMAN, 15TH DISTRICT, QUEENS
82-17 153RD AVENUE
HOWARD BEACH, N. Y. 11414
845-0808

CHAIRMAN:
COMMITTEE ON PARKS, RECREATION
AND CULTURAL AFFAIRS

COMMITTEE MEMBER:
FINANCE
EDUCATION
YOUTH SERVICES

STATEMENT MADE BY COUNCILMAN WALTER WARD ON AUGUST 18, 1988 AT KINGSBOROUGH COMMUNITY COLLEGE, MAIN AUDITORIUM, 2001 ORIENTAL BOULEVARD, BROOKLYN, N.Y. AT A PUBLIC HEARING REGARDING HIS OPPOSITION TO THE U.S. ARMY CORPS OF ENGINEERS DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT USE OF SUBAQUEOUS BORROW PITS FOR DISPOSAL OF DREDGED MATERIAL CONTAINING HIGH LEVELS OF PCB'S (CADIUM LEAD AND PETROLEUM HYDROCARBONS) IN AND AROUND JAMAICA BAY AND PROPOSED SITES OFF ROCKAWAY POINT.

I AM HERE TO VOICE MY SERIOUS CONCERN AND OPPOSITION TO THE U.S. ARMY CORPS OF ENGINEERS DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT USE OF SUBAQUEOUS BORROW PITS FOR THE DISPOSAL OF DREDGED MATERIAL CONTAINING HIGH LEVELS OF PCB'S (CADIUM LEAD AND PETROLEUM HYDROCARBONS) IN AND AROUND JAMAICA BAY AND PROPOSED SITES OFF ROCKAWAY POINT.

MATERIAL WHICH IS BROUGHT TO THE SITE OF THE BORROW PIT AND IS DUMPED INTO THE WATER EXPECTING FOR IT TO FALL INTO THE PIT, DOES NOT NECESSARILY FOLLOW THE PREDETERMINED PATH. a

THIS PLAN WOULD PLACE THE WELL-BEING AND PHYSICAL HEALTH OF OUR PEOPLE IN SERIOUS JEOPARDY. THE POSSIBILITY EXISTS THAT OUR MARINE SYSTEM WOULD BECOME CONTAMINATED AS A RESULT OF THE AFOREMENTIONED PROPOSAL BECAUSE OF THE POTENTIAL FOR INCREASING LEVELS OF CONTAMINATES IN THE TISSUES OF ANIMALS AS THEY PASS THROUGH THE FOOD CHAIN. THE WILDLIFE SANCTUARY AND ECOLOGY IN AND AROUND JAMAICA BAY MUST NOT BE THREATENED. IT IS IMPORTANT THAT THESE NATURAL RESOURCES BE PRESERVED. b

MOREOVER THIS AREA IS USED FOR RECREATION BY AN INNUMERABLE AMOUNT OF PEOPLE WHO ENJOY FISHI AND SWIMMING. IT IS ADJACENT TO THE MAJOR MARINA IN THE AREA.

THIS PROPOSAL TO DUMP IN AN AROUND JAMAICA BAY IS ILLOGICAL AND ILL-ADVISED. IT IS IN DIRECT VIOLATION OF THE NY STATE COASTAL ZONE MANAGEMENT PROGRAM WHICH STATES IN POLICY #44 "TO PRESERVE AND PROTECT TIDAL AND FRESHWATER WETLANDS AND PRESERVE THE BENEFITS DERIVED FROM THESE AREAS." c

ABOVE ALL, OUR PEOPLE MUST BE PROTECTED. WE MUST NOT SET OFF A CHAIN REACTION WHICH WILL ADVERSELY AFFECT OUR PEOPLE AND THOSE OF GENERATIONS TO COME.

I URGE THAT EVERY EFFORT BE MADE TO ELIMINATE THIS HARMFUL PLAN. I FEEL THAT IT IS TOTALLY UNREASONABLE AND UNACCEPTABLE.

THE CITY OF NEW YORK
OFFICE OF THE MAYOR
NEW YORK, N.Y. 10007

September 9, 1988

OBERT ESNARD
eputy Mayor for Physical Development

Colonel Marion L. Caldwell, Jr.
New York District Engineer
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278

Dear Colonel Caldwell:

In response to the Army Corps of Engineers' Public Notice number 13374 of July 13, 1988, the attached statement outlines the combined comments and concerns of several City agencies which may be affected by the Corps' proposal to bury dredged material in subaqueous borrow pits.

We understand that the Corps plans to issue a draft supplemental environmental impact statement in the near future based on the comments you are receiving from interested parties. It would be helpful if the issues raised in the City's statement are addressed at that time.

Sincerely,

Robert Esnard
Deputy Mayor

encl.
cc: Mario Paula
Stanley Brezenoff
Harvey Schultz
Michael Huerta
Henry Stern
Sylvia Deutsch

NEW YORK CITY COMMENTS ON ARMY CORPS
SUBAQUEOUS BORROW PIT PLAN

The continued economic viability of the New York metropolitan region depends in no small part on the NY-NJ port which contributes an estimated $14 billion annually in economic activity and 200,000 jobs to the area. In addition to longshore jobs, there are jobs in trucking, warehousing, brokerage, ship repair, supplies and services as well as administrative and clerical jobs.

In order to keep the port viable, periodic dredging to maintain our navigable channels and deep-water slips is required. Some of the dredged material is contaminated and therefore does not meet current federal criteria for unrestricted ocean disposal.

The Army Corps of Engineers is now proposing to use subaqueous "Borrow Pits" which exist in a number of off-shore locations in the New York area for the disposal and containment of these potentially contaminated dredged materials. The Corps' draft EIS argues that this alternative is the most cost effective means of disposal, and one that appears to address environmental issues. b

In theory, the idea of using "capped" borrow pits for contaminated materials may be acceptable. However, the City of New York has several concerns which it feels have not been adequately addressed in this proposal.

Several of the borrow pits identified in the Corps' proposal are in the proximity of a number of New York City recreational beaches. The lack of definitive environmental studies demonstrating the effect of these materials on semi-enclosed inland waters and the shores they touch requires us to be particularly cautious to insure that the use of borrow pits does not pose short or long term environmental or health problems. c

One concern relates to the fate of materials which escape from the sediment plume as the plume descends from the disposal vessel into the pit. Specifically troublesome is the potential for the release of toxic substances associated with the liquid and suspended particulate phases of the dredged material. The draft EIS indicates that release of particulate matter (less than 5% of total volume disposed) is not an environmental concern since the suspended particulates tend to settle relatively rapidly and tend not to release bound contaminants. However, the draft EIS does not address the release of contaminants associated with the d considerable liquid phase volume. Since the liquid phase constitutes the majority of the total volume disposed (using typical density values) and will tend to disperse, the City believes that the fate of materials associated with this phase is a significant concern which should be thoroughly assessed, especially in the context of disposal within a partially closed bay.

Second, the City is concerned with the feasibility of capping unconsolidated soft muds such as may be found in some harbor tributaries. The draft EIS asserts that this will not be a problem, but does not substantiate that the installation of an effective cap can be accomplished under such worst case conditions. The draft EIS should confirm with particularity the feasibility of capping. e

Third, the City is concerned about preventing the erosion of material from the pits. The draft EIS suggests that erosion will not be a problem when the surface of a deposit in a pit is at least 23 feet below sea level and at least 6 to 14 feet below ambient sea floor. While the draft EIS does not provide detailed calculation of pit depth, it appears that the above configuration requirements may restrict the use of certain pits. For example, pits 1 and 7 are relatively shallow depressions in shallow water and meet neither of the above criteria; pit 6 is located on a slope such that the effective pit depth is controlled by the height of its downslope site, thus constraining its capacity; other pits appear to be marginally within the configuration requirements. These requirements appear to substantially constrain usable pit capacity and should be considered when computing volume. f

Finally, the City believes that inadequate attention is paid in this proposal to alternatives, such as the use of containment islands, similar to the Hart-Miller complex in Baltimore's harbor. Initially more expensive, such islands may be more environmentally sound in the long run. g

The City understands the complexities, uncertainties and difficulties associated with this project as a result of its own waste management activities. The steady progress toward improving water quality in New York Harbor has been achieved through tremendous effort and expense. It is therefore extremely important to ensure that the use of subaqueous borrow pits would be consistant with the goal of continued improvement of that water quality.

While the City realizes that the disposal of dredged materials is essential for the health and vitality of our port, it can only be supportive of disposal programs that, through careful and thorough scientific analysis, are proven to be environmentally sound.

Comment Letter 27

Community Board No. 14

City of New York • Borough of Queens

1931 Mott Avenue • Far Rockaway, N.Y. 11691 • (718) 471-7300

August 2, 1988

Col. Marion L. Caldwell, Jr.
Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278

Dear Col. Caldwell,

Enclosed is a petition from the Breezy Point Cooperative in opposition to the dumping of dangerous sediment in Jamaica Bay.

Please enter this into your record.

Sincerely,

Jay Steingold,
District Manager

JS/co

Enc.
cc: Kevin Callaghan

TO: ARMY CORPS OF ENGINEERS

Attn: Len Houston

We, the undersigned, are opposed to the dumping of dangerous chemicals in dredged sediment in pits in and around Jamaica Bay. The negative impact on wildlife and marine life in addition to destroying the entire recreational area will hurt us all for many generations. NOTE: This is one page of petition, see volume 2 for entire petition with all signees.

NAME	ADDRESS
Stephen E. Glavey	7 Doris Ln Rockaway Pt NY 11697
Kevin E. Quinn	7600 Shore Front Pkwy Rockaway Beach
[illegible]	577 [illegible] NY
Bridget [illegible]	1463 [illegible] 10 Street
[illegible]	881 [illegible] 92 St - [illegible] NY
M. Thomas	[illegible]
[illegible]	[illegible]
R. Ankoz	99-06 R.B. Blv. R.B. N.Y.
Estlero	47 W. Market St. R Pt. N.Y.
V. Pinto	[illegible] Dulton [illegible] 11697
J. Ronzino	CATskill NY
T. Boyle	39 Marion Walk Bzy Pt. N.Y. 11697
Alice Schriener	
[illegible]	[illegible]
Joe Mastino	147 Cortelyou Ave. SI
[illegible] B. Hut	21 Beach 219th St
[illegible]	43 [illegible]
Margaret [illegible]	3217 [illegible] Place [illegible] 11512

Community Board No. 10

City of New York • Borough of Queens

115-01 Lefferts Blvd. • South Ozone Park, N.Y. 11420 • 843-4488

August 15, 1988

United States Army
Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, N.Y. 10278

Re: Use of Subaqueous Borrow Pits for the disposal of dredged material from the Port Authority of New York - New Jersey

Attention: Colonel Marion L. Caldwell, Jr.

Dear Colonel Caldwell:

This Board has reviewed the Draft Supplemental Environmental Impact Statement issued regarding the above referenced matter and has unanimously voted to condemn the placement of any of the proposed dredged material within the New York Bight.

The proposal would place toxic material in a potentially unstable environment in close proximity to beaches and waters which are used for boating, fishing and general recreational activities. In addition, a
the majority of the waters constitute a wild life refuge which has been created at great expense to serve an ecologic need.

Jamaica Bay waters, in particular, have suffered for many years from pollution and degradation in quality caused by past such proposals which have been effectuated and those waters have only now recovered, at great expense, some of their former high quality.

The Board feels strongly that the dredged material in question should be placed in an absolutely secure site, preferably one upland, where b
it would not be possible to migrate from its placed location.

Very truly yours,

Joel A. Miele Sr., P.E.

JAM:cv

Joel A. Miele, P.E.
Chairman

Anne Grossberg
District Manager

The City of New York
Community Board No. 15

EDWARD I. KOCH
Mayor

ALLEN LASHLEY
Chairperson

HOWARD GOLDEN
Borough President

DOROTHY H. CUNNINGHAM
District Manager

STATEMENT MADE BY RABBI ELI GREENWALD

CHAIRPERSON, ENVIRONMENTAL PROTECTION COMMITTEE

COMMUNITY BOARD NO. 15

Community Board No. 15 has been made aware that the Corps of Engineers, New York District, is currently in the process of developing an operational program for the disposal of dredged material in subaqueous borrow pit disposal sites in lower New York Harbor and adjacent areas. We have been further informed that one of the "adjacent areas" includes Jamaica Bay.

The Shoreline of Community Board No. 15, which is used by the residents of our District as well as literally millions of visitors during the summer months, is of prime importance to this Board in terms of its cleanliness, safety, and availability to all who wish to avail themselves of its offerings. In addition, the fishing fleet of Sheepshead Bay ply these waters in their commercial ventures which, also, is of major concern to our Board.

The waters have proven to be disastrous in terms of its various forms of contamination during 1988. Much will have to be done to make all of our waters safe in the years to come. With this in mind, a fearful concern arises as to the possible effects of placing contaminated materials in waters near or accessible to our shoreline. How foolproof will the safety mechanisms be to guarantee that there will be no additional contamination to our waters should the proposed site be utilized as requested? Indeed, what are the mechanisms for safety? Many questions will have to be answered and many guarantees of responsibility given in order to allay the concerns and fears of those who use the waters along the Community Board No. 15 shoreline.

The City University of New York

Office of University Relations 535 East 80th Street, New York, New York 10021
(212) 794-5317

September 29, 1988

Mr. Mario A. Paula
Water Compliance Branch
U. S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Paula:

I am enclosing, for your information and consideration, Chancellor Joseph S. Murphy's testimony on the Borrow Pit PCB Dumping Proposal.

Thank you for your consideration.

Sincerely,

Jay Hershenson
Vice Chancellor

JH:jb
Enc.

cc. Chancellor Joseph S. Murphy
Dean Milton Drucker

STATEMENT BY CHANCELLOR JOSEPH S. MURPHY ON BORROW PIT DISPOSAL OF TOXIC MATERIALS

As Chancellor of The City University of New York, the largest urban university system in the nation, I feel obligated to take strong positions on issues which potentially threaten the health and welfare of the people of New York. Such is the situation arising from the recent proposal by the U.S. Army Corps of Engineers to begin disposal of dredging materials heavily contaminated with toxic substances within the waters of New York Harbor. It is an idea whose time has NOT come, and hopefully, it will be abandoned until the safety of this proposed action can be fully proven.

It is the responsibility of the Corps of Engineers to keep navigation open principally through a dredging program, and furthermore, to regulate the disposal of dredged materials in a manner minimizing the degradation of the environment. Because of this latter requirement, the Corps must file Environmental Impact Statement detailing the actions to be taken and assessments of the effects of these actions, or alternatives, on the involved environment.

Most dredged materials are disposed of by open ocean dumping, a situation deplorable in itself for a variety of reasons. However, in the case of New York Harbor, a significant amount of the dredged sediments is so heavily contaminated with a toxic substances that it cannot be disposed of in the ocean. It is this material then that the Corps proposes to bury in the lower bay of New York Harbor by a method known as sub-aqueous borrow pit disposal. The idea is to dig an underwater hole or use an existing pit, dump the contaminated dredgings from transport barges into the hole, and finally cover the materials with approximately three feet of clean sand. a

Since the burying of toxic materials is not the kind of action that any reasonable homeowner would allow to occur in his or her front yard, one begins to wonder then, why should we allow this to occur in our "public front yard," one of the most heavily populated, economically valuable, important fishing, boating and recreation areas in the country? Indeed, some of the sites considered in the proposal are extremely close to the shoreline and beaches of Coney Island and Manhattan Beach in Brooklyn, Jamaica Bay and the Rockaways in Queens, and various sites off Staten Island and New Jersey. b

These are hardly the kinds of places where one would expect a federal agency to experiment with methods of disposal of toxic materials. However, in the summary of their report in a section entitled S.3 <u>Unresolved</u> <u>Issues</u>, the Corps of Engineers state that pit disposal is:

"....yet to be verified in a full-scale operation. Thus the issue of its actual ability to avoid adverse impacts to the c fishery, while also containing pollutants in the face of biological and physical erosional processes, must await the implementation of the project and completion of the related monitoring studies, before it can be finally resolved." c

Many community groups and community leaders have already expressed their adversion to the proposal. In preparing my statement, I asked Dr. Milton Drucker, Dean of Marine Education at the Center for Marine Development and Research of The City University, to solicit the opinions of concerned scientists on our faculty and to hold discussion meeting with officials from the Corps of Engineers. He has reported that many faculty members have serious reservations about the adequacy and suitability of the latest Environmental Impact Statement. Among the concerns raised were several technical questions involving the proposed testing methods for toxicity including the following:

(1) The tests to be used to determine toxic levels of pollutants are limited mostly to certain heavy metal ions, PCB's and hydrocarbons. It is possible that even more hazardous substances may be present in the dredged sediments and they may be redistributed during the dumping operations of materials into the pits. Among these substances may be carcinogens, mutagens, teratogens and others. Considering the proximity of some of the suggested dump sites to swimming areas and fishing areas, how will the potentially d

harmful effects on human and aquatic flora and fauna be evaluated and prevented if such substances are present?

(2) Moreover, the test to be used for toxicity are mostly of short duration and are based primarily on expected numbers of deaths of healthy marine creatures. How does one account for sub-lethal effects on the reproduction and growth of already stressed populations of aquatic flora and fauna over long periods of time?

e

The above are but a small sample of the types of questions raised by members of our faculty which are not addressed in the proposal. These reflect the fact that important issues are still unanswered and demand consideration before any borrow pit disposal should be begun.

It is clear that the corps of Engineers is faced with serious problem. On the one hand, they are required to keep the navigation channels open. On the other hand, they must dispose of contaminated dredged materials in the safest possible manner. But, particularly in this period of heightened public awareness of environmental pollution following a tragic summer of closed beaches due to medical waste, concerns over acid rain and the climatic warming of the greenhouse effect with related flooding, the Corps must be especially careful that the proposed answer of their problem does not cause yet greater problems for society as a whole.

Rather than trying to "bury" mistakes of the past, perhaps the Corps should consider investing in the future. Perhaps, they should take the initiative and leadership in the development of alternative technologies to remove toxic materials from the environment. f

The City University stands ready to work with all groups and agencies to help study, and hopefully to resolve, the increasingly debilitating problem of toxic wastes in our "own front yard". Thank you. g

MONMOUTH COUNTY PLANNING BOARD
FREEHOLD • NEW JERSEY

JOSEPH RETTAGLIATA
CHAIRMAN

ROBERT W. CLARK, P.P.
DIRECTOR

September 30, 1988

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278-0090
ATTN: Mr. Mario A. Paula
Water Quality Compliance Branch

RE: Comments on the Draft Supplemental Environmental Impact Statement, (DSEIS) of the U.S. Army Corps of Engineers Proposed Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York-New Jersey; June 1988

Dear Mr. Paula:

At its regular meeting on September 19, 1988, the Monmouth County Planning Board discussed and approved the attached staff report on the above mentioned (DSEIS). We submit this to you for your consideration and to be part of the public record of comments.

After careful review of the Draft Supplemental Environmental Impact Statement, the Monmouth County Planning Board respectfully recommends that the U.S. Army Corp of Engineers conduct an investigation of the containment island alternative with the same intensity and scope as the subaqueous borrow pit alternative. It is the Monmouth County Planning Board's opinion that an assessment of an acceptable disposal method for contaminated dredged material cannot be complete until such as investigation is undertaken. a

We appreciate your time and consideration of our comments.

Sincerely,

Robert W. Clark

RWC:cc

cc: Joseph Rettagliata,
Planning Board Chairman

HALL OF RECORDS ANNEX • POST OFFICE BOX 1255 • FREEHOLD, NEW JERSEY 07728-1255 • 201-431-7460

MONMOUTH COUNTY PLANNING BOARD
FREEHOLD • NEW JERSEY

JOSEPH RETTAGLIATA
CHAIRMAN

ROBERT W. CLARK, P.P.
DIRECTOR

TO: Monmouth County Planning Board Members

RE: DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT; U.S. ARMY CORPS OF ENGINEERS PROPOSED USE OF SUBAQUEOUS BORROW PITS FOR THE DISPOSAL OF DREDGED MATERIAL FROM THE PORT OF NEW YORK - NEW JERSEY; JUNE 1988

Introduction

The U.S. Army Corps of Engineers is responsible for keeping New York Harbor open to navigation by continually dredging and maintaining the navigational channels. The areas the Corps must dredge include Kill Van Kull, Newark Bay and Arthur Kill, in addition to New York Harbor. According to Section 1.3g of the Draft Supplemental Environmental Impact Statement (DSEIS) cited above, "(t)hese areas accumulate some of the most contaminated sediments in the harbor," which are comprised of such pollutants as heavy metals and PCBs. Historically, this contaminated dredge material, which is classified as "material not suitable for unrestricted ocean disposal" [DSEIS, Section 1.3d], has been disposed of at what is known as the Mud Dump, located six miles off Sandy Hook, and "capped" (covered over with a thick layer of clean sediment). The Environmental Protection Agency is mandated to close the Mud Dump and designate a new disposal site 20 miles offshore. This new site cannot be used for disposal of contaminated dredge material, hence the need to find an acceptable alternative as soon as possible.

As an alternative, the Army Corps of Engineers is proposing the use of former sand mining pits (subaqueous borrow pits) located in the lower New York Harbor (please see attached map).

After careful review of this document, the Monmouth County Planning Board staff would like to offer the following comments:

Suspended Sediment Transport

Staff is concerned about the introduction of contaminated material to the Bayshore area. The use of subaqueous borrow pits would result in the resuspension of disposed contaminated dredge material.

Since the disposal pit would not be capped with clean sediment until the completion of a dredging job (usually on the order of months rather than days), the dredged materials would be available to the environment for "continual resuspension and exposure to water column release..." [DSEIS, Section 1.3g]. b

The Lower Bay Complex's circulation pattern is "a large counterclockwise gyre" [DSEIS, Section 3.2.1a], which would carry resuspended disposed material toward the northern Monmouth County (Bayshore) area and possibly result in an increase in local contamination.

Figure 7 in the DSEIS shows averaged suspended sediment plume movement in Lower New York Bay toward the east. There is no indication, however, of the associated meterological conditions. Currents are affected daily by wind speed, direction and duration, and fluvial c discharge, and twice daily by tides. Therefore, it should be noted that there will be times when daily meterological events cause Bay water and associated suspended sediment to move southward to the Bayshore region.

Capping of the Borrow Pit

Section 2.2.2.1.1c of the DSEIS states that capping of the dredged material works "if properly placed." This statement raises the following questions:

1) Is there an example of a cap improperly placed?
2) If so, what corrective methods were used? d
3) How will the integrity of the cap be maintained?
4) According to O'Connor and O'Connor (1983), a cap has a predicted lifetime of around 20 years. What assurance is there of perpetual federally-funded monitoring of these non-perpetual caps?

Fishery Use of the Bay

The DSEIS implies that pollution of the Lower Bay complex would have little impact on fisheries because "the Bulk of commercial activity occurs outside the Bay complex" [Section 2.2.2.2.1c]. At the recent public hearing held by the Corps in Middletown, Monmouth County residents pointed out that this statement is erroneous. There is a very successful commercial fishery, the Belford Seafood Co-Op, as well as an active recreational fishery in the Bay evidenced by the number of headboats operating out of Atlantic Highlands. e

Shellfish, which are bioaccumulators of pollutants, were restricted from harvesting within Raritan Bay in the past. In 1983, Bay conditions improved to the point where clamming was allowed on a seasonally restricted basis. In July 1988, the Interstate Sanitation Commission reported that shellfish harvesting in Raritan and Sandy Hook Bays should be extended to a year-round basis. The use of subaqueous borrow pits would introduce the same contaminants which in the past led the State to close shellfishing beds and would, therefore, undermine efforts to improve shellfish habitat. f

Containment Island Alternative

An alternative that the Corps claims "does not represent an environmentally unacceptable alternative" [DSEIS, Section 4.3.3c] is the construction of a well-planned containment island (a dike within which sediment would be disposed [DSEIS, Section 2.2.2.3]). This is not the Corps' "preferred" alternative due to the high initial constuction cost.

The containment island alternative has several very positive features which do not occur with the subaqueous borrow pit alternative. g

1) Permanent removal of contaminated dredged material from the marine environment and elimination of all adverse impacts created by present and proposed forms of aqueous disposal.
2) A containment island, because of no interim caps, would have a larger capacity than the borrow pits, e.g., a longer lifetime.
3) A containment island could be utilized year-round. Borrow pit disposal would have to be closed during seasons of high storms (resuspension) and fishery spawning activity.
4) Ultimately new land would be created.

Staff Recommendation

In its' most recent statement, Monmouth County Planning Board submitted that the "subaqueous borrow pit disposal is the least offensive method for disposal of dredged material"; however, "staff feels that construction of a containment island should be [seriously considered as a viable] alternative". h

Staff now recommends that a similar effort be undertaken investigating the containment island alternative as was done for the subaqueous borrow pit alternative.

Staff further recommends that the Planning Board adopt a resolution opposing any further action by the Corps towards the use of subaqueous borrow pits until the containment island alternative is thoroughly researched. Staff feels that time is of the essence and requests immediate action on this matter.

THE TOWNSHIP OF MIDDLETOWN
Township Hall, 1 King's Highway
Middletown, NJ 07748-2594
(201) 615-2000

October 14, 1988

Mr. Richard Maraldo, P.E.
Chief, Planning Division
Department of the Army
N.Y. District Corps of Engineers
Jacob K. Javits Federal Bldg.
New York City, N.Y. 10278-0090

Re: DSEIS-Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York-New Jersey- June 1988

Dear Mr. Maraldo:

A public hearing was held on this matter in Middletown on 24 August 1988. In spite of various inquiries, I cannot determine who from the Township received information regarding the hearing or received documents pertaining to same. Note: Mr. Paula of your office is researching this matter.

A local citizen did attend the meeting and did obtain copies of the above referred to report; I perused the report last weekend. Concerns have been expressed regarding those materials too toxic to be dumped in the subaqueous borrow pits and recommendations that alternate methods would be utilized to dispose of the material; one of which is "upland sites" (4.1.4) of your report. It states that two sites are still being considered, one of which is Belford, N.J. (N-61) a residential area of the Township of Middletown.

The Township of Middletown goes on record of being strongly opposed to the use of this area of Belford as a dumping site of toxic wastes. We wish to be kept fully informed as to the intentions of the Corps of Engineers with regard to any contemplated use of the Belford area for such purposes.

As per a previous request, I wish to receive a copy of the minutes of the meeting held in Middletown on 24 August 1988.

Very truly yours,

James A. Alloway
James A. Alloway
Administrator

cc: Township Committee
Mike Napolitano
Art Weimer

6.4.3.2 Responses to Local Officials/Agencies

(23) Walter Ward, NYC Council (July 19, 1988)

response a: All tests on disposal operations throughout the country show that at the worst-case, ocean disposal results in a loss of less than 5% of the sediment, with 1 -2% being more likely, especially within the calmer waters of the bay complex(see 4.2.1). To ensure that losses are minimized, clam shell dredging will be required.

b: As detailed in this FSEIS, in comparing all the alternatives for the safe containment of contaminated sediments, the borrow pit is consistently identified as the best, and that includes comparison to a no dredging/disposal alternative as well. While the pits location in Jamaica Bay would not detract from this conclusion, other factors, such as the impacts from extensive dredging of access channels on circulation, water quality, and disposal volume, along with potential conflicts with established Federal Management goals in the Bay, have lead to a decision to remove the Jamaica Bay pits from the list of recommended alternatives (see 2.3.1.3).

c. Though the FSEIS no longer recommends use of the Jamaica Bay pits, your statement is not true. The DSEIS carried a draft CZM consistency finding (appendix E) which determined the proposed action to be consistent with policy. Though NYDOS (responsible for CZM) reserves its decision on a proposal's consistency until they can review the Final EIS, they have reviewed the DSEIS and found no point for concern relative to its consistency with the NY CZM plan (see comment letter 19).

(24) Howard Golden, Brooklyn Boro President (August 17, 1988)

response a: An extensive mailing list has been developed for the entire dredged material management planning (DMMP) process, of which the borrow pit alternative and SEIS are but one facet. All experts in this field, including academia, and potentially interested parties, such as city government agencies and elected officials, were long ago informed of the process and invited to participate through a formal Public Involvement Coordination Group. Members of PICG are continually updated by newsletter regarding all facets of the DMMP, and invited to attend regular meetings where progress and proposals are summarized and discussed by the investigators. In addition, separate mailings where sent from the Corp's extensive regulatory and Public Affairs mailing lists announcing the availability of the DSEIS and public hearings. Faculty members from both institutions you mention attended the hearings and gave testimony, which is a formal part of the record and was considered in detail while preparing the FSEIS. No formal written testimony was received from either school, though a written statement from the Chancellor of City University was received (comment letter 30). No faculty members have followed up on these concerns or attended any of the numerous PICG meetings held since the DSEIS was released (nearly two years ago). However, on its own initiative, the Corps did meet with some of the faculty of both colleges before the hearings to discuss their concerns in more detail. Should members of either institution, or any other, wish to provide further input at this time, that still will be seriously considered in arriving at the final decision for implementation.

<u>b:</u> The timing of the hearings was coincidental with the completion and release of the DSEIS. Though only a 45 day review period is required, a three month comment period for responding to the DSEIS was finally provided, to allow sufficient time and encourage detailed responses.

<u>c:</u> On the contrary, our own research, supplemented with an extensive data base from around the country, fully supports the findings of the DSEIS, and the recommendations in this FSEIS.

<u>d:</u> As summarized in section 2.2, and discussed in detail in sections 4.2 - 4.9, all alternatives have been identified and considered in detail. Through three separate and detailed study phases (beginning with the Mitre plan in 1979, the 1983 ocean disposal EIS, and the current FSEIS) borrow pits consistently are identified as the environmentally preferred alternative for the safe disposal of dredged material not suited for unrestricted ocean disposal.

<u>e:</u> The Corps welcomes participation from all the groups you identify. Membership in the PICG remains open to all, either as active participants at meetings with the SC, or as recipients of mailings.

(25) Walter Ward. City Council, NYC
(August 18 1988)

<u>response</u> <u>a:</u> See response a to your preceding July 9 letter, as well as response a to comment letter 11 and response b to comment letter 13.

<u>b:</u> The sediments under consideration are already located in the harbor, where they are fully exposed to uptake by organisms that currently inhabit the dredge areas and pits. The proposal would isolate these sediments from exposure, thereby dramatically reducing potential uptake and accumulation. In addition, for reasons discussed in response b to your July 9 letter, the two Jamaica Bay pits are no longer being considered for disposal.

<u>c:</u> See response c to your July 9 letter.

(26) Robert Esnard, Deputy Mayor for NYC
(September 9, 1988)

response a: The Public Notice announced that a DSEIS was already available. The Corps is now releasing a FSEIS, and has reviewed the concerns identified in the City's attached statement and taken them into consideration while preparing that document.

b: Your interpretation is not correct, in that the Corps has confirmed the use of borrow pits as being the environmentally preferable feasible alternative (2.2.3) and not the most cost effective. In view of the stringent controls being proposed for potential users, this alternative is not likely to be the most cost effective but it will provide for the safest containment of contaminated dredged material.

c: Your point is an important one. Possibly the greatest concern with any containment alternative is that the material remain on site. The borrow pits were selected as a preferred site because they offer the greatest security from such losses occurring; the sheltering nature of the semi-enclosed areas serves to reduce the potential for material being resuspended and leaving the site. On the other hand, as identified in section 2.3.1.3, the enclosed nature of these areas, their shallow waters, and fine-grained sediments did raise serious concerns with respect to large-scale access dredging that would be required to use sites such as those in Jamaica Bay. Consequently, these two sites (14 and 15), along with a smaller pit in a shoal area (2) are no longer being recommended for use.

d: It is expected, based on observed events, that from 1% to no more than 5% of the total discharged sediment from a barge (including the liquid phase) will remain in suspension long enough to be carried away from the disposal site area. Further, past studies have repeatedly failed to detect any differences in contaminant or nutrient levels in the receiving body of water following disposal of dredge material (4.2.1). The sheltering conditions of an enclosed bay would tend to produce calmer seas, thereby reducing dispersal and minimizing the volume of material lost. However, with respect to a dredging plume, impacts would likely be less for pits more exposed to currents and wind. For this reason the DSEIS (2.3.1.3a(4)) considered the sheltered Jamaica Bay pits least desirable with respect to potential water quality impacts, essentially agreeing with your note of caution.

e: Current capping practises include placement over mud deposits. The recently completed capping study of the Mud Dump (Parker and Vallente, 1988) indicates that such deposits can be successfully capped. Further, as stated in the management plan (Appendix D), to increase the cohesiveness of the deposit, material for disposal into a borrow pit will have to be clamshell dredged. Finally, the monitoring plan proposed (2.3.4.2) would identify any problem and prevent or modify the procedure for disposal of such material.

f: The depths quoted here are based on calculations of the depth at which salinity stratification most likely occurs, not erosion. The absence of natural holes on the bay floor suggests that erosion is not a major concern. In any event, the proposed monitoring plan would provide a tool for the continual assessment of such factors, and should quickly identify if a pit is reaching maximum safe capacity before its predicted capacity is reached.

g: This is not true. Containment islands and upland disposal are considered and discussed in detail equalling that afforded the borrow pits (see 2.2.2 and all of section 4). These two alternatives are both considered as viable options that would provide similar levels of security and environmental impact. The borrow pit does have some potential advantage in its natural affinity to accumulate sediments and its reduced state of chemical activity. The most telling factor in selecting borrow pits is their immediate availability, dealing with the potential contaminant problem most expeditiously.

(27) Jay Steingold, District Manager of Community Board 14 (August 2, 1988)

response a: Receipt of your petition opposing disposal in Jamaica Bay is acknowledged. The entire petition, with all signatures is reproduced in volume 2, which is available in the NYD Corps offices or by separate request. Please note that the FSEIS no longer recommends use of the two borrow pits in Jamaica Bay (see response 26c above).

(28) Joel Miele, Community Board 10 (August 15, 1988)

response a: This statement is untrue, borrow pits were determined to provide a very stable containment environment (see 2.2.2.2 and 4.2.2) for dredged material, which is not toxic waste.

b: As indicated in the FSEIS (2.2.2.4) upland disposal is considered a viable alternative but one whose implementation is uncertain because of lack of available sites. Based on a need to deal with the contaminated sediments now, and the security provided by the reduced and depositional nature of a capped borrow pit, the latter alternative is preferable. Upland sites will continue to be investigated as a potential future alternative, should other sites be necessary. However, the two Jamaica Bay pits are no longer being recommended for use because of potential impacts associated with access dredging (see 2.3.1.3).

(29) Eli Greenwald, Community Board 15
(August 18, 1988)

response: None of the all too common problems with beach closings and health warnings during the summer of 1988 are caused by dredge materials; sewage sludge, garbage, and medical waste are the direct culprits in all cases. These sediments already exist in the harbor, often in very close proximity to the shore. To maintain navigation and the economic well being of the Port they must be dredged, the proposal under consideration in this FSEIS would place these materials into a secure disposal site within the confines of sub-aqueous borrow pit walls. These sites are already depositional areas, further protected by the calmer waters inside the Bay complex, and capped to prevent subsequent losses. All disposal operations will be monitored to ensure that the material is properly placed, and that contaminants are contained over time (2.3.4.2).

(30) Joseph Murphy, Chancellor; City University of New York (September 29, 1988)

response a: This is a misleading statement in that all but a very small portion of dredged material is presently disposed of at the ocean Mud Dump site. Of this material less than 8% requires the added precautionary measure of capping; it is this 8% that is being proposed to be placed into the more secure borrow pit site (2.1).

b: All the leading scientific evidence points to the depositional nature of borrow pits as ideal disposal repositories (2.2.2.2 and 4.2.2). The proposal is to place dredged material from the harbor, not toxic waste, into the pits as a full-scale operational program. It is not intended as an experiment, but an implementation of a technique based on sound oceanographic principals supported by an impresive body of existing evidence. The fact that the pits are offshore, close to populated areas has no more bearing on this point than would an argument for placing them far away simply to get them "out of sight"; borrow pits do not exist in the ocean for the very reasons that make their inshore locations such favorable containment sites. The close proximity of the pits to populated areas does raise strong concerns with respect to an unanticipated failure, and an intense monitoring effort (2.3.4.2) is planned to provide a strong defense against this by identifying any problem early and rectifying the procedure or terminating the use of the site and taking remedial action.

c: A smaller-scale operation has been undertaken in Seattle, where a small volume of dredge material was placed into a far shallower pit then we are proposing. After five years tests have shown no increase in lead nor PCBs in the cap or surrounding water (4.2.1b, d). Though the program discussed in this FSEIS is of a considerably larger scale (with a correspondingly deeper pit), the principle is the same. Based on all the evidence to date, as discussed in the FSEIS, the concept is sound and the objective (timely halt to ocean disposal) is worthy of its implementation. The project is supported by the Federal resource agencies and includes a comprehensive monitoring plan that will confirm the project's soundness or provide a meaningful basis for its safe termination.

d: The tests conducted are those dictated by Federal regulations, and augmented by specific, identifiable concerns within the region. There is every reason to assume that if the material tested for is not found to be escaping the pit, others would not either. Contaminants are bound to sediments, and the mechanism for chemical release and bonding is similar among all major sediment associated chemical groups. Therefore, as long as the sediment remains in place and no leaching or other form of release is observed among those compounds tested, it is unlikely that any untested (and currently unknown) compound would pose a threat.

e: Sub-lethal effects are always noted in current testing procedure, and longer duration tests intended to measure acute toxicity are being developed now. The tests used for evaluating dredged material and for monitoring the pits will be the most recent ones in effect at the time.

f: Federal agencies are bound by jurisdictional responsibilities delegated by Congress. The agency charged with control of toxic materials is the US EPA. The Corps has worked closely with EPA to develop its present plans, and in fact dose so under EPA review and approval.

g: The Corps welcomes the interest and assistance of academia, and has often sought the expertise of faculty from a number of universities in evaluating and developing alternatives. We invite the City University to become an active participant on the PICG, to stay abreast of developments in all fields relating to dredged material disposal and to provide their own specific input when they feel it is appropriate.

(31) Robert Clark, Director of Monmouth County Planning Board (September 30, 1988)

response a: The containment island alternative has been considered in great detail (2.2.2.3), and is still being studied by the Corps. The borrow pit alternative is considered at least as good a secure containment alternative, with the added advantage of being available for immediate use, thus meeting the objective for a timely end to placement of contaminated sediments at an ocean site.

b: All of the sediment being considered for borrow pit disposal comes from the NY/NJ area, including the Raritan and Sandy Hook bayshore areas, where it is presently exposed to resuspension and biotic uptake. Based on past monitoring the average level of resuspended sediment that escapes the disposal area is on the order of 1-2% of the total disposal volume. Added restrictions being implemented (see management plan in appendix D) would reduce this even further by requiring further compacting through use of clamshell dredging and pinpoint dumping procedures. Extensive monitoring (2.3.4.2), including real time onboard or electronic surveillance of each individual barge discharge will alert us to any unforeseeable problem in time to suspend and terminate a given disposal operation before any serious potential harm occurs.

c: The average movements take into consideration all components effecting plume movement. On any given day conditions may alter the average substantially, and plumes can be expected to move westward, though on a far lesser frequency of occurrence. Considered in conjunction with the expected release and monitoring described in the above response, there will be minimal, if any, adverse impact on Raritan Bay.

d: The most recent study of capping at the Mud Dump indicates the process is working well, with excellent coverage and durability (Parker and Vallente, 1988). This site is on the exposed continental shelf with the entire deposit well above the sea floor, fully exposed to ocean currents and waves. The borrow pit is in a depositional environment, with its cap even with the bottom; its life span would be much greater than O'Connor's prediction. In fact, there is every reason to expect the pit site to be permanent in that currents now do not scour holes in the bay bottom. The Corps remains responsible for the site integrity, which could be maintained, if needed, through inexpensive surveys and replenishment with sands from all future maintenance dredging of the Federal navigation channels.

e: In the statement you quote, the commercial fishery did not refer to head boats or charters, which are considered recreational. Though the seafood coop works out of Belford, the majority of fishing, by the coop and others, occurs offshore, outside the Bight transect.

f: The borrow pit alternative was chosen because it provides a secure containment of contaminated material (see responses above) and will not result in the contamination of the biota you are concerned with. The monitoring plan (also discussed above) serves as a effective check against this unforeseen event, able to provide direct and continuous evaluation of the biota.

g: Most of the benefits of a containment island you identify are basically true, though there is no intent to suspend disposal during spawning seasons as there is no evidence that any spawning occurs in the pit (a conclusion your own state DEP concurs with; see comment letter 21). Our own assessment (summarized in 2.2.2.3) does identify islands as a viable alternative but goes on to recommend borrow pits because they are an immediately available alternative capable of ending ocean disposal now (2.2.3). Funds for an island construction are not available, but this alternative is still being actively pursued, and could become available in the future.

h: See response a above.

(32) James Alloway, Administrator for the Township of Middletown (October 14, 1988)

response: Your opposition to the use of the upland site in Belford is acknowledged. At this time the Corps is pursuing the use of sub-aqueous borrow pits for disposal of dredged material in question. Should upland disposal become an active alternative for implementation a separate SEIS would be prepared and subjected to public review and comment before any further action were considered.

6.4.4 Organizations and Corporations

6.4.4.1 Organization/Corporation Comments Received:

(see full text of Organization Comment letters beginning on page 6-111; responses to these letters are in section 6.4.4.2 beginning on page 6-169, immediately following the text of all written organization comments)

NEW YORK CITY AUDUBON SOCIETY
71 WEST 23 STREET, SUITE 1828, NEW YORK, NEW YORK 10010, 212 691-7483

1478 Point Breeze Place
Far Rockaway, NY 11691
July 27, 1988

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278-0090
ATTN: Mario A. Paula

Dear Mr. Paula:

I am writing to you in regard to US Army Corps of Engineers Public Notice 13374, 13 July '88 re disposal of dredged materials in subaqueous borrow pits.

#1 I hereby request an opportunity to make a ten-minute presentation at the First Public Hearing on August 18 at Kingsborough Community College. I would like to be scheduled after 7:00 PM along with other speakers in category 9; Organized Environmental Groups.

#2 Kindly send me, at the earliest possible date, appropriate reports, circulars, etc., pertaining to this porject.

#3 My comments shall be from the perspective of my role as Mott Basin Shorekeeper / NYC Audubon Society. (Mott Basin, as you probably know is situated immediately south of the Grassy Bay proposed disposal area.)

Sincerely yours,

Maxwell "Mickey" Cohen
Mott Basin Shorekeeper, NYCAS

PORT NAV
Consulting Service
10 Greenock Avenue
North Plainfield, New Jersey 07062
(201) 757-2903

July 29, 1988

Mr. Len Houston
EIS Coordinator
New York District
Corps of Engineers
Department of the Army
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Houston:

I have reviewed the Draft Supplemental Environmental Impact Statement - Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York and New Jersey dated June 1988, forwarded for comment with Mr. Richard Maraldo's letter of June 24, 1988. My comments reflect my basic interests as Vice Chairman, Industry Subcommittee, Public Involvement Coordination Group, Dredged Material Management Program.

From my perspective, the DSEIS represents a very thorough and exhaustive treatment of the subject of the creation and use of subaqueous pits for the placement and capping of dredged material. My comments will be confined to the creation of new pits. This is anticipated to be done by private industry in search of commercially marketable sand. It is not clear whether the DSEIS has made such an analysis of the two candidate sites in sufficient detail to answer this question to the level of satisfaction of potential sand mining interests. Until this is done, their creation by the private sector as a by-product of sand mining is not a certainty. a

Mr. Len Houston
July 29, 1988
Page Two

While four locations (which should have a 1900 rather than 1700-foot diameter on page 4-22) have been cleared of any archeological, historic, or shipwreck restrictions within the East Bank site, the remainder of this site, plus the entire West Bank site, remain uncleared in this regard. We assume that the Corps will undertake future site evaluations so as to open up new areas for pit creation. The DSEIS is basically silent with regard to any operational requirements to be imposed upon the creation of the pits, nor the procedures to be followed in seeking authority to do so. I thus assume no extraordinary measures are contemplated. b

I note that thought is being given to allowing a pit depth of 90 feet. What is important is that there be a sufficient quantity of commercially marketable sand in each pit to attract a mining interest, and that this potential be exhausted, since once a pit is filled with dredged material, its future use for remaining sand is totally foreclosed. c

One final thought. The pits are intended to function as dredged material disposal facilities. Their users derive a benefit. To motivate sand mining interests to create them where desired, such interests should be given some incentives. One such incentive could be a waiver, or at least reduction, of State royalties. It seems only reasonable to share the benefits of subaqueous borrow pits among all beneficiaries, not just one category. d

Thank you for your interest in my comments.

Sincerely,

Alfred Hammon
Consultant

AH:MS/8116g

Received 17 Aug 88 M.P.

Comment Letter 35

Joel W. Pangborn

ATTORNEY AT LAW

MEMBER OF NEW YORK BAR
54 STUYVESANT AVENUE
STATEN ISLAND, NEW YORK 10312
(718) 984-5896

MEMBER OF NEW JERSEY BAR
5 FREEMAN ROAD
SOMERSET, NEW JERSEY 08873
(201) 246-7673

CERTIFIED MAIL
RETURN RECEIPT

Col. Marion C. Caldwell, Jr.
US ARMY CORPS OF ENGINEERS
26 Federal Plaza
New York, NY 10278

31 July 1988

Re: Dredge Spoil Disposal
Public Notice 13374
13 July 1988

Dear Col. Caldwell:

I am Vice President and General Counsel of the Natural Resources Protective Association of Staten Island, NY, Inc. (NRPA). Please accept the NRPA's thanks for spending time last week with its president, Lou Figurelli, at Congressman Guy V. Molinari's office to discuss the NRPA's concerns about the above project. I regret that I was unable to attend the meeting.

As Mr Figurelli advised you, although as a general principal the NRPA does not oppose per se the use of subaqueous pits as a means of disposing of dredge spoils, provided that the disposal is conducted in an environmentally sound, lawful manner, the NRPA does object to the proposed use of the areas designated in Figure 4 of Public Notice 13374 as Points 2,3,4,6, and 7. These are extremely productive marine recreational areas used by the citizens of New York and New Jersey. (a) You are probably aware that the NRPA successfully sued to block a 1981 proposal to use this vicinity for an identical project. The suit raised many factual and legal issues which need not be addressed here. It suffices to say that the underlying premise of the suit was that it was environmentally senseless and counterproductive to dispose dredge spoils (whether or not under the guise of an experiment) in this pristine marine environment. This premise holds true today and the NRPA will vigourously oppose any attempt to conduct this project in this vicinity. (b)

To reiterate a point made by Mr Figurelli, however, the NRPA desires a harmonious relationship with the Corps - we can achieve much good for the marine environment together, particularly in these troubled times of closed beaches and infected waters. In this regard, the NRPA has suggested viable alternatives for this project over the past seven years, specifically, the area south of the Transco Pipeline. Rather than burden this project with needless acrimony and controversy, the NRPA urges you to eliminate the above points

Co. Marion C. Caldwell, Jr.
31 July 1988
Page Two

from further consideration as part of this project and to proceed with the project using the areas designated as C and D in the Draft Environmental Impact Statement referred to in the above Public Notice. c

One final point. In light of the fact that the written comment period regarding the DEIS has been extended to 9 September 1988, the public hearings scheduled to August should be adjourned until late September or October to allow the public an opportunity to review the submitted written comments. d

Thank you once again for taking the time to meet with Mr Figurelli. The NRPA looks forward to working with the Corps.

Very truly yours,

JOEL W. PANGBORN
Vice President & General Counsel
NRPA

cc: Hon. Guy V. Molinari

cc; List Attached Page 4

Attachments	(1)	Feb 18 1988	Opposition letter to PICG
	(2)	Nov. 26 1984	E.D.F. Response to D.E.C. B. Rinaldi
	(3)	Aug. 3 1983	D.E.C. Press Release Voiding 401 Permit
	(4)	C C List	CC and Supplimental CC List
	(5)	Dec. 13 1984	Response to D.E.I.S. FILE 20-83-0348
	(6)	Dec. 14 1984	DEC CAC 7 Application 20-83-0348 NRPA Comments
	(7)	June 5 1984	E.D.F. NYBWG J.Tripp Outline Proposal
	(8)	)ct. 1 1984	NYBWG Citizens Proposal
	(9)	March 5 1987	Community Board 3 letter to COE Comments

NATURAL RESOURCES PROTECTIVE ASSN.
OF STATEN ISLAND, INC.
P.O. BOX 306 GT. KILLS
STATEN ISLAND, N.Y. 10308
PRES. L FIGURELLI

Thank You Sincerely
Lou Figurelli
Pres N.R.P.A.

Port of New York and New Jersey

SAVE OUR PORT

A coalition of business, government, industry and labor dedicated to a rational balance between economic and environmental values in the conduct of public and private harbor dredging and disposal activities.

Comment Letter 36

August 3, 1988

Mr. Mario Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Paula:

Save Our Port (SOP) has reviewed the Draft Supplemental Environmental Impact Statement entitled "Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York-New Jersey". SOP is cognizant of the diligence with which the Corps has explored alternatives to the ocean disposal of dredged material. The Corps' efforts in preparing this extensive document are to be commended and we support your proposed actions.

The Port of New York and New Jersey makes an enormous contribution to the economy of the New York-New Jersey region. It creates some 200,000 direct and indirect jobs, generates about $14 billion annually in gross regional economic benefits, provides close to $4 billion in wages and salaries, and generates nearly half a billion dollars in tax revenues. The dredging of the Port's navigational channels and berths is essential to the continued prosperity of the Port.

SOP believes that the recommendations made in the DSEIS, that is to utilize an existing pit for immediate containment of potentially contaminated dredged material, while constructing a new pit for future use, is a sound one. We agree that disposal of dredged material in subaqueous borrow pits is environmentally safe and economical, and is an outstanding solution to the controversy surrounding the disposal of material that does not meet ocean dumping criteria.

SOP remains firm in believing that for the majority of dredged material, ocean disposal is the preferable method. For material that does not meet ocean disposal criteria, expeditious capping at the Mud Dump or disposal in a subaqueous borrow pit is the preferred alternative.

Sincerely,

James H Peterson

Captain James Peterson
Chairman
Save Our Port

CIRCLE Line SIGHTSEEING YACHTS INC.

"America's Favorite Boat Ride"

Comment Letter 37

CIRCLE LINE PLAZA, WEST END OF 42nd STREET
NEW YORK, NEW YORK 10036/1095

INFO: 212-563-3200
ADMIN: 212-563-3204
TELEX: 497-1555

August 5, 1988

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
Attention: Mario A. Paula
Water Quality Compliance Branch

Dear Mr. Paula:

We at Circle Line Sightseeing Yachts, Inc. reviewed the Draft Supplemental Environmental Impact Statement entitled "Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York and New Jersey ".

We feel that the Port of New York and New Jersey make an enormous contribution to the economy of the New York-New Jersey region. The dredging of the Port's navigational channels and berths is essential to the continued prosperity of the Port.

We also feel that to utilize an existing pit for immediate containment of potentially contaminated dredged material, while constructing a new pit for future use, is a sound one. We agree that disposal of dredged material in subaqueous borrow pits is environmentally safe and economical, and is an outstanding solution to the controversy surrounding the disposal of material that does not meet ocean dumping criteria.

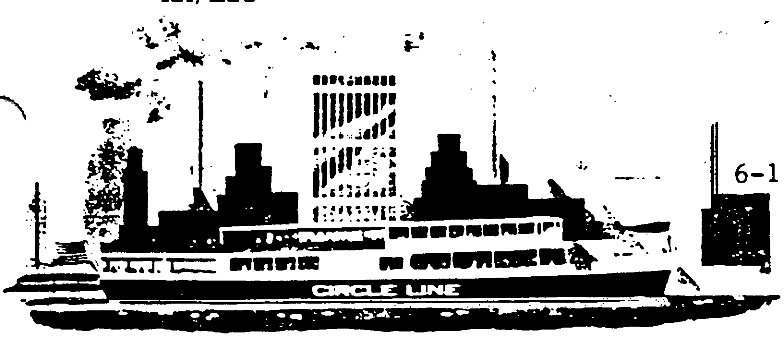
We remain firm in believing that ocean disposal is the preferable method. For material that does not meet ocean disposal criteria, expeditious capping at the Mud Dump or disposal in a subaqueous borrow pit is the preferred alternative.

Very truly yours,

Robert Mattsson

Robert Mattsson
Senior Vice President
of Operations

RM/mdc



Sightseeing Cruises Around Manhattan Island

International Union of Operating Engineers
LOCAL 25, MARINE DIVISION • AFL-CIO
Dredgemen — Boat Operators — Drillers — Helpers
675 FOURTH AVENUE, BROOKLYN, N. Y. 11232 (718) 768-5138

WILLIAM F. ZENGA
BUSINESS MANAGER
NATIONAL VICE-PRESIDENT MTD

August 10, 1988

Mr. Mario Paula
Water Quality Compliance Branch
New York District
U. S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Re: Draft DEIS "Use of Subaqueous Borrow Pits for the Disposal of Dredged Material From the Port of New York and New Jersey

Dear Mr. Paula:

As Business Manager of Local 25, Marine Division, of the International Union of Operating Engineers and as Executive Vice-President of the Maritime Trades Department of the AFL-CIO, I am pleased to submit the comments of Local 25 and those of the maritime workers of the BI-State region regarding the above reference matter.

Local 25 fully supports the concept of utilizing an existing sand mining pit for the immediate containment of potentially contaminated dredged material while constructing a new pit for future use. We believe that disposal of dredged material in this manner is environmentally sound.

However, before a new pit is constructed, we urge that the Corps of Engineers determine the effects that such a new pit will have upon the future sand mining capabilities of the Lower Bay. Such a pit could be constructed in conjunction with future sand mining operations.

The economic survival of the Port of New York and its importance as a strategic military asset depends upon its ability to maintain its naturally shallow waterways and its ability to deepen its waterways at a depth compatible with the draft of modern tankers, container ships, barges and military vessels. This requires efficient dredging and economically feasible transportation and disposal of dredge material.

At the present time, dredging and disposal operations in the highly urbanized Port of New York dictates the utilization of a reliable and economically feasible ocean disposal site for dredged material.

Local 25 firmly believes that the use of subaqueous borrow pits is an idea whose time has come. Such disposal will allow those areas of the Port that are without a disposal option to be dredged and remain economically viable.

There are no easy answers. There are only hard choices.

Until we remove the political rhetoric, environmental emotionalism and the "not in my backyard" mentality from the decision making process and develop a realistic dredged material disposal management plan, there will be no resolution of the dredged material problem. Without a positive resolution the Port of New York and New Jersey will not long endure and the economic benefits to the Region can not be sustained.

Local 25 commends the Corps of Engineer's efforts to implement this feasible alternative to ocean for potentially contaminated dredged material. It is a positive step in the resolution of the dredged material problem within the Port.

Sincerely,

William F. Zenga

THE TOWBOAT & HARBOR CARRIERS ASSOCIATION OF NY/NJ
17 BATTERY PLACE, NEW YORK, N.Y. 10004

LINDA O'LEARY
President

(Area Code 212)
943-8480

August 10, 1988

Mr. Mario A. Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-009

RE: Subaqueous Borrow
Pit Disposal
Project

Dear Mr. Paula:

The Towboat & Harbor Carriers Association represents companies which own and operate tugs, barges and motor tankers in the Port of NY/NJ and the surrounding waters. The majority of the members transport petroleum products, scrap metal, waste materials, sand, stone and construction debris.

The transportation and delivery of these products often requires that vessels navigate the smaller waterways within the confines of the harbor. As you are no doubt aware, these waterways are often not maintained with the same diligence accorded the larger access channels. Environmental objections, lack of funding and low visibility contributes to the lesser attention paid the river and creek systems in the New York District. Nonetheless, this waterway network is vital in terms of the tug and barge industry and the delivery of petroleum products and construction materials.

The Army Corps of Engineers Dredged Material Disposal Management Plan has attempted to identify and evaluate a number of disposal alternatives for the New York District. Certain disposal options have been eliminated over the past several years of study and others may warrant further evaluation. One option that has been identified as feasible for the disposal of unsuitable dredged material--that is, unsuitable for unrestricted ocean disposal-- is the utilization of subaqueous borrow pits.

The use of such borrow pits appears to facilitate the maintenance of the smaller waterways throughout the harbor and, at the same time, provides a viable disposal alternative for dredged material which may not qualify for ocean disposal. The Draft Environmental Impact Statement outlines a number of environmental benefits associated with subaqueous borrow pit disposal -- not the least of which is the maintenance of particular waterways and the confinement of dredged material in a secure location. a

The Army Corps of Engineers efforts over the last several years reveals that a through evaluation of disposal options has been conducted. Economically feasible and environmentally acceptable disposal alternatives need to be implemented in order to maintain the navigable waterways in the Port. The proposed use of subaqueous borrow pits and/or capping of material remains the preferred alternative for dredged material which does not qualify for unrestricted ocean disposal.

Sincerely,

Linda O'Leary

bcc: Joseph Birgeles, PANYNJ
Thomas Creamer, Army Corps
Carol Koch, Army Corps
Richard Weeks, Weeks Marine
Richard Roche, Sandy Hook Pilots
Steven O'Hara, Great Lakes

201 653-7400

HUDSON COUNTY CHAMBER OF COMMERCE & INDUSTRY • 911 BERGEN AVENUE, JERSEY CITY, N.J. 07306

August 11, 1988

Mr. Mario A. Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-009

Dear Mr. Paula:

The Hudson County Chamber of Commerce And Industry supports the use of subaqueous borrow pits for the disposal of unsuitable dredged material for unrestricted ocean disposal.

The Port of New York and New Jersey contributes significantly to the economy of the region with over 200,000 direct and indirect jobs and a flow of close to $14 billion in gross benefits. The dredging of the Port's navigational channels in New Jersey and New York is essential to the sustenance of prosperity in the Port.

The Chamber believes with the SEIS recommendations, utilizing an existing pit for immediate containment of potentially contaminated dredged material while constructing a new pit for future use.

We also believe that ocean disposal is the preferred method in the removal of the majority of dredged material. For material that does not meet ocean disposal criteria, expeditious capping at the Mud Dump or disposal in a subaqueous borrow pit is the preferred alternative.

Sincerely yours,

Ellsworth C. Salisbury, Jr.
President

ECS/mts

KUPPER ASSOCIATES

15 Stelton Road, Piscataway, New Jersey 08855-0036 (201) 752-5600 Fax (201) 752-9338

JOHN L. BUZZI
HARRY S. ALLEN
JOSEPH B. PRYOR
RUDOLPH J. CHALOUPKA
JAMES A. PARR
NORMANN C. WOLF, JR.

August 12, 1988

Mr. Mario A. Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-009

Re: Public Hearings
Disposal of Dredged Materials
in Subaqueous Borrow Pits Site
Public Notice #13374, 13 July 1988

Dear Mr. Paula:

Having followed the progress of the study of the appropriate method for the disposal of dredged material which does not meet the standards for ocean disposal, I write to commend the conclusions of the Federal Supplemental Environmental Impact Statement, and urge that the program be expeditiously implemented.

It is important to carefully observe the requirements of Federal and State regulations, and of good practice, in carrying out dredging in an environmentally responsible manner. It is also obviously important for the welfare of the entire Port of New York and New Jersey region for navigation to be maintained at an economically beneficial level.

I support the environmentally sound conclusions of the draft Supplemental Environmental Impact Statement for the use of Subaqeous Borrow Pits.

Very truly yours,

KUPPER ASSOCIATES

J. B. Wiley, Jr., P.E.

JBW,JR./ds

EVERGREEN INTERNATIONAL (U.S.A.) CORPORATION
ONE EVERTRUST PLAZA, JERSEY CITY, N.J. 07302
TEL.: (201) 915-3200 • TELFAX: (201) 915-3898/3899
TELEX: RCA 235355, WU 645839, 645840, TWX 710-581-2219

August 17, 1988

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-009

Attention: Mr. Mario A. Paula
Water Quality Compliance Branch

Dear Sirs:

We read with great interest the detailed Public Notice on the use of Subaqueous Borrow Pits for the disposal of dredged material unsuitable for unrestricted ocean disposal and heartily approve and support the recommendation made by the Corps of Engineers.

The dredging of the channels and berths is very important to containerships and other vessels calling this great Port of New York and New Jersey.

We look forward to the operational program for the disposal of dredged material in subaqueous borrow pit disposal sites in the not too distant future.

Sincerely,

Captain S.Y. Kuo
Vice Chairman and
President

SYK/pm

cc: Ms Lillian C. Liburdi
Director
Port Department
The Port Authority of NY & NJ

Neponsit Property Owners' Association, Inc.

NEPONSIT, NEW YORK 11694

August 17, 1988

Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278
Attn: Len Houston

Dear Mr. Houston:

I'm writing in response to the Federal Supplemental Environment Impact Statement for the proposed disposal of toxic dredged sediment in subaqueous borrow pits located in and around Jamaica Bay. The plans that have been developed for this project would have long term negative impact on wildlife and fish in the area as well as the groundwater systems which are contiguous to the bay. a

We can understand why the Army Corps of Engineers has concerns about dumping dredged sediment which contains dangerous chemicals such as Mercury, Cadmium, PCB's and Petroleum Hydrocarbons. We share your concern over the disposal of such toxic material but object to even the thought of dumping this in any part of Jamaica Bay.

For many years we were forced to live with a bay which was surrounded by garbage land fills, of which one is still active and numerous creeks which were outlets for various sewage feeder systems without benefit of treatment plants. Things have improved in recent years with the closing of land fills, the expansion of sewage treatment plants and the construction of separate storm sewer systems in various areas around the bay to reduce the surges which treatment plants could not handle after heavy rains or storms.

A TAX EXEMPT CIVIC ORGANIZATION DEDICATED TO THE PRESERVATION OF NEPONSIT

Fish and wildlife have returned to the area and the bay has again become a major spawning ground for flounder. Residents actively fish in the bay and in the waters off Breezy Point. The Jamaica Bay Wildlife Sanctuary besides being home to many birds and animals, also serves as a safe stop over point for hundreds of thousands of migrating birds every Spring and Fall. The negative impact that your proposed dumping would have on the fish and wildlife would be unconscionable. b

Residents of Queens and Brooklyn use Jamaica Bay for recreational purposes. Besides fishing and boating, numerous beaches along the shore are being used again for swimming and Plum Beach has become the windsurfing capital of the New York Metropolitan Area. These people who directly use the bay as well as those living in the middle in Broad Channel and around the bay would be directly impacted and in years to come we could be faced with another Love Canal. c

The Neponsit Property Owners' Association would like to go on record as being opposed to the plan to dump dredged sediment in or around Jamaica Bay or anywhere near the Rockaway Peninsula. We feel that it is a violation of the New York State Costal Zone Management Program #44 which was established to protect tidal and freshwater wetlands. d We feel that you should go after the companies that generated this toxic material and permitted it to end up in the water and sludge located near their plants. These companies should be forced to pay for the clean up and proper disposal of toxic waste which can be traced to their operations. This is done on land, you should apply the same rules to removing toxic waste from under the water. e

We appreciate having had the opportunity to express our opposition and hope that you will give favorable consideration to our comments.

Sincerely,

Peter F. Sammon

Peter F. Sammon
President

BREEZY POINT COOPERATIVE, INC.

202-30 ROCKAWAY POINT BLVD.
ROCKAWAY POINT
NEW YORK 11697
Tel. 945-2300

August 18, 1988

Army Corps of Engineers
26 Federal Plaza
New York, NY 10278

Gentlemen:

The Breezy Point Cooperative, Inc., located on the westerly tip of the Rockaway Peninsula, is a community of 2,836 residential home owners. As a Cooperative we are unalterably opposed to your proposal to dump toxic waste in Subaqueous Borrow Pits in the Jamaica Bay area. We consider the dumping of toxic sediments into waters that are adjacent to communities that have enjoyed the waters of Jamaica Bay to be an incredibly poor solution for the disposal of bottom sediments containing toxic substances. a

The agreement signed in 1975 between the governments of Japan and the USA for cooperation in the field of environmental protection would seem to be at odds with the installation that you have proposed. This proposal is particularly disturbing in view of the most recent medical waste incursion that our beach shores have been invaded with. b

It is our hope that a more satisfying solution for the community and the waters of Jamaica Bay will be arrived at for the disposing of toxic substance.

In closing, I wish to re-affirm that the Breezy Point Cooperative is unalterably opposed to toxic waste being dumped in the Jamaica Bay area.

Sincerely,

John W. Fallon

John W. Fallon
General Manager

JWF/pmw

Statement by
Edmond J. Harrison
Director of Public Affairs of
Universal Maritime Service Corp.
Before the United States Army Corps of Engineers
on the Draft Supplemental Environmental
Impact Statement For The Use
of Subaqueous Borrow Pits
For the Disposal of Dredged Material
From The Port of New York - New Jersey

August 18, 1988

My name is Edmond J. Harrison, and I am Director of Public Affairs, Universal Maritime Service Corp. operating at Red Hook Container Terminal, Brooklyn, New York and Port Newark, New Jersey. We are the only major container terminal operator left in New York City. Overall, we employ 700 people at that facility.

Universal believes that the Draft Supplemental Environmental Impact Statement regarding the "Use of Subaqueous Borrow Pits for the Disposal of Contaminated Dredged Material from the Port of New York and New Jersey" is a comprehensive and thoughtful document which provides an economical and environmentally sound management plan for dredged material in our harbor. We support the Corps' proposal to use subaqueous borrow pits for the disposal of contaminated dredged material.

The Port makes an enormous contribution to the economy of the New York-New Jersey region, creating over 200,000 jobs, $14 billion in regional economic benefits and nearly $4 billion in wages and salaries. Dredging the Port's channels and berths is vital to a modern maritime facility and necessary for the continued prosperity of the region. If we cannot dredge economically, we would not be able to operate competitively with the other North Atlantic Ports. The economic hardships of a non-competitive position created from the inability to have an economical means to dispose of dredged material are real - that is a direct loss of maritime jobs in Brooklyn and the 150 million dollar impact these jobs have on our community. If this were to happen, it would be tragic, in that it is our understanding that the environmental consequences of implementing the Corps' Plan are negligible.

We are grateful to the Corps for the opportunity to express our views on this matter of vital economic importance to the Port and wholeheartedly support the Corps' proposal as specified in the DSEIS.

STATEMENT BY
LILLIAN C. LIBURDI
DIRECTOR, PORT DEPARTMENT
BEFORE THE UNITED STATES ARMY CORPS OF ENGINEERS
ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL
IMPACT STATEMENT FOR THE USE OF SUBAQUEOUS BORROW
PITS FOR THE DISPOSAL OF DREDGED MATERIAL
FROM THE PORT OF NEW YORK-NEW JERSEY

KINGSBOROUGH COMMUNITY COLLEGE
BROOKLYN, NEW YORK
AUGUST 18, 1988

My name is Lillian C. Liburdi. I am the Director, Port Department of The Port Authority of New York and New Jersey. The Port Authority is most grateful for the opportunity to comment publicly on this Draft Supplemental Environmental Impact Statement for the Subaqueous Borrow Pits Disposal of Dredged Material Project proposed by the U.S. Army Corps of Engineers.

The general public may not be aware that the Port of New York-New Jersey is a river port, and that we need to relocate approximately 6 to 8 million cubic yards of dredged material annually to maintain our shipping channels and berths. The natural depth of our port is only 19 feet. If we do not dredge, the port cannot operate. The economic consequences of our inability to operate would be quite dire.

The quality of our ocean has become an increasingly important public issue, and rightfully so. Therefore, it is important to note that dredging and dredged material disposal are regulated by law and all actions are scientifically managed. Over 90 percent of the material we dredge each year meets EPA and Corps criteria for unrestricted ocean disposal.

The Corps and others, including notable scientists and academics, over the past 15 years have spent millions of dollars studying dredged material disposal and developing alternatives to ocean disposal of dredged material. Their findings conclude that for our densely populated region of over 16 million people, the only economically and environmentally sound option available is to dispose of clean dredged material in the ocean. Moreover, whenever possible, dredged material that is predominantly sand should continue to be used as a construction material or for beach restoration projects. However, for the 10 percent of material that cannot be disposed of in the customary way, borrow pits are the only environmentally and economically sound option. It is not often that you can achieve both considerations. The Port Authority believes that the Corps of Engineers' proposal should be implemented as soon as possible. We believe that adequate resources have been brought to bear on studying this problem, are reassured by the EPA on the appropriateness of the option, and feel that it is time to implement the Corps' plan.

The Draft Supplemental EIS is concerned with the management of that small quantity of contaminated material which generates much of the public controversy over dredged material ocean disposal. The Port Authority believes that the recommendation made in the EIS, which is to utilize an existing subaqueous borrow pit for immediate containment of potentially contaminated dredged material, while constructing a new pit for future use, is an excellent one. We agree that disposal of dredged material in subaqueous borrow pits is environmentally safe and economical, and is an outstanding solution to the controversy surrounding the disposal of material that does not meet ocean dumping matrix criteria. We have faith in the technical expertise of the Corps and belief in the scientific judgment on the part of all the cooperating agencies, and we hope that their proposal as specified will be implemented. We believe that the particular merits of this proposal will permit implementation to be balanced against the understandable concerns of the nearby communities.

The Port Authority was established over 65 years ago by compact between the States of New York and New Jersey to develop transportation facilities and to promote the commerce of the New York and New Jersey Port District. The New York-New Jersey Port generates $14 billion annually in economic activity; 200,000 jobs and billions in income and taxes. I believe we can all agree, port commerce is an essential part of our region's economic life.

I believe it is very important and relevant to put into the record the economic content for port maintenance and channel improvement. In 1987, after three consecutive years of record cargo volumes, foreign oceanborne general cargo handled at the Port of New York and New Jersey declined 6.1 percent. We sustained losses for both general cargo imports and exports. The Port's general cargo loss exceeded the losses suffered by the other North Atlantic ports and trailed the 5.2 percent collective gain of United States ports. Our market share is being eroded, but we remain aggressive in marketing and promotion and in mitigating those factors responsible for our Port's recent tonnage decline. For instance, in order for the Port to remain competitive with other ports, our costs must be reduced. This is best characterized as an exercise in continued belt-tightening on all fronts to provide cost-effective and competitive cargo operations to shippers to encourage port use. The Port's annual dredging cost is approximately $25 million. Economical disposal options for dredged material are critical in order to remain competitive. Should this cost radically escalate, the Port would become less competitive, thereby further impacting our cargo market share and in turn, the jobs, wages, and taxes this activity creates. That is why we were pleased that the most environmentally acceptable option is also economically acceptable.

We commend the Corps of Engineers and express our appreciation to the Dredged Material Disposal Management Plan's Interagency Steering Committee comprised of the Environmental Protection Agency, United States Fish and Wildlife Service, National Marine Fisheries Service, New York State Department of Environmental Conservation, New Jersey Department of Environmental Protection and the Coastal Zone Management programs of New York and New Jersey for their joint efforts in managing the disposal of dredged material. In addition, we should recognize the special work of the Public Involvement Coordination Group in behalf of the Dredged Material Disposal Management Plan. The 500 people in the Public Involvement Coordination group represent government agencies, labor, environmental organizations, civic associations, elected officials and industry. The Corps' proposal clearly reflects the concern and input of all these interested parties.

In summary, the Port Authority supports the Corps findings and recommends implementation of the use of subaqueous borrow pits for that small quantity of dredged material presently not permitted to be disposed of in the ocean. Thank you.

(212) 648-6813

FOUNDED 1962

PLUMB BEACH CIVIC ASSOCIATION of SHEEPSHEAD BAY, INC.

MAILING ADDRESS: 2792 BATCHELDER STREET, BROOKLYN, NEW YORK 11235

President
Eunice Rofsky

1st.Vice President
Adele Dannell

2nd.Vice President
Thomas Lauro

Recording Secy,
John Reinhart

Corresponding Secy.
Andrew Levenbaum

August 18th.1988.

Public Notice No.13374.

Colonel Marion L.Caldwell Jr.
U.S.Army Corps of Engineers,
N.Y.District.
26 Federal Plaza,
New York.10278.

Dear Sir;

We,the Plumb Beach Civic Association of Sheepshead Bay Inc. object to the Army Corps of Engineers proposal of using Subaqueous borrow pit disposal sites for dredged material from the Ports of Ne York and New Jersey,based upon draft supplemental Environmental impact statemer that we have been unable to review in the past few days.However to be fair to all we are requesting that the U.S. Army Corps of Engineers extend the 9th of September 1988 deadline to give our Organization and citizens of our Area an opportunity to fully examine the Environmental impact statement.

We would also like to meet with one of your represent ives from your Agency to explain why this process is being proposed.The citiz in our Community have not had sufficient time to be aware of this issue and would appreciate a postponement of this deadline.

Thanking you,

Yours Sincerely,

Eunice Rofsky
President.

George J. Dougherty
Environmental Chairman.

c/Congressman Charles Schumer
Community Board #15.

North Shore Baymen's Assn., Inc.
P.O. Box 744
Huntington, New York 11743

August 18th, 1988

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

Re: Public Notice # 13374

Dear Mr. Paula:

The North Shore Baymen's Association is an organization of comercial shellfishermen which is dedicated to the preservation of the marine environment. We are writing to oppose the dumping of dredge spoils in subaqueous borrow pits in lower New York Harbor. We are also opposed to the excavation of any new pits for the same purpose. Our reasons for opposition are as follows:

1) These burrow pits contain a great variety of marine life. While the original excavation was not undertaken with the intent of creating new habitat, new habitat has in fact been created. Any fishermen can tell you that dramatic underwater terrain features are usually very active fishing areas. It may be true that the bottom of these pits are sediment sinks. The sides and edges however, support dynamic benthic communities which in turn atract finfish and lobsters of commercial and recreational importance. a

2) Dumping dredge spoils within this highly stressed estuary will create environmental problems related to the release of nutrients, the suspension of sediments, the release of toxic contaminants which will be subsequently uptake by the biota, and the depletion of oxygen. b

3) The imprecise methods of dumping fine particulate matter into the water column will make it impossible to ensure the spoils arrive in the pit instead of spreading throughout the estuary. c

These are but a few of the problems we see with this proposed project.

Respectfully,

Robert M. Wemyss, Secretary NSBA

ATLANTIC CONTAINER LINE

80 PINE STREET, NEW YORK, N.Y. 10005
TEL: 212-908-2000

TELEGRAMS: ATCONLINE RCA 226138
TWX: 710-581-2111 WU 649547

Aug. 19, 1988 WRITER'S DIRECT DIAL NUMBER

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278-009

<u>Attention: Mario A. Paula</u>
Water Quality Compliance Branch

Dear Mr. Paula:

Atlantic Container Line is one of the major steamship carriers linking the ports of New York and New Jersey with Europe and the United Kingdom. As Vice President of Operations of ACL, I am most concerned about the cost of disposal of dredged materials and particularly the cost of disposal of dredged material unsuitable for unrestricted ocean disposal.

As I understand the current situation, past studies by both the Army Corps of Engineers and others have concluded that for this densely populated region the only economically as well as environmentally sound option for disposal of clean dredged material is in the ocean. a I also understand that about 10% of the dredged material does not meet EPA and Corps criteria for unrestricted ocean disposal and therefore a safe method for disposal of this material must be found.

Since 10% of dredged material has been contimated by man, it seems that the man-made solution for disposing of this material into subaqueous borrow pits offers a solution to this problem.

As I understand it, there are already suitable existing pits and more could certainly be created. b

Since both EPA and the Corps find this solution to be environmentally sound, ACL fully supports this method of disposal since it is surely the least costly for disposal of contaminated material and therefore keeps the port of New York and New Jersey competitive from a cost standpoint. c

Very truly yours,

ATLANTIC CONTAINER LINE

R. N. Steiner
Vice President, Operations

RNS:fmm

New Jersey Waterways Coalition

Project T.R.A.D.E.

Take a Responsible Approach to Dredging and the Environment

TESTIMONY OF:

Mr. William R. Healey
Public Affairs Coordinator
Project TRADE (Take a Responsible Approach to Dredging and the Environment)

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT ON SUBAQUEOUS BORROW PITS
MIDDLETOWN, NEW JERSEY
24 Aug 1988

Project TRADE is pleased to offer comments to this meeting of the U.S. Army Corps of Engineers on the supplemental environmental impact statement on subaqueous borrow pit disposal. Project TRADE stands for Take a Responsible Approach to Dredging and the Environment. Our organization was originally formed due to our concern for factual dissemination of information on the impact of dredged material disposal. In the rush to produce a vast amount of information on the maladies facing our shores during the last two summers, the issue of dredged material was unfortunately discussed in the same instances with issues such as medical waste, inadequate sewage treatment, non-point source pollution and illegal dumping. Little mention was made of the mostly benign effects of dredged material disposal, nor of its importance in keeping maritime commerce a vital part of the region's economy. a

We have been active on all dredging issues affecting New Jersey and our neighboring states of New York, Pennsylvania and Delaware, with whom our port facilities are linked.

Project TRADE's members include: The New Jersey Alliance for Action, the Sandy Hook Pilots Association, Kupper Associates, Operating Engineers Local 25, the New Jersey Chapter of the National Dredging Association, and the Port Authority of New York and New Jersey.

The subject of the hearings being held today by the Corps on the subaqueous borrow pit issue is another disposal option of key importance to our region, one whose population is growing. As we continue to grow, so must the role of our ports expand in importance. That expanding and changing role is a key to the future economic health of our region and to the vitality of our nation's economy.

P.O. Box 5525 • Clark, New Jersey • 07066 • (201)382-0061

The material that would be disposed of in subaqueous borrow pits represents about 10% of the total of dredged materials from the region. It's important to note that 90% of the material dredged from our harbors is safe for unrestricted disposal in the ocean. As an option, ocean disposal is utilized by a number of ports on both the Atlantic and Pacific seaboards and along the Gulf of Mexico.

The remaining material in question has perhaps received the greatest amount of attention as it relates to the public's concern over dredged material disposal. After reviewing the SEIS prepared by the Corps of Engineers, and cognizant of their nearly two decades of research into the issue, we believe the plan that has been devised is both environmentally proper and the most feasible economically. In addition to the diligent study by the Army Corps of Engineers, their efforts have been backed up by the work of such groups as the Public Involvement Coordination Group, made up of hundreds of persons from local, regional, state and federal government; union organizations and other labor groups; appointed and elected officials; and members of the business community. b

Project TRADE is supportive of the plan to utilize both existing subaqueous borrow pits for dredged disposal of materials for present needs, as well as support the construction of new pits for the needs of the future. The plan put forth by the Army Corps of Engineers represents a realistic assessment and balancing of the environmental needs of the New York Bight and the economic needs and operational realities of the Port of New York and New Jersey. b

This supplemental environmental impact statement is based on extensive research done by the Marine Science Group at the State University of New York (SUNY). The studies have been conducted to pinpoint areas with the least environmental impact and the most long-term benefit to the fisheries of the New York Bight. The capping provided to these pit areas will safely protect these habitats from the mildly contaminated (but non-toxic) materials that will be disposed of there. Ongoing monitoring will ensure that the program continues to meet the goals that have been set for it. c

The plans put forth by the Corps on both the original EIS and the SEIS being discussed here today are completely defensible on the entire range of scientific study and environmental acceptability.

The harbor region of New York and New Jersey has perhaps the most severe problem with the range of options for dredged material disposal. Because of the expansive development of the region, there is little, if any, land available for an upland disposal option. In any event, the proximity of these tracts to existing and expanding population does not make land disposal a realistic alternative, as anyone who has recently tried to site facilities like resource recovery plants, landfills and sludge incinerators will attest. Perhaps upland disposal will be a future option, but this supplemental environmental impact statement wisely recognizes the reality of its limitations. d

The Port of New York and New Jersey is not the only port region in the country to utilize ocean and bay disposal for dredged material. A partial list of ports utilizing this option includes the Ports of Norfolk, Virginia; Charleston, South Carolina; Tampa, Florida; San Francisco, California and Seattle/Tacoma, Washington.

While this SEIS supplements an extensive study that lead to the delivery of the Environmental Impact Statement in 1983, subaqueous borrow pits also prove to be the most economically feasible disposal alternative for this quantity of dredge material. Since our port region is by nature an unusually shallow one, constant and active dredging is a must in order to keep our shipping lanes clear.

Members of Project TRADE believe that environmental concerns should be the most prominent, however, our economy's importance must also be addressed. We believe this plan will accomplish both goals--protecting both our environment and our economy.

I'm sure that others here this evening will go into much greater detail about the economic impact on our region. Simply put, we're talking about nearly a billion dollars in tax revenue to the State of New Jersey, 200,000 direct jobs, along with three times that number in indirect employment. More than three-quarters of a million people look to the port as an economic vehicle to their livelihood.

As our land-based modes of transportation are impacted by increasing development and resulting congestion, the delivery of goods and services into our region by waterborne commerce will grow in importance. This plan will help to keep our region's ports competitive with those up and down the East Coast. As the American economy seeks to turn around our balance of trade problems, we need to have in place the means to export more of our goods, as well as receive those goods that we cannot produce ourselves.

The use of borrow pits is just one issue in the ongoing discussion of dredged materials. Next month, Project TRADE and its members look forward to participating in hearings on the relocation the Sandy Hook dredged materials disposal site. At that time, Project TRADE expects to comment on the feasibility study that is being conducted in response to Section 211 of the Water Resources Development Act of 1986.

Project TRADE and its members wish to thank the U.S. Army Corps of Engineers for the opportunity to comment on the Supplemental Environmental Impact Statement document. On behalf of our group, I would be pleased to try and answer any questions that you may have.

WRH/dlo'b;bh.12

ELLIS S. VIESER
President

New Jersey
ALLIANCE for ACTION INC.
P.O. Box 6438 • Raritan Plaza II • Edison, New Jersey 08818
(201) 225-1180

TESTIMONY ON:

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

USE OF SUBAQUEOUS BORROW PITS FOR THE DISPOSAL OF DREDGED MATERIAL

FROM THE PORT OF NEW YORK - NEW JERSEY

DATED JUNE 1988

BEFORE:

U.S. ARMY CORPS OF ENGINEERS

NEW YORK DISTRICT

PRESENTED BY:

ELLIS S. VIESER, PRESIDENT

NEW JERSEY ALLIANCE FOR ACTION

AT

MIDDLETOWN MUNICIPAL BUILDING

MIDDLETOWN, NEW JERSEY

AUGUST 24, 1988

I am Ellis S. Vieser, President of the New Jersey Alliance for Action. The Alliance is a unique coalition of more than 500 business, labor, professional and governmental organizations. The Alliance, to my knowledge, is the only organization in New Jersey that brings together all of these diverse interests to work on common problems.

The Alliance's commitment is to improve the quality of life through economic progress, creation of jobs and the elimination of bureaucratic red tape.

The Alliance for Action is no stranger to the public involvements process of the Corps of Engineers as set forth in Chapter 6 of the Draft Supplemental Environmental Impact Statement.

We became involved with the Dredged Material Disposal Management Plan (DMP) in the late 1970's when the Mitre Report was being finalized. We were a founding member of the Public Involvement Coordination Group (PICG) and we were an active participant in the many interagency Steering Committee (SC) meetings and the many public meetings held in New York, Central Jersey and the Jersey Shore area.

Many diverse opinions were expressed by the various representatives at the numerous meetings held throughout the past decade. Tradeoffs were made and compromises were hammered out to accommodate the concerns of the various participants.

Throughout this process, however, there was a virtual unanimous support for the use of subaqueous borrow pits for the disposal of dredged material.

The business community pledged their support to the environmental community to keep open several non-ocean disposal options for Category III sediment.

We are here today to support the use of subaqueous borrow pits and to continue to fulfill our commitment to the environmental community for support of non-ocean disposal options.

There are still a few areas of controversy as set forth in the Draft SEIS. We believe that the numerous studies that have been conducted provide an adequate data base to support the proposed management plan. Extensive use of physical and biological monitoring programs will verify the validity of the assumptions used to formulate the management plan.

Having been an active participant in the public process that has been used to formulate the proposed plan, it is interesting to reflect upon the history of the public perception of the environmental impacts of subaqueous borrow pits.

In the early meetings there was some concern that the excavation of existing borrow pits would negatively impact the benthic and fishery populations. When it was then proposed to fill in these subaqueous borrow pits with Category III sediments and then cap them with Category I material (which is suitable for unrestricted ocean disposal) to bring the river bottom back to its pre-borrow pit condition, there was concern that this process, in and of itself, might have a negative impact on the benthic and fishery populations.

When it was then suggested to excavate new borrow pits and refill them with suitably capped dredged material we see that the process has gone full circle.

The reports, studies and findings have shown that the "concerns" and "perceptions" have indeed been adequately addressed and that the use of existing or new borrow pits will have minor overall impacts on the benthic and fishery population.

The Alliance is confident that the proposed management plan can adequately utilize subaqueous borrow pits for the disposal of dredged material. As in the past, the Alliance for Action stands ready to provide whatever assistance is necessary to bring this matter to a successful conclusion so that we may safely use our waterways for recreation and commerce.

(Prepared by Dr. John L. Buzzi, P.E., Chairman of NJAFA Water Committee)

The Maritime Association
of the Port of
New York/New Jersey

Founded in 1873 as a non-profit organization serving U.S. port activities and our maritime business community.

Comment Letter 52

August 29, 1988

Mr. Mario A. Paula
Water Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278-009

Dear Mr. Paula:

The Maritime Association of the Port of New York/New Jersey is a 115 year old not-for-profit organziation dedicated to the promotion and development of our great port. The Association also maintains a 24 hour ship look out service logging all ship movements since 1873 and providing official ship arrival and departure to governmental and commercial organizations in the world trade and transportation field.

The loss of shipping from a high of 13,000 arrivals in 1959 to less than 6000 in 1987, continues today without any likelihood of dramatic turnaround.

Trying to maintain the current volume of shipping requires a competitive, properly dredged harbor, offering safe, and properly maintained navigational channels and berths. Dredging is the key to our economic health and competitiveness.

Our association fully supports the U.S. Corps proposal for developing an operational program for the disposal of dredged materials in subaqueous borrow pit disposal site in lower New York Harbor.

Sincerely,

N. Nick Cretan
Executive Director

ne
nge

17 BATTERY PLACE, SUITE 1006, NEW YORK, N.Y. 10004 (212) 425-5704

MAERSK INC.

August 29, 1988

Mr. Mario Paula
Water Quality Compliance Branch
US Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Paula:

Maersk Inc. supports and requests expeditious implementation of the Corps' proposed Borrow Pit Project as described in the Draft Supplemental Environmental Impact Statement entitled "Use of Subaqueous Borrow Pits for Disposal of Dredged Material from the Port of New York-New Jersey."

At our marine terminal facilities at Port Newark, New Jersey, we handle modern, deep draft vessels requiring safe and well maintained channels. In order for us to remain competitive, it is imperative that a comprehensive dredged material disposal management plan capable of handling all dredged material be implemented. We are gratified that the Corps' proposal is both economical and the environmentally preferred method for handling contaminated dredged material, and that clean dredged material will continue to be disposed of in the ocean. In addition, the Port of New York and New Jersey makes an enormous contribution of $14 billion to the regional economy, provides over 200,000 jobs and requires economical and environmentally safe dredging practices.

Maersk Inc. commends the Corps' perseverance and competence in finding an acceptable solution to the dredged material disposal matter and believes the implementation of the proposed project will provide benefits to the environment and shipping industry. We appreciate this opportunity to comment.

Very truly yours,

MAERSK INC.

J. Damgaard Nielsen
General Manager, Operations

JDN/leb

GIRALDA FARMS. Madison Avenue P.O.Box 880 MADISON, NJ 07940-0880 USA
Telephone: 201-514-5000. Telex: Graphnet 3767563. Telecopier: 201-514-5410.

GREATER NEWARK
CHAMBER OF COMMERCE
SERVING METRO NEW JERSEY BUSINESS

August 29, 1988

Mario A. Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278-009

Dear Mr. Paula:

The Greater Newark Chamber of Commerce has been closely monitoring and evaluating all sides of the arguments on the use of Subaqueous Borrow Pits for the disposal of dredging materials.

More recently, we had the opportunity to review the New York District Army Corps of Engineers' Draft Supplemental Environmental Impact Statement (DSEIS) on the use of the Subaqueous Borrow Pits for the disposal of dredged material from the Port of New York and New Jersey's navigational channels and berths and we support its proposed actions. a

Ever since a commercial gristmill was opened in Newark in 1671, the fate of this region's economic development has been unstrictably linked to its waterways, and dredging has been a vital procedure in keeping our Port and economy on a prosperous footing.

We firmly believe that the utilization of the Subaqueous Borrow Pits for dredging material is safe and economical, and the best technological alternative for disposal.

We should add that dredging materials are no longer considered in the same vain as some of the real culprits for water contamination such as sewer, wastewater, solid waste, and non-point source pollution. Therefore, we support the utilization of existing pits for the immediate disposal of dredging material while additional pits are constructed for this purpose. b

Again, we stand behind the DSEIS's proposed actions and we look forward to the development of an operational program.

Very truly yours,

Richard G. Schoon
President

40 Clinton Street • Newark • New Jersey 07102 • (201) C-H-A-M-B-E-R

UNITED NEW YORK SANDY HOOK PILOTS' BENEVOLENT ASSOCIATION
AND
UNITED NEW JERSEY SANDY HOOK PILOTS' BENEVOLENT ASSOCIATION

201 EDGEWATER STREET
STATEN ISLAND, N. Y. 10305

CABLE ADDRESS:
"HOOKPILOTS" - NEW YORK
TEL. (212) 448-3900

September 1, 1988

MR. Mario Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278-0090

Dear Mr. Paula:

The Sandy Hook Pilots Association endorses the Corps proposal as described in the Draft Supplemental Environment Impact Statement entitled "Use of Subaqueous Borrow Pits for Disposal of Dredged Material from the Port of New York-New Jersey".

The Port of New York-New Jersey contributes $14 billion in economic activity; 200,000 jobs and billions in wages and salary. In order to provide for safety of navigation and remain competitive, the Port must dredge its channels and berths and have an economical dredged material disposal option always available. We believe implementation of the Corps' proposal would finalize the dredged material disposal management plan and provide a comprehensive means by which all dredging projects would be viable.

The Sandy Hook Pilots Association commends the Corps' efforts in preparing the DSEIS and believes the implementation of the proposal project would assure the increase in navigation safety of our Port. We appreciate this opportunity to comment.

Sincerely,

Captain W.R. Peterson,
President
UNYSHPBA

Captain T.J. Walsh,
President
UNJSHPBA

jh

NEW YORK SHIPPING ASSOCIATION, INC.

• 2 WORLD TRADE CENTER • NEW YORK, N.Y. 10048-0649 • (212) 323-6600

September 2, 1988

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

Attention: Mario A. Paula
Water Quality Compliance Branch

Subject: Public Notice No. 13374

Dear Sir:

This statement is submitted to inform you that the New York Shipping Association, Inc., strongly supports the Corps of Engineers' recommendation that subaqueous borrow pits be used for the disposal of contaminated dredged material from New York Harbor, the subject of the draft Federal Supplemental Environmental Impact Statement (SEIS) referred to above.

The NYSA represents the shipowners, maritime terminal operators and other businesses that employ longshore labor in the Port of New York and New Jersey. NYSA negotiates collective-bargaining agreements between its members and waterfront labor and administers fringe-benefit funds and other contractual programs that total nearly $200,000,000 per year.

On behalf of its members and their employees, the NYSA is vitally concerned with the economic health, well-being and continued viability of the Port of New York and New Jersey. In brief, we support the above proposal because this port's harbor is too shallow to handle modern maritime traffic without dredging; dredging cannot proceed without a program to dispose of dredged material; and careful analysis had shown that subaqueous borrow pits are the safest practical alternative for disposal of the small portion of dredged material that is unsuitable for more conventional disposal.

The Port of New York and New Jersey is in a very precarious position today. Because of fundamental changes in the maritime industry -- automation, deregulation and international economic developments -- competition between ports is at an all-time high. Cargo that once was captive to a particular port can be handled today at a variety of other ports and moved easily by other modes of transportation to its final destination. Cost considerations loom larger than ever before in transportation decisions, and are likely to continue doing so far into the future.

Unfortunately, virtually everything in New York/New Jersey is more expensive than in competing ports: labor costs, construction costs, tug costs, pilotage costs, and so on. Historically, the bi-state port has thrived because of this region's huge population base. However, as competition has grown more intense, economic factors will outweigh population and we can expect to face a steady erosion of our cargo base as goods that once were handled here are increasingly funnelled through lower-cost competing ports.

This already is occurring. New York/New Jersey has problems competing for Midwest freight. Cargo from the Far East that once came here by ship increasingly is landed on the West Coast and hauled East by rail. Canadian ports are booming with European traffic that could be handled here. And, while exports from U.S. ports overall grew by 15% last year, our exports declined.

Consequently, it is absolutely imperative that the Port of New York and New Jersey decrease costs. Waterfront management and labor are striving to do our part. But all parties -- including government and environmental advocates -- must realize this port's position and cooperate if we are to salvage the maritime industry and the powerful economic benefits it generates. And that includes taking a realistic look at all aspects of the dredging issue.

The use of subaqueous borrow pits as depositories for contaminated dredged material is part of an environmentally sound and economically practical approach to disposal of material that must be dredged if the port is to continue to survive. Other alternatives have been shown to be politically unacceptable or economically ruinous, and further delay will only complicate the issue. a

Allow me to note an irony. The maritime industry does not contaminate the bottom of our harbor. Someone else has discharged that material into the water further upstream. Even if New York were no longer a port and required no dredging, polluted sediment would flow through the harbor from the upland. b

Rejection of the approach offered by the proposal in question would have a highly negative economic impact on the New York/New Jersey metropolitan region. It would set a course that ultimately could lead to elimination of the bi-state port -- and the billions of dollars of wages and taxes and revenues it provides -- without resolving the pollution problem.

Respectfully submitted,

Anthony J. Tozzoli
President

AJT:pw

new york
sport fishing federation

September 4,1988

Mr. Mario Paula
Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0090

Dear Mr. Paula:

I would like to take this opportunity to go on record of opposing the dredging of toxic material from the navigational channel in New York Harbor and depositing it in the Borrow Pits that are off Staten Island, Coney Island and Jamaica Bay.

It would seem to us that since these pits are spread out over a large area and that each area has unique environmental characteristics, that a separate environmental impact statement should be available for each pit. I know that these depressions hold large numbers of finfish and it would be a shame to impact a situation that is already in a stressful condition. a

We also believe that your notion of testing these pits to see if they will hold the dredged spoils is playing Russian Roulette with our Marine Environment. Suppose they don't? What then?

Furthermore, The New York Sportfishing Federation, a coalition of sport fishing clubs that have over 40,000 members seriously doubts that the proposed cover of sand will be sufficient, especially if the area is exposed to a hurricane or severe storms. b

From what we are reading in the media, it would seem that this plan is very similar to the one that was overturned several years ago. c

We respectfully request that you reconsider this outrage against our marine environment and come up with a viable alternative that can stand the test of time and not be a time bomb waiting to further degrade an already highly stressed area.

Please put us on your mailing list so that we may appear at any further public hearings.

Very truly yours,

Charles H. Johnson

Charles H. Johnson, Pres.

P.O. BOX 240 OAKDALE N.Y. 11769

Commerce and Industry Association of New Jersey

September 7, 1988

Mr. Mario A. Paula
Water Quality Compliance Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-009

Dear Mr. Paula:

On behalf of the Commerce and Industry Association of New Jersey, representing over 1700 business members in the northern New Jersey area, I am writing in support of the Corps' proposal on the use of subaqueous borrow pits for the disposal of dredged material unsuitable for unrestricted ocean disposal.

We believe this proposal to be both economically and environmentally sound and in the best interests of all citizens of this region.

Sincerely,

Richard T. Anderson
Richard T. Anderson
Director of Government Relations

Continental Plaza • State Highway #4 & Hackensack Avenue
Hackensack, New Jersey 07601 • (201) 487-4600

NEW YORK ZOOLOGICAL SOCIETY

NEW YORK AQUARIUM
OFFICE OF THE DIRECTOR

September 8, 1988

U.S. Army Corp. of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278-0090
Attn: Mario A. Paula
Water Quality Compliance Branch

Dear Mr. Paula:

The New York Aquarium is concerned about the proposed plan for the disposal of dredged material in subaqueous borrow pit disposal sites.

The basic premise of inshore dumping of dredged material which does not satisfy the Federal testing criteria for unrestricted ocean disposal is a dangerous proposition, dependent on the containment of recognized hazardous materials. If the containment fails, these materials will impact marine life, and be difficult to later clean from the environment. a

The containment method of capping into natural "sinks" is difficult to ensure that proper disposal will be carried out or that the containment will be reliable. The migration of sand and mud is a natural process that changes the coastline regularly. Hurricanes and winter storms could easily disrupt and spread the materials from the pits. b

The dumping process itself would expose these materials to the water column as they pass into the pits. The accuracy of the dumping will be critical and at some influence of tide, wind, and currents. The capping process of laying dense sand on top of the dredged mud is likely to displace the lighter material, with a piston - like effect. c

In all, this proposal has serious flaws with serious consequenses. I would urge that another plan be adopted. The New York Aquarium has recently spent $1.6 million to construct a sea water intake system which is adjacent to proposed sites #8 and #9. While these are of lower priority ranking, we feel that this method of disposal is short sighted and could negatively impact the local environment and would likely continue to directly jeopardize of our d

WEST EIGHTH STREET AND SURF AVENUE BROOKLYN, NEW YORK 11224 TELEPHONE 718-265-3400 TELEX 428279 NYZWCI

collections as well as the health of the fragile estuarine environment of New York Harbor.

Sincerely,

Louis E. Garibaldi
Director

LEG/mv

Friends of Gateway

September 8, 1988

Mr. Richard Maraldo, P.E.
Acting Chief, Planning Division
Department of the Army
NY District Corps of Engineers
Jacob K. Javits Federal Building
NY, NY 102-0090

Dear Mr. Maraldo:

I represent Friends of Gateway, a not-for-profit corporation established in 1987 to ensure that Gateway National Recreation Area is adequately protected and to promote the park's unique recreational opportunities.

We wish to comment on the Army Corps of Engineers' proposal to dispose of contaminated dredged material from the Port of New York and New Jersey in several subaqueous borrow pits within Jamaica Bay, a unit of Gateway National Recreation Area under National Park Service management. Friends of Gateway objects strongly to this proposal, which we believe violates legislation expressly protecting Jamaica Bay in perpetuity as a significant natural resource, 86 Stat. 1308: "the Secretary (of the Interior) shall administer and protect the islands and waters within the Jamaica Bay unit with the primary aim of conserving the natural resources, fish, and wildlife located therein and shall permit no development or use of this area that is incompatible with this purpose." a

It is thus incomprehensible that sites within Jamaica Bay are being considered as "high priority" for dumping toxic materials "unfit for restricted ocean dumping". A more inappropriate area could not have been selected. b Jamaica Bay is a vital estuarine environment and component of a wildlife refuge supporting more than 50 species of fish and 320 bird species, including many shore birds dependent on the Bay for sustenance. It is also used actively for recreational fishing. Because of its regional ecological and recreational importance, Jamaica Bay has received hundreds of millions of dollars in federal and local funds to reduce or eliminate pollution caused by toxic waste. The proposal to introduce new contaminants into the borrow pits would undermine the substantial clean-up effort that has been made and defy mandated protection of the area. As a result, the Jamaica Bay waters will suffer further pollution, likely harming the wildlife that is now flourishing there. c

51 Chambers Street
Room 228
New York, NY 10007
212 233 4788

Although we recognize that there are no risk-free solutions to today's waste disposal problems, we state unequivocally that Jamaica Bay is not a place for such experimentation. We urge the Army Corps of Engineers to withdraw these sites from the proposal and encourage the agency to act with sensitivity to conservation concerns in the future.

Sincerely,

Lisa Block

Lisa Block
Executive Director

Jack A. Drobnick
Group Vice President
North American Operations

September 8, 1988

U. S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-009

Re: Draft Supplemental Environmental Impact Statement (SEIS)
Public Notice 13374

Gentlemen:

Sea-Land Service, Inc. (Sea-Land) is submitting the following comments pursuant to Public Notice 13374, on the draft SEIS issued by the Corps of Engineers, New York District, and pertaining to the disposal of dredged material in specified sites located in lower New York Harbor and adjacent areas. We request that Sea-Land's comments be included with the record of the SEIS review process.

Sea-Land is a world-wide integrated transportation company operating containerships and providing related services to more than 75 foreign and domestic ports. Our largest ocean terminal is the Port Authority-Elizabeth Marine Terminal in New Jersey, and each week at least 4 of our vessels call at that the facility. The Elizabeth Terminal has been a hub in the Sea-Land network since 1962, and our company is one of the major carriers serving the Port of New York.

Since European seafarers first arrived in this area on tiny sailing vessels in the sixteenth century, the Port has been a dominant factor in the economic well being of this region and indeed the entire nation. Sails have given way to modern diesel powered vessels, containerships have largely supplanted the freighters of old, while condominiums and boutiques have sprung up along much of the lower Manhattan waterfront, yet despite these changes, waterborne commerce remains important to the States of New York and New Jersey as it has ever been.

Sea-Land Service, Inc. • 1210 Corbin Street • Elizabeth • New Jersey 07207 • (201) 820-7375 • Telex 138511

Today, the Port serves as a highway for billions of dollars worth of imports and domestic trade exports annually, not relating just to the immediate area but serving much of the United States. We understand the Port is directly responsible for more than $14 billion in economic benefits, in excess of 200,000 jobs, and several billion dollars of salaries and taxes annually.

In order to maintain safe access to the Port for virtually all types of commercial vessels, it is essential that a regular program of dredging be accomplished each year, and it is equally essential that an economical and environmentally sound dredge spoils disposal plan be in place. The Corps' proposal relating to subaqueous burrow pits, which is detailed in the draft SEIS represents such a plan, and Sea-Land therefore wishes to indicate its strong support for the SEIS' prompt adoption.

Thank you for giving consideration to these comments.

Sincerely,

Sea-Land Service, Inc.

JAD/bsj

Comment Letter 62

Our Neighbor's Civic Association of Ozone Park, Inc.

107-30 77 Street
Ozone Park, NY 11417

September 22, 1988

Army Engineers NY District
Jacob Javits Federal Building
26 Federal Plaza
New York,NY 10278

RE: "BORROW PITS"

To Whom It May Concern:

It has come to my attention via newspaper reports, TV programs and discussion at my Community Planning Board # 10, Queens, of your intentions and proposals to use the "borrow pits" in Jamaica Bay as receptacles for the dredged toxic material to be removed from N.Y. Harbor.

This proposal is definitely opposed by our community and Civic Association as detrimental to our well being and to our environment, especially Jamaica Bay. The sludge you will gather from the harbor and hope to "direct" into the "borrow pits" is not practical and will eventually be contaminating the entire bay much to our loss and will be hazardous to our community.

Again, I will state that our organization and community is vehemently opposed to your proposal and trust you will discover other and safer means to dispose of this toxic waste.

Thank you!

Sincerely,

Joseph L. Boccio
President

CC: U.S. Secretary,Department of Interior
Department of Environmental Conservation, NYS
Honorable Alphonse D'Amato
Honorable Daniel P. Moynihan
Honorable Floyd Flake
Honorable Walter Ward

ENVIRONMENTAL DEFENSE FUND

257 Park Avenue South
New York, NY 10010
(212) 505-2100

September 30, 1988

Mr. Mario Paulo
Chief Regulatory Functions Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278

RE: Comments on the Draft Supplemental Environmental Impact--Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey (June 1988).

Dear Mr. Paulo:

We have reviewed the New York District Corps of Engineers draft SEIS and alternative methods of disposing of dredged spoils from the New York/New Jersey Harbor area. We have submitted an earlier written statement to you at the time of the hearing. We have also submitted to you a copy of our October 1984 Citizens Proposal.

1. The rationale for a new, subaqueous pit.

In our Citizens Proposal, we proposed consideration of four sites for new, deep subaqueous pits for the disposal of what we denominated as contaminated or marginally contaminated dredged material. We are opposed to the open ocean dumping of such material either at the dumpsite, or elsewhere in our coastal waters, or in the ocean because such disposal facilitates eventual dispersal of toxic metals and organics in those dredged sediments.

The Corps of Engineers has proposed a number of potential sites for disposal of dredged materials in subaqueous pits. Some of those pits are existing areas, such as Borrow Pit #7. As we have indicated before, we are opposed to the use such shallow, existing pits. Other sites are in Jamaica Bay or near-shore, shallow embankments which also should not be used.

20 ANNIVERSARY

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1108 East Main Street
Richmond, VA 23219
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128 East Hargett Street
Raleigh, NC 27601
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In our 1984 Proposal, two of the four sites that we suggested for further consideration are landward of the transect connecting the Far Rockaways with Sandy Hook. This transect divides the jurisdiction of the Corps of Engineers under the Clean Water Act from the jurisdiction of EPA under the Marine Protection Research & Sanctuaries Act over selection of sites for disposal of dredged material and regulation of such disposal. The Corps' EIS has considered only those two sites landward of the transect. We have designated those sites A and B. Of the two, B would appear to be a generally preferable location from an environmental point of view. The challenge in part to find the best possible configuration of that site. We have been advised that the subsurface materials there constitute reasonably good aggregate. It could be used by the construction industry (although we will oppose any effort to dispose of any such mined material in wetlands or shallow estuarine areas). The depth of water at Site B appears to be suitable for the construction of a 90 foot deep subaqueous pit that could have a capacity of about 5 million cubic yards. In addition, barges should be able to get access there. a

Under controlled conditions, we consider use of new, deep subaqueous pits to be a suitable option for the disposal of contaminated or marginally contaminated dredged materials because, in theory, such sediments containing toxic contaminants should be effectively contained there. Because there are unscientific uncertainties as to the exact level of effectiveness of containment, particularly during the disposal period, in our view, the construction of the first new subaqueous pit and its use should be viewed as a demonstration project. This demonstration project should be operated on a full-scale basis for a specified period of time. However, careful scientific monitoring is necessary to determine exactly what portion of the dredged material effectively finds its way into the pit and remains there, what impacts such material may have on biota outside of and within the parameters of the pit and whether such biota would bioaccumulate any toxic contaminants. We urge the Corps to use the most rigorous monitoring protocols possible to assure concerned parties that the monitoring data is satisfactory. Basing monitoring requirements decisions on cost and labor concerns, as done in the DEIS, does not adequately assure that the best physical monitoring program will be undertaken during and after disposal. b In addition, just as RCRA Subtitle C facilities have post-closure requirements, the Corps must impose and implement restrictions on the use of this site once it is capped so as to assure the long-term integrity of the cap. c Further, during the demonstration period, no Category III materials should be disposed of in any pit.

While we are prepared to consider Site B to be the preferred site for a new subaqueous pit within the transect, we are concerned about several limitations of the Corps proposal and the framework of its generic EIS. First, because of the line drawn between the Corps and EPA's jurisdiction under the Clean Water Act and Marine Protection Research & Sanctuaries Act, the Corps has not considered possible sites for new subaqueous pits seaward of the transect. Second, the Corps' definition of highly and marginally contaminated dredged materials is unduly restrictive. As a result, the Corps, in particular, has not considered as potential sites our Sites C and D, although they are demarcated in the draft GEIS. Third, the Corps has proposed no limits on the amount of dredging that may occur. Fourth, we do not yet have in place an effective program for controlling discharges of metals and organics through wastewater discharges and atmospheric deposition into the Lower Hudson Estuary and its tributaries so as to reduce levels of toxic contaminants in dredged sediments to a point where a broader array of options for their environmentally benign disposal would be available.

2. Corps/EPA Jurisdiction

In our view, the Corps of Engineers, with or without EPA, should have conducted a comprehensive environmental, economic and social assessment of the use of potential sites for new subaqueous pits both within and outside of the transect. It has not done so. Its scientific studies of biota have been restricted to the Lower Harbor area landward of the transect. e While mining for sand at sites seaward of the transect may be somewhat more difficult because of weather and sea swells, it certainly is not impossible. It simply means that the number of days during the year when such mining can occur to construct a pit would be less than might be landward of the transect.

In addition, there would appear to be sites seaward of the transect where the subsurface material would constitute suitable aggregate such that the Corps could successfully persuade the private sea mining industry to remove the material necessary to construct the pit. We enclose a copy of a letter from the New York District to EDF dated December 3, 1984 which describes, among other things, based on subsurface sediment borings, the nature of the materials at our four proposed sites. The letter indicates that the subsurface materials at Sites C and D would be suitable. Further, Sites C and D are of a depth (about 30 feet) such that construction of a deep pit is feasible, access is practicable and control of the dispersal of dredged materials from barges is implementable. Our own analysis has suggested that Sites C and D would be biologically preferable from sites within the transect. f

The sole reason why the Corps has not considered Sites C and D in detail in its analysis is that they fall within EPA's jurisdiction under the Marine Protection Research & Sanctuaries Act. We do not consider this to be an adequate reason. If these are preferable sites, EPA and the Corps should initiate a process immediately to consider them. EPA's task in this respect is complicated by restrictions under Section 211 of the 1986 Water Resources Development Act. That Act calls upon EPA to designate sites for the ocean disposal of dredged materials which are not "substantially free of pollutants". We have a number of questions about the meaning of Section 211 and how EPA intends to carry out the intent of that Section. Attached is a copy of a letter to EPA from EDF dated September 19, 1988 that raises a number of these concerns. Needless to say, if EPA interprets 211 to prohibit siting of subaqueous pits within 20 miles of a transect, i.e, in or around our Sites C and D, we could be in the ironic situation where one federal agency would construct a site within the transect and another federal agency would be prohibited from siting such a pit immediately outside of the transect although the latter may be environmentally preferable and would be economically feasible. g

3. <u>Definition of Contaminated Materials</u>

As indicated in our earlier statement and the 1984 Citizens Proposal, the application of the ocean dumping criteria used to determine what sediments may not now be ocean dumped lacks scientific credibility. In our view, a significantly larger portion of the dredged materials should qualify as Categories II or III materials, to use the Corps of Engineers categories. h

The problem is no one has developed a satisfactory system for classifying dredged materials. Three years ago, EPA put out a publication that contained some threshold numbers for categorizing sediments. [<u>National Perspective on Sediment Quality</u> (1985)] Under Section 211 of the 1986 Water Resources Development Act, EPA will have to develop criteria to determine what dredged materials are not "substantially free of pollutants". In our view, all dredged materials that are not substantially free of pollutants should not be open dumped in the ocean anywhere, including the Harbor area, the Mud Dump Site or further out, beyond 20 miles.

Needless to say, unless EPA interprets the Section 211 term "substantially free of pollutants" to mean nothing more than continued implementation of the current interpretation of the ocean dumping regulations, the Corps will be forced to seek alternative means and locations for the disposal of a significant portion of dredged materials from the New York/New Jersey Harbor area. i

4. Volume of Dredged Material

One goal of the Federal Clean Water Act is to make all waters of the United States suitable for contact recreation for fishing and shellfishing and for fish and shellfish propagation. We have a long way to go in terms of improving the quality of water and sediments in the New York/New Jersey Harbor region to reach this laudable goal. Safe containment of dredged materials that are not substantially free of pollutants is an important step in this direction. However, dredging itself can cause severe adverse environmental problems.

The fact that there is no practical site for the disposal of Categories II and III dredged materials at the present time constitutes a constraint on dredging of such sediments. If EPA restricts the disposal of dredged material at the Mud Dump Site, j
there will be additional constraints on dredging.

From an environmental point of view, our concern is not so much with maintaining the existing dimensions of federal or even non-federal navigation channels as prospects for enlargement of those channels. While we endorse construction of properly sited new subaqueous pits as an effective technique (following a demonstration project) for isolating and containing sediments with toxic contaminants, we do not want the availability of this technique to serve as an excuse for expanding channels.

5. Quality of Sediments

High levels of toxic metals and organics are found in sediments throughout the Lower Hudson Estuary, including its tributaries, of the Lower Harbor and the New York Bight. These concentrations reflect historic discharges of municipal and k
industrial effluents, sludges, runoff and atmospheric deposition. The federal and state environmental resource agencies in the New York/New Jersey region have not put in place effective programs for reducing significantly loadings of toxic contaminants into the estuarine and marine environment such that all sediments could be said to be substantially free of pollutants.

Given the poor quality of sediments found in the lower Hudson Estuary and its tributaries, we recommend that the liquid phase test of the elutriate test procedure described in the DEIS l
be expanded to include chromium, lead, copper, nickel and zinc in addition to mercury, cadmium, PCB and PHC. All heavy metals should also be tested during bioassay tests. Lastly, we urge that the full testing protocol, which applies to federal m
projects, apply to all private dredging projects as well. The exemption of bioassay tests for private dredging projects should be made on a case-by-case basis only, not the requirement.

The availability of one or more subaqueous pits for the disposal of dredged materials containing toxic materials above acceptable threshold levels should not serve as an excuse to postpone much needed efforts to strengthen and enforce the industrial pretreatment program, construction grant programs, quality of sewage treatment plant effluents and control of air pollution sources.

n

Yours very truly,

James T.B. Tripp
Counsel

Sarah L. Clark
Staff Scientist

Enclosures

6.4.4.2 Responses to Organizations/Corporations

(33) Maxwell Cohen, NYC Audubon Society
(July 27, 1988)

<u>response:</u> You are welcome to speak at any or all of the scheduled hearings. Simply fill out a speakers card when you arrive at the hearing and you will be called in turn. In the mean time, a copy of the DSEIS is being forwarded for your review.

(34) Alfred Hammon, Port Nav Consulting Services
(July 29, 1988)

<u>response a:</u> The DSEIS did make a preliminary analysis of private sand mining potential, and received a favorable reply. Subsequent to the DSEIS review the Corps attended a meeting at EDF offices in NYC where the subject of sand mining was discussed with the private sector and their interest in the two sites was high, especially the East Bank.

<u>b:</u> At this time the responsibility for further evaluations, and associated testing, of areas beyond the four locations cleared for cultural impacts will be left with the private sector, as part of their normal required coordination for sand mining permits.

<u>c:</u> Certainly in that by digging a deeper pit its capacity as a disposal site increases. If sand resources exist beyond ninety feet, and they can be demonstrably mined without added impact or encroaching beyond the buffer zone established for the cultural resource protection, then that option will be pursued.

<u>d:</u> It is the responsibility of the state to impose and/or waive fees and royalties for use of public resources. It should be noted, however, that private contractors continue to seek sand mining leases, indicating that there is sufficient financial incentive even with payments to the state.

(35) Joel Pangborn, General Counsel, Natural Resources Protective Assoc of Staten Island
(July 31, 1988)

<u>response a:</u> Based on our assessment of the resources and characteristics of the pits, we do not believe they serve a critical role in the overall ecological productivity of the fishery (4.3.2). In this we are supported by both NMFS and NJDEP (see comment letters 8 and 21). We do acknowledge that the pits contain higher densities of some species and therefore likely provide value for the sport and commercial interests. Based on an assessment of the fishery data (2.3.1.5) it was determined that the East Bank pits offered a greater resource value, so that the least impact would occur from loss of a West Bank pit (3 or 4). In comparison to the overall benefit

derived from use of an existing pit for disposal, loss of one pit was deemed of minor consequence.

b: To the contrary, the waters of the Lower Bay complex are not pristine; they have suffered from extensive disturbances and degradation. It is to remedy one of these sources of degradation, namely contaminated sediments, that the proposed action derives some of its chief environmental benefits, sufficient to warrant the support of the SC. It should also be noted that as deposition basins the pits accumulate the very type of sediments associated with contaminants, and that to harvest the resource so exposed may be placing the public at risk. In addition, the court did not find that the demonstration project proposed in 1982 was "...environmentally senseless and counterproductive...". The court enjoined the action until a detailed evaluation of the impacts, especially to the fishery, could be assessed. The data gathered since then provides ample evidence that the use of subaqueous borrow pits will not adversely impact the environment, including the fishery.

c: We do not concur with your preference for BRG sites C and D. Both sites are in a more unstable environment, with rougher weather and seas. Such a situation is inherently more inhospitable for site security, accurate disposal, and maximum retention than sites inside the transect. The sites ultimately recommended by the FSEIS (2.3.2.3) are very close to the other two BRG recommended areas A and B. In addition, as discussed with your group and EDF, there are also potential jurisdictional problems that may preclude use of areas C and D, even if they were of equal value as sites inside the transect (which they are not).

d: The purpose of the hearings is to allow the public an opportunity to respond to the SEIS and the proposed project, and therefore they must be scheduled within the document's comment period. With extensions granted, three months were finally provided in which to submit comments, an ample opportunity for any interested party (especially those fully involved in this procedure as your group) to develop and present detailed comments.

(36) James Peterson, Chairman of Save Our Port (August 3, 1988)

response: We acknowledge your support of the SEIS conclusions recommending the restricted use of borrow pits as a disposal area for material not suitable for unrestricted ocean disposal. We point out however, that the availability of the present ocean disposal site is limited. The location of future sites and restrictions on their use, is the subjec of intensive investigation by the Corps, and subject to EPA approval.

(37) Robert Mattsson, Senior Vice President of Operations for Circle Line (August 5, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendation (see response to comment letter 36).

(38) William Zenga, Business manager of Local 25 of the International Union of Operating Engineers (August 10, 1988)

<u>response:</u> We acknowledge your support and refer you to section 2.3.2.1 of the FSEIS, in which locating new pit construction is strongly tied to the availability of useable sand. In fact, this option is considered feasible because the need for sand would allow the pit to be constructed either without cost to the government or with substantial benefits to the public from beneficial use of the material (see 2.2.2.2.2).

(39) Linda O'Leary, President of Towboat and Harbor Carriers Assoc of NY/NJ (August 10, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendation (see response to comment letter 36)

(40) Ellsworth Salisbury, President of Hudson County Chamber of Commerce and Industry (August 11, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendation (see response to comment letter 36).

(41) J. B. Willey, Jr., Kupper Associates (August 12, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(42) S.Y. Kuo, President of Evergreen International Corp (August 17, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(43) Peter Sammon, President of the Neponsit Property Owners Assoc (August 17, 1988)

<u>response a:</u> Based on our evaluation, as

discussed in the SEIS, the borrow pit alternative represents a sound environmental alternative that offers excellent containment of contaminated material, and its isolation from the surrounding environment, including groundwater

b: Our assessment differs with your conclusion in that we believe that a substantial body of facts already clearly leads to the conclusion that the disposal of contaminated dredged material into subaqueous borrow pits is environmentally sound (see 4.2.1; 4.3.2; 4.3.5; 4.4). However, based on comments received some real concerns exist with respect to the impacts of dredging access channels (2.3.1.3). As a result, the FSEIS no longer recommends the use of the two Jamaica Bay pits (14 and 15) as preferred environmental alternatives.

c: See response b above.

d: See response c; comment letter 23

e: See response f; comment letter 30

(44) John Fallon, Breezy Point Cooperative (August 18, 1988)

response a: Based on concerns raised regarding potential impacts of dredging on water quality and conflicts with planned goals for Gateway, the borrow pits in Jamaica Bay are no longer under consideration as potential disposal sites (see responses to comment letter 7).

b: Though we acknowledge your opposition to this project, it is important to point out that the problems you refer to regarding medical waste and other beach closings are not the result of disposal of dredge material; sewage sludge, garbage, and medical waste itself are the culprits behind the disastrous events of the past few summers. We further wish to state that as the proposed action is considered the environmentally preferable means of dealing with the material in question (2.2.3), there is no violation of any agreements, international or otherwise.

(45) Edmond Harrison, Universal Maritime Service Corporation (August 18 1988).

response: We acknowledge your support of the SEIS recommendation (see response to comment letter 36).

(46) Lillian C. Liburdi, Port Authority of NY/NJ (August 18, 1988)

response: We acknowledge your support of the SEIS recommendation (see response to comment letter 36).

(47) Eunice Rofsky, Plumb Beach Civic Association (August 18, 1988)

response: We acknowledge your objection to this project and point out that the comment deadline was extended to the end of September, as a result of several requests received during the review process. It is our belief that the proposed action represents a sound environmental alternative for the disposal of the types of dredge material in question.

(48) Robert Wemyss, North Shore Baymen's Association (August 18, 1988)

response a: The existence of sediment sinks increases the potential for natural accumulation of contaminated sediments, this in turn risks contamination of the commercial and recreational species that are found in the pits, either through direct exposure or bioaccumulation through the food chain. While it is true that breaks in the terrain often contain more diverse communities, no evidence to date supports a theory that the pits are critical or even important to maintaining the fishery of the Bay complex (4.3.2). One of the proposals for possible mitigation of loss of pit habitat would look into creating a reef habitat above or around the pit, to maintain the diversity of terrain that make presently attract some species of fish (2.3.4.1).

b: No study of any dredge material disposal operation as is planned for the borrow pits has detected any significant long-term differences in contaminant, dissolved oxygen, or nutrient levels in the surrounding water before, during, and after disposal into open waters (4.2.1).

c: See response a to comment letter 11 and response b to comment letter 13.

(49) R. N. Steiner, Vice President of Operations for Atlantic Container Line (August 19, 1988)

response a: Your assumption is basically true

b: This is true, as documented in sections 2.3.1 and 2.3.2.

c: We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(50) William Healey, Public Affairs Coordinator for Project TRADE (August 24, 1988)

response a: This is an important point, the concerns and impacts that resulted from the beach pollutions and closings are in no way associated with dredged material, yet these events seem to have precipitated much of the opposition to the proposed action.

<u>b:</u> We acknowledge your support of the SEIS recommendations.

<u>c:</u> This is a correct assessment of the monitoring plan, as a means of certifying the project's safety and a check to stop it if that safety is violated.

<u>d:</u> We concur, Upland disposal is still a viable alternative and is being studied further. In the event a suitable location can be located this alternative could be implemented, but only after its own SEIS and public review.

(51) Ellis Vieser, President of NJ Alliance for Action (August 24, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(52) N. Nick Cretan, Executive Director of the Maritime Association of the Port of NY/NJ (August 29, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(53) J. Damgaard, General Manager of Operations for Maersk Inc. (August 29, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(54) Richard Schoon, President of Greater Newark Chamber of Commerce (August 29, 1988)

<u>response a:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

<u>b:</u> See response a, comment letter 49

(55) W. R. Peterson and T. J. Walsh, Presidents of United NY and NJ Sandy Hook Pilots Benevolent Associations (September 1, 1988)

<u>response:</u> We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(56) Anthony Tozzoli, President of NY Shipping Assoc Inc (September 2, 1988)

response a: We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

b: This is a good point, and a major reason for rejecting the no action alternative since it leaves the contaminated sediments exposed to the biota and water column (see 2.2.1.5).

(57) Charles Johnson, President of NY Sport Fishing Federation (September 4, 1988)

response a: There is no evidence to indicate each pit is unique, though conditions may vary in each to some degree. Even if they were unique they still all would be considered as alternatives under a single EIS, as they are compared and evaluated in this FSEIS.

b: The sand cap at the exposed Mud Dump site has served well under a variety of conditions (see 2.3.3.1). There is every reason to believe that a cap over a borrow pit that will be level with the bay bottom should do even better. The bay has been subjected to many storms in the past, its protected nature shelters it from the worst effects, and no one has detected holes or other depressions gouged in its floor after such events.

c: The plan you elude to was a proposed demonstration project in a corner of one pit. Its WQC was remanded by the court pending a more detailed assessment of its impacts on the fishery (see 1.3). This assessment has been completed (see 4.3.2), along with more detailed studies to support the full-scale implementation of the borrow pit alternative

(58) Richard Anderson, Director of Government Relations, Commerce and Industry Assoc of NJ (September 7, 1988)

response: We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(59) Louis Garibaldi, Director of NY Aquarium (September 8, 1988)

response a: It is because the borrow pits, situated in a depositional area with a chemically reducing environment and less currents, offer a safe containment alternative that it continues to be identified as environmentally preferable for the disposal of contaminated dredge material (see 2.2.2.2 and 4.2.1). However, hazardous levels of contaminants will not go into the pit.

b: See response a above.

c: Because dumping is critical, it will occur at a taut-line buoy, under carefully monitored and managed conditions (see 2.3.4.2.1 and Appendix D).

d: Neither sites 8 or 9 pass the minimal criteria for use (see 2.3.1.2) and therefore are not considered feasible for use as disposal pits. However, all past studies have consistently shown that water quality impacts at the disposal site are negligible.

(60) Lisa Block, Executive Director of Friends of Gateway (September 8, 1988)

response a: See response b, comment letter 7.

b: Jamaica Bay sites 14 and 15 were not high priority sites in the DSEIS, and their potential conflict with recreation and education roles of Gateway was identified as a likely deterrent to use, as was the need for extensive access dredging and possibly major bridge replacements (see 2.3.1.3a(3) and (6) of the DSEIS). In any event, because of their potential for adversely impacting the environment (as identified in response b to the Gateway comment letter 7), the two Jamaica Bay sites are no longer being recommended for use.

c: The borrow pit alternative has continually been identified as the environmentally preferred disposal alternative because of its superior ability to isolate contaminants and keep them from release into the water column and biota. Though the extensive need for access channels and other modifications no longer warrant that pits 14, 15, and 2 continue to be recommended for use, the remaining pits (3, 4, 6, 7) are still viable safe alternatives for the disposal of contaminated dredged material.

(61) Jack Drobnick, Group Vice President of North American Operations for Sea-Land Service (September 8, 1988)

response: We acknowledge your support of the SEIS recommendations (see response to comment letter 36)

(62) Joseph Boccio, President of Our Neighbors Civic Assoc of Ozone Park (September 22, 1988)

response: Dredged material contains no sewage sludge, garbage, medical waste, or other contaminants that have resulted in the numerous beach closings this past year, nor is it hazardous waste. The proposal is to contain sediment dredged from the port, and found unsuitable for "unrestricted" ocean disposal, in artificial pits beneath the floor of Lower NY bay. The vast majority of this material is now disposed of in the open ocean, where it is capped to isolate it from the biota. The borrow pit alternative for disposing of this material was selected because it offers a more secure containment facility to prevent the loss of deposited sediments (see 2.2.2.2). Because of impacts associated with access channel dredging, the pits in Jamaica Bay are no longer recommended for such use (see 2.3.1.3).

(63) James Tripp and Sarah Clark, Counsel and Staff Scientist for Environmental Defense Fund (September 30, 1988)

<u>response</u> <u>a:</u> The citizens proposal was closely reviewed by the Corps (2.3.b,c). Though we decided to conduct our own independent screening for new pits, using more recent and documented survey data (2.3.2.1) and 2.3.2.2) the two sites identified as preferred (2.3.2.3) are very closely situated to sites A and B of the citizen's proposal. Your recommended site B partially overlaps our East Bank site. The closeness in location of sites from these two independent surveys lends greater credence to each; because we had to access data unavailable when the citizens proposal was completed, we feel our location has a bit more scientific credibility, and that is the one we identify as preferable.

<u>b:</u> We agree with your conclusion regarding borrow pits serving as effective containment sites for contaminated sediments, but chose not to misrepresent our intentions by calling the operation a demonstration when in fact we are seeking a fully operational long-term alternative. While we are not seeking to demonstrate a theoretical technique, we recognize the need to monitor our operation closely to safeguard the marine system. The monitoring plan proposed in the DSEIS, and the revised plan presented in the FEIS (2.3.4.2) are <u>not</u> based on costs and labor concerns, though these considerations must come into play when attempting to design a workable long-term program. The most successful monitoring program is one that is as simple as possible, with enough flexibility to respond to actual conditions within the basic guidelines of its goals. Toward this end we are puzzled as to what aspect of the physical monitoring you object to; we propose to monitor each disposal action to determine if material is leaving the site boundary, and conduct regular surveys to keep a close eye on the disposal mound configuration (see 2.3.4.2.1). These are well established techniques chosen irrespective of costs and at a considerable manpower expense. In separate SC sessions devoted to monitoring not one member has criticized the physical program and we feel this more than justifies our faith in it.

<u>c:</u> We have no intentions to ever have the site used after closure nor permit any activity that will demonstrably risk its integrity. We are certain that the appropriate state agencies will similarly protect such a site, and restrict other

activities from future intrusions.

d: We do not agree with your desire to exclude category III material during what you call a "demonstration period". This is partly because we view this proposal as a fully operational one, which of necessity must include all levels of contaminant proposed for containment. We remind you that category III material already exists in the harbor, exposed both to the water column and biota with no safeguards or isolating mechanisms. The contaminants in this category are bond to sediments (and released) by the same mechanism that govern category II sediments. We firmly believe that all existing data strongly supports the ability of a pit to contain all classes of sediments. If your concern is the loss of this material during disposal, indicated in the previous part of your letter, then the monitoring program would detect this. If your concern is with biological uptake and accumulation then the presence of such material would greatly increase the potential of detection in comparison to the low contaminant levels of category II.
This material should be viewed as a worst-case test. If it fails the contaminants associated with any given operation would be dispersed and diluted with little impact to the ecosystem from any one project. The operation would then be assessed to determine the cause and the most appropriate action, including sealing off the site if necessary.

e: Our restriction to areas landward of the transect was not based on sand mining limitations alone, though the practicality of digging deep pits in such an environment is a concern. Deeper water, stronger currents, heavier seas, and generally poorer weather combine to increase the potential for material to be lost during and after disposal, when compared to the more sheltered environment within the Bay (2.3.2.1b).

f: See response e above. Also, your analysis is based mostly on subjective data and doesn't present as sound a basis for comparison as the data on fish and benthos collected and analyzed by MSRC. Unfortunately, because of the limitations discussed in 2.3.2b, the MSRC study did not include that area, and the scientific data to refute or confirm your claim does not exist.

g: As stated in your letter to EPA (and their reply) jurisdictional limitations appear to preclude siting a new pit outside the transect. However, in the absence of such restrictions, there are also compelling environmental reasons for staying inside the transect (see response e above and 2.3.2). As indicated in response a above, the BRG report identified two suitable new pit areas inside the Bay, close to areas our own screening process identified as well.

h: We are well aware of your position from past discussions. Both the Corps and EPA believe the testing criteria are valid and defensible. However, as you are also aware, new criteria are being examined. If appropriate these criteria will be proposed for use, subject to public review, and implemented. Should new criteria alter the volumes of dredged material placed into categories II and III then the need to approve use of borrow pits, and do so for as large or as many pits as can be identified as environmentally acceptable, becomes even more critical. Failure to do so would then have an even greater detrimental effect on the port and its related economy. Under this scenario your resistance to the use of existing pits might have to be re-examined.

i: We disagree with this interpretation. As "effective" containment sites for contaminated sediments, why would you rule out their use for disposal of material not deemed "substantially free of pollutant". It is precisely with this goal in mind, to safely contain and isolate sediments potentially harmful to the ecosystem, that the borrow pit alternative was identified and developed. In fact, three separate iterations of alternatives (starting with the Mitre report (1979; 1980)) have all singled out borrow pits as the environmentally preferred alternative for disposal of large volumes of sediments unsuitable for unrestricted ocean disposal.

j: A proper, controlled dredging operation will not only have minimal impacts to an ecosystem, but can also serve as a source of cleaning up a contaminated habitat. Blanket condemnation of dredging for category II and III, which in effect is what calling for constraints amounts to, is unfounded and denies a given project its right to a fair hearing on its own merits. Expansion of channels would have to be evaluated on a case by case basis. If the project is justified, passes state and Federal review, and can be accomplished in an environmentally sound manner then it would be improper to deny it just as it would be improper to allow it merely because a disposal site exists. It is highly unlikely that such an expansive operation would be undertaken just because a disposal site exits,; as you are well aware the cost in time and money for the environmental review, studies, testing etc. would be a formidable obstacle alone. As a point of information, category II material can be disposed of at the Mud Dump with capping, and is therefore effectively free of constraints now, yet there is no rush to expand channels while that option is still available. In addition, in the past many new work dredging has met the exclusionary criteria for ocean disposal or has tested as clean, and therefore would be unimpeded by the failure to designate a new site for contaminated dredge material.

k: The weight of evidence appears to show that toxic discharges have been substantially reduced. This can best be seen in the high proportion of sediments that fall into category I, and can be disposed of at an approved ocean site without restriction.

l: The testing criteria employed today is dynamic, and has evolved (and continues to evolve) over years of experience to represent a sound comprehensible mix of chemicals that best gauges a sediment's effects on the biotic community directly and without having to test for every substance possible.

m: Bioassay exemptions are always made on a case-by-case basis, and never automatically assumed.

n: Though not strictly within the Corps' jurisdiction, to our knowledge, the availability of a disposal site has never served as the basis for lessening ongoing efforts to clean our environment, and should never do so in the future.

6.4.5 Individuals

6.4.5.1 Individual Comments Received:

(see full text of Individual comment letters beginning on page 6-181; responses to these letters are in section 6.4.5.2 beginning on page 6-228, immediately following text of all written individual comments)

Army Corps of Engineers
N.J. District
Attn: Len Houston

July 18, 1988

Dear Sir,

As a family, we have resided in the Rockaways for many years, and we are strongly against the use of pits in and around the waters of the Rockaways to store the dredgings which contain PCBs and many other toxic wastes. Our areas have been and hopefully will continue to be used for recreational and wild life preservation purposes and we dread what the future will bring to our children if this condition resulting from contaminated waters should exist.

(over)

Please try to use other methods in your power to dispose of this dredging without threatening our waters and our beautiful national park lands.

Sincerely

N Maida
333 B 32 ST
FAR ROCKAWAY
QUEENS, N.Y.
11691

Joseph
Naomi
Alice
Bryan
& Rose
The Maida Family

TO WQ 7/21

Comment Letter 65

Maher & Rifai

ATTORNEYS AT LAW

55 JOHN STREET
NEW YORK, NEW YORK 10038
(212) 267-4008

DANIEL F. MAHER, JR.
ADMITTED
N.Y. & N.J.

ALI E. RIFAI
ADMITTED
N.Y. & N.J.

July 26, 1988

Colonel Marion L. Caldwell, Jr.
District Engineer
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278

Re: Disposal of Dredge Material in
Subaqueous Borrow Pits
Public Notice 13374

Dear Mr. Caldwell:

This letter is to express my opposition to the proposal before the Army Corps of Engineers for which public hearings are presently being held with regard to use of subaqueous borrow pit disposal sites for the disposal of dredged material including toxic waste contaminants. I respectfully request that this expression of opposition be read into and made part of the record on the public hearings with respect to this proposal. a

At the outset, let me state that I make these comments as a private citizen, and not as an attorney nor an individual with an expertise either in the area of environmental law nor toxic tort litigation. My comments can more accurately be described as a matter of common sense.

Particularly in light of the recent focus on the contamination of the beaches and shores of New Jersey, New York, Connecticut, and even Rhode Island as a result of the failure of our government to properly dispose of sewerage and medical wastes, it is truly unconscionable that a proposal to dispose of potentially lethal toxic waste materials within 1.5 miles of our shores could be seriously entertained. *

*THE WAVE, Rockaway Beach, New York
Newspaper Article dated July 16 1988, copy of which is attached.

Over the past two years, the inability to control the disposal of certain day-to-day waste, whether it be sewerage, medical waste, or what have you has been clearly demonstrated, as evidenced by the substantial contamination of our beaches. For those of us who greatly appreciate the esthetics and the many recreational activities which the shores and waters of these states allow, the closing of our beaches to swimming as a result of contamination is most disheartening. At least we can take some solace in the thought that the damages caused by the present problems are not permanent but may be corrected with the implementation of an intelligent waste disposal plan. However, the proposal now being entertained by the Army Corps of Engineers, as I understand it, calls for the dumping of various dredged wastes, including toxic chemicals, and the dumping of these wastes into the ocean above certain dredged pits in the hopes that these wastes will filtrate through the water and land in the pits so that these pits can be capped. This proposal, at least thus far, doesn't speak to the damage which will result from those materials which do not fall to the pits but dissipate into the ocean waters, nor does the proposal address the possible leakage or leaching from the pits or the ultimate erosion over time of the caps, inevitably leading to the spreading of toxic wastes along the shores. Such results are not evanescent as are the problems with sewage and medical wastes. Should toxic chemicals wind up on the shore, the damage would not only be real but, in all probability, irreparable. Further, such damage in the early stages would probably go unnoticed exacerbating the problem. Toxic chemicals, unlike sewerage and medical wastes, do not necessarily show themselves by sight nor smell. However, once discovered, the results will most likely have a very serious long-term adverse impact to many Americans whether they be boaters, swimmers, tourists, fishermen, or those, who live on the coast primarily for its esthetic qualities. The adverse impact to our economy and our ability to use these natural resources is self-evident in the results from the recent shut down of the beaches because of the dumping of sewerage and medical wastes. Various reports indicate that the hotel, motel industry on the Jersey shore is off at least 25% with concommittant reductions in other tourist activities, such as board walk vendors, restaurants, and other retail businesses. It should be noted that the tourist industry is generally characterized as one of the top three categories of economic production in the State of New Jersey.

b

c

d

The failure of this proposal to contain toxic wastes in a safe manner could obviously be devastating. It could lead potentially to a ban on ocean swimming, ocean fishing, and recreational activities which make up the largest segment of the tourist industry. If such adverse results are at all possible, is this proposal something that we can afford as a nation to be wrong about?

In this day and age, when the adverse effects of our industries on our environment are becoming clearer, does it not make sense to develop a longer range solution to problems such as the disposal of toxic wastes rather than offer short-sighted solutions which could ultimately devastate our whole coastal environment. Unless a guarantee can be offered that there will be no damage to the shores as a result of the use of these subaqueous borrow pits for the dumping of toxic chemicals, this proposal should be tabled, and a longer range solution should be sought.

Sincerely,

Daniel F. Maher, Jr.

DFM:p
Enclosure
DM-7-26-88 pd

July 26, 1988

Gentlemen;

Please reconsider your proposal to bury waste materials (much of which is toxic) in borrow pits in Jamaica Bay.

If disposal in the ocean appears to be impractical then it is incongruous to contaminate the bay by burying, then covering with sand, etc. What is to prevent the leaching of dangerous materials, no matter how much material is placed over the dumped wastes? DO NOT DESTROY THE BAY AND PRESENT AND FUTURE GENERATIONS! PLEASE!!

Yours truly,

S. Gorod

2521 Bayswater Ave.
Far Rockaway, N.Y. 11691

July 26, 1988

MRS. MARVIN LIEBERMAN

Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278

Attn: Len Houston

Dear Mr. Houston,

We object to the dumping of the dredged sediment into the sites in and around Jamaica Bay. The wildlife, the fish and the groundwater systems need to be free of any toxic substance.

Yours truly,
Rose Lieberman
145-11 Newport Ave.
Neponsit Queens, NY
11694

162 Beach 145th Street
Neponsit, N. Y. 11694

July 28, 1988

Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278
Attn: Len Houston

Dear Sirs:

I understand that your organization is proposing the dumping of dredged sediment which is too toxic for ocean dumping in pits located in and around Jamaica Bay. This would have a long term negative impact on wildlife and fish in the area as well as groundwater systems which are contiguous to the bay.

I am adamantly opposed to this proposal.

Very truly yours,

Steven L. Shapiro

139 Beach 207 Street
Rockaway Point, NY 11697
July 29, 1988

Len Houston
Army Corps of Engineers
New York District
Jacob Javits Federal Building
New York, NY 10278

Dear Mr. Houston:

Our beaches in the Rockaways, Riis Park, Coney Island, Staten Island as well as Sandy Hook have all been closed for extensive periods of time this summer. There semms to be no end in sight to the contamination, medical waste, dead rats and sewage that has washed up along our shore lines. Our waters have been used as dumping grounds for all kinds of garbage and are now so saturated that they are sending the wastes back to us along our beaches. Our ocean and bay fronts are now a source of disease and disgust instead of recreation and enjoyment as they were meant to be.

In the midst of all this we are told that you are planning more burrow pits for the disposal of waste in our harbor. The last thing our waters can handle is more dumping sites. To further add to the problem of wastes in the Rockaway Inlet at Ambrose Channel, East Bank Pit, Sandy Hook or Rockaway Pits is unthinkable. The City is unable to cope with or control the current amount of pollution. We should be searching for alternate means of waste disposal not adding to a problem that has gone from bad to worse over the years.

All of us who care about reclaiming the Sea as one of our precious resources are opposed to further misuse of our Oceans. As a resident of the City who can now only look at a contaminated Ocean instead of swim in it I am opposed to any further waste disposal in our Harbor. It is time to reclaim our waters. We can no longer hide our garbage and waste under water because it is coming back to haunt our shores.

Yours truly,

Marilyn Gualtieri

142-08 Cronston Avenue
Neponsit, N.Y. 11694
August 1, 1988

Army Corps of Engineers
New York District
New York, N.Y.

Dear Sir:

I am writing to protest the recent proposal to dump dredged sediment and toxic waste into the pits located in and around Jamaica Bay.

I am shocked that this site, so close to a wildlife sanctuary and in itself an area that spawns new life, should be selected by people knowledgeable about the marine life in that location.

We implore you to reconsider this horrendous idea.

Sincerely,

Marilyn Baratto

7 Aug 88

Gentlemen:

We urge you not to dump the NYC harbor sludge in Jamaica Bay. We are trying to get the toxic waste that is now in the Edgemere Landfill from leaching into the bay. We don't need any additional toxic waste. This bay is a refuge for wildlife. We should preserve it, not make it worse.

Please give this serious consideration.

Yours truly,

Lu & Larry Stenzler
6 Pinnacle St
Far Rockaway
NY 11691

Mr. and Mrs. Walter N. Wilson
105 Beach 215th Street
Breezy Point, New York 11697

August 2, 1988

Army Corps of Engineers
N.Y. District
Jacob Javits Federal Bldg.
New York, New York 10278

Attention: Len Houston

We are opposed to the Army Corps of Engineers use of Borrow Pits for disposal of toxic materials in and around Jamaica Bay and proposed sites off Rockaway Point.

This plan would place the physical health of our children in serious jeopardy.

We urge you to eliminate this proposal.

Sincerely,

Walter and Maureen Wilson

Walter & Maureen Wilson

c.c. Rockaway Point Association
Breezy Point Cooperative, Inc.

August 2, 1988

Mr. Len Houston
Army Corps. of Engineers
N. Y. District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278

Dear Mr. Houston,

I am writing to you as a concerned citizen to express my outrage and concern over the proposed dumping of PCB contaminated dirt in the ocean and/or Jamaica Bay.

Isn't it time that all people begin to realize that if we kill our waters, we're only killing the futures of our children. Was it ever considered by the Army Corps. of Engineers that these waters are used for recreation by thousands of children and it is the only area available to them. To quote a recent article in the Rockaway Point News, "1988 WILL BE KNOWN AS THE YEAR THE OCEAN CRIED OUT." Isn't it time we all began to work together to save one of GOD's greatest creations?

I understand the difficulty of disposing this and all other forms of waste, but to bury it in pits that are near swimming and wildlife is unconscionable. Please reconsider your options and find a location that will not impact now or in the future, the lives of anyone or anything.

With the ocean being polluted from all sides, I hope you can understand the frustration and sadness all Rockaway residents are feeling.

Thank you for reconsidering.

Elaine Smith

Elaine Smith
204-01 12th Avenue
Rockaway Point, New York 11697

ALTON R. WALDON, JR.
COUNSELOR AT LAW
115-103 222ND STREET
CAMBRIA HEIGHTS, NEW YORK 11411

MEMBER OF 99TH CONGRESS
6TH DISTRICT, NEW YORK

August 4, 1988

Mr. Len Houston
Army Corps of Engineers
New York District
Jacob Javits Federal Building
26 Federal Plaza
New York, NY 10278

Dear Mr. Houston:

Recently, I was apprised that the Army Corps of Engineeers is considering dumping toxic dredged materials in the Wetlands of the Jamaica Bay area. Purposeful contamination of this wildlife sanctuary is, in my opinion, an insensitive and heartless act which, at its very best was ill-conceived. Did not anyone consider what will happen to recreational fishing if the polluting actually occurs? Did not anyone consider the impact on the recreational use of the Rockaway Point area being dramatically undermined by this contamination? Did not anyone anticipate the destruction which will surely occur to the ecological balance of the Jamaica Bay area? It appears if your intention is to go forth with the dumping, that the human, wildlife and recreational concerns I have hereinabove mentioned were not considered.

I want you to know that I hereby go on record as being unequivocally opposed to this planned polluting of the Jamaica Bay area. I hope that the people of this city, by their actions and opposition, will be able to stop this foolish act.

Yours truly,

Alton R. Waldon, Jr.

ARW:mmb
CC: Kevin Callaghan

To:

District Engineer,

Army Corps of Engineers, NY District

Jacob Javits Federal Building

26 Federal Plaza

New York, NY,10278

To whom it may concern:

This is to inform you that I have read your Draft Supplemental Environmental Impact Statement thoroughly. I find that it is extremely irresponsible to even consider the use of subaqueous borrow pits for the disposal of toxic dredge spoils. As your own document attests to, it is not known whether such use would constitute a threat to the environment or not. My suspicion is that it would not only end up contributing to the degradation of the area, but would probably lead to other abuses and widescale use of pits and further destructive sandmining practices. a

This aside, there are many other probelmatical aspects of the DSEIS. The statement that artificial reefs subject the fish to overharvest is ridiculous and goes against current philosophy supporting the use and construction of artificial reefs to enhance marine resources. b The further assertion that the borrow pits subject the fish to overharvest by concentrating them shows a lack of knowledge concerning Raritan Bay's fisheries. In effect, the location of the pits may have curtailed illegal commercial harvest in those areas c

because of their uneven contours. Filling the area to resemble the original shoal habitat would allow such illegal practices to flourish there again, as they do in other flat c
bottomed areas in the bay. In fact, a good case might be made that the pits are so full of fish because the organisms find safe haven from the draggers there. In effect, the pits may shelter certain species from overharvest.

While I find the Army Corps' stated desire to end dumping at the 106 mile dumpsite commendable, I find it offensive that another form of ocean disposal, (the use of the borrow pits), much closer to the fragile estuarine d
environment would be considered in light of the current pollution crisis inundating the inshore area. Surely the Army Corps must realize that the people who recreate in Raritan Bay will never allow this project to proceed. We maintain that upland disposal is the only alternative, no matter how e
costly or time consuming, that is acceptable for the disposal of toxic dredge spoils.

Sicerely,

Dan Mazza,
Field Editor,
The Fisherman
Magazine , 1622
Beaver Dam Rd.,
Pt.Pleasant,NJ
08742

MRS. ARNOLD GOTTLIEB
179 BEACH 149 STREET
NEPONSIT, NEW YORK 11694

Aug 6, 1988

Dear Mr. Houston,

We live in a wholesome beautiful area on the edge of Jamaica Bay.

The negative impact on the wildlife and fish, let alone people, will be a disaster.

We are registering our objection to the proposed dumping in no uncertain terms.

Sincerely,
Beatrice J. Gottlieb

Comment Letter 77

SYDELLE
[redacted] - BREJENSKY
3220 - ANCHOR - DRIVE
FAR ROCKAWAY, N. Y. 11691

August 9, 1988

Army Corps of Engineers - NY District
Jacob Javits Federal Building
26 Federal Plaza
NY, NY 10278

Attn: Mr. Len Houston

Dear Sirs:

I am writing to express my opposition to the dumping of toxic waste in Jamaica Bay.

Yours Truly,
Sydelle Brejensky

Aug 9, 1988

Dear Mr Houston:

We are readers of the Queens Chronicle newspaper and were shocked to read an editorial in the August 4TH edition about possible dumping of toxic waste in the Jamaica Bay Wildlife Refuge. We feel that it would be a shame for this to happen to the Refuge. The Wildlife Refuge provides enjoyment and education to many people - young, old, as well as families. As frequent visitors of the Wildlife Refuge, we got a lot of pleasure observing the environment. To destroy a place of beauty filled with trees and animals within the borough of Queens would be terrible.

We urge you to please reconsider more carefully where to dump the toxic waste - Don't ruin this special place!

Sincerely,

Barbara Mines
June Holborow
Catherine McGillen
Mildred Kelly

80-28 Parsons
Jamaica, NY
11432

Comment Letter 79

MURRAY WEINER, PH.D.
3212 HEALY AVENUE
FAR ROCKAWAY
NEW YORK 11691

GRANITE 1-2517

August 10, 1988

Army Corps of Engineers - NY District
Jacob Javits Federal Building
26 Federal Plaza
New York, N.Y. 10278

Attention: Len Houston

Dear Mr. Houston:

I am a homeowner less than one block from Jamaica Bay in the Bayswater section of Far Rockaway.

I am particularly disturbed about a proposal to dump harbor sludge--some of it toxic--into Jamaica Bay and urge that this not be permitted.

At a time when we in Bayswater are sitting on an environmental time bomb in the form of toxic waste that is leaching out of the Edgemere Landfill and are trying to get that under control, we are faced with another environmental onslought, the consequences of which can hardly be known at present.

As you know, the courts have recently held that federal agencies can be held liable for the damage they cause. I submit that allowing toxic dumping in Jamaica Bay will cause harm to those of us who live on or near the Bay in terms of our health, the health of our unborns and certainly in terms of the economic value of our properties and businesses.

If the Corps approves of this proposal, I will devote myself to holding those responsible legally accountable.

Sincerely,

Murray Weiner, Ph.D.

August 10, 1988

Gentlemen:
I wish to express my opposition strongly to the dumping of toxic waste in Jamaica Bay. Do you realize what a health hazard it will be to our community? We are already suffering enough by our beaches being closed due to the waste that was thrown in the water. Please reconsider your devastating plan for the Rockaways.

Thank You,

Yours truly,
Mrs. Laura Cohen

8/1/88 -

Dear Sir.

Rockaway is Beseiged with many problems -- please please, please don't add to them by dumping the toxic waste sludge into Jamaica Bay. I live on Jamaica Bay water front - and do all I can to keep the lands clear clean & free of garbage dumping here in the Bay Front Shacks -

Sue Levin Family

1141 McBride St. Apt. 1F
Far Rockaway, N.Y. 11691
August 12, 1988

Army Corps. of Engineers - N. Y. District
ATTN: Len Houston
Jacob Javits Federal Building
26 Federal Plaza
New York, N.Y. 10278

Dear Mr. Houston,

I would like very much to voice my opinion against the Dumping of Sludge into Jamaica Bay.

I am a resident of Rockaway now for approximately 30 years. We have an area dump around 32nd street in the Rockaways that we have been fighting to have closed. As a resident of Rockaway, I have seen and heard of so many Cancer cases, that it is frightening. I am very convinced that this is a terrible hazard for our people.

We cannot afford to worry about sludge dumping in our back yards. My husband was a WWII veteran and died of service connected causes. I have sacrificed enough.

Please act on our behalf because we intend to fight back.

Sincerely.
Rita Pollack

Rita Pollack

ESTELLE HAFT
1157 BAY 24 ST
FAR ROCKAWAY NY 11691
MADD

RECD 8/15/88

Dear Mr. Houston:

It's not fair! Enough dumping on the Rockaways by NY City.

It is illegal to dump toxic sludge into our waters, and Jamaica Bay is not the place for this.

Kindly reconsider these plans. Think of the Rockaway residents and their struggle - remaining in NYC and desiring a healthy environment.

Thank you.

E Haft

Mr. Eisner
1207 E. B'way
Hewlett, NY 11557

August 15, 1988

Mr Paula

I am writing to say that I oppose dumping under Jamaica Bay and the New York Bight both as a Nassau resident and as a person who fishes in this area. I would not like to see the water polluted and the marine life destroyed.

Sincerely
Mrs. Eisner

32 Pt. Breeze Avenue
Rockaway Point, NY 11697
August 18, 1988

Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278

Attention: Water Quality Compliance Bureau

Re: Public Notice No. 13385-CENANOP-W

Published: 8 August 1988

Gentlemen:

Having briefly studied your proposed plans for depositing contaminated dredged materials within the confines of Jamaica Bay in subaqueous borrow pits and in the ocean off Ambrose Light Ship, I wish to state for the record that I am opposed to such "dumping" of dredged materials for the following reasons:

(1) The identified areas in and around Jamaica Bay have been identified as wetland protected areas vital to several species of marine and bird life which are on the endangered species list. a

(2) The proposed method of dredging and dumping leaves very little likelihood that the material dumped would stay where placed. b

(3) Use of the area between Ambrose Light Ship and SandyHook New Jersey, also brings into question if the dumped material will stay where it is suppose to owing to the tidal action and strength of current in the area. c

(4) If the Federal Government, your bosses, won't let you dump this material in the open ocean, why are you considering dumping it in protected bay areas where marine, wildlife and humans habitat? d

(5) Offered as a suggestion is the use of two islands in lower New York Bay, HOffman and Swine, which are part of the Gateway National Recreational Area. As these islands are uninhabited, if it is determined that this dredged material can be suitably located in an open air area, I propose that negotiations be instituted with Gateway through the National Parks Service to dump this material on these islands.

A question arises in my mind with respect to the sites propsoed. It does not appear in the report that contact was made with the National Park Service with regard to dumping in the protected enclave of Gateway National Recreation Area. Did you contact them and if so, what was their answer to your proposal?

I believe we all recognize the need to keep the lower New York Bay area open to shipping and that you have the impossible task of dredging and putting the dredged material somewhere. However, I believe it is vitally necessary to us, our children and their children's children to see to it that proper disposal of this contaminated material is arrived at.

Please continue to study all possible options and find something better than what you have proposed here today.

Respectfully submitted,

Noreen S. Schramm

received 18 Sept 88

115 Oceanside
Rockaway Point, NY 11697
August 20, 1988

To The Army Corp. of Engineers:

As a resident of Rockaway Point, an avid swimmer and scuba diver, I am writing you with great concern of the proposed ocean dumping plan. I am against this since it will ruin our beach water not only for those of us who enjoy water sports now; but for our future generat[ions] as well. Please hear all of us who know there must be a better solution.

Sincerely,
Celia D'Apuzzo

c.c.: Alfonse D'Amato
Daniel Patrick Moynihan
Floyd Flake
Audrey Pheffer
Jerome Weinstein
Walter Ward
Claire Shulman
Jay Steingold

JACK I. APPEL
1230 EAST 29TH STREET
BROOKLYN, NEW YORK 11210

August 21, 1988

U.S. Army Corps of Engineers
26 Federal Plaza
New York, N.Y. 10278

Dear Sirs:

According to newspaper reports, you propose to dump dredged material from the Gowanus Canal + Newtown Creek into the waters near Staten Island + Norton Point + South Shore, Gravesend Bay, [illegible] the Coney Island Flats. Dumping at these [illegible] the material is too toxic to dump in the ocean is outrageous.

This defies all logic and is outrageous. I swim in those waters, boat in those waters + fish in those waters. With one flow [illegible] you will ruin those waters — used each year by hundreds of thousands of people — for swimming, boating and fishing.

I protest the proposal + urge you not to proceed.

Sincerely yours,

Jack I. Appel

ROBERT P RAIT
4683 BEDFORD AVENUE
SHEEPSHEAD BAY BROOKLYN
NEW YORK NY 11235

Col Marion Caldwell Jr
US Army Corp of Engineers
26 Federal Plaza
New York NY 10278

Dear Sir

With Respect to the proposed plan to dump in the New York Harbor area, I must respectfully request that the Army Corp of Engineers NOT proceed with such an awfull idea!!

Surly there must be a better place to dump toxic waste, or a better way to dispose of waste that is an immediate danger to so many people on so many beaches!! Please understand that I have been a resident of this area for over 30 years and have not lost my appreciation for our nations shores. Without question as a member of our armed forces sworn to protect this nation you would not want to be the one to attack your own people with chemical warfare!!

Please understand that as a fourth generation American and third generation member of this community I will follow all legal means to prevent this HOLOCOUST about to be committed against our major source of foods from the oceans ——

Respectfully

Robert P Rait

PM 8/24/88

Dear Mr. [illegible],

I strongly oppose the proposed plan to dump New York Harbor sludge into Jamaica Bay. Stop endangering my health, polluting the environment, I live in and destroying the ecology.

Martin [illegible]
31-41 [illegible] Ave.
Far Rockaway, N.Y. 11691

8/28/88

From the desk of
HEDDA PESSIN

Mr. Len Houston,
Army Corps of Engineers

Dear Mr. Houston,

Having been a long time resident of Bayswater, & having just moved across the channel to Long Beach, & now living close to the Long Beach dump with its NOXIOUS ODORS, anything you can do to keep from polluting this planet would (once please) be greatly appreciated.

We just returned from a trip to beautiful Quebec, & found that the St. Lawrence between St Simeon & Riviere-du-Loup was filled with miles & miles of garbage. The whales had to swim in that disgusting looking water & we sailed in it on the ferry.

We are destroying our planet. Please help.

Very truly yours,
Mrs. Hedda Pessin

Mrs. Hedda Pessin
360 Shore Road, Apt. 7 K
Long Beach, NY 11561

rc'd 8/29

Dear Mr Houston

I strongly oppose the proposed plan to dump New York harbor sludge into Jamaica Bay. Stop endangering my health, polluting the environment I live in and destroying the ecology.

Frances Fink
31-41 Healy Ave.
Far Rockaway NY 11691

8/29/88

Dear Mr. Caula

Please do not allow the use of borrow pits for disposing contaminated dredge spoils. No civilized person would throw garbage detrimental to health and safety in his own back yard. ~~Additionally~~ - all ocean dumping is a savage rape of our environment. Money talks, ethics & morals walks.

Someone must take a stand and do the right thing. Hopefully you are the man.

Regards

[signature]

M. GIACCO
P.O. BOX 189
ATL. HLNDS.
N.J. 07716

Gentlemen, 8/30/88

Please don't use the dredge holes off Northern New Jersey for a landfill type dump spot. I have fished this area for many years and to fill the holes and destroy this areas fertility is ridiculous. I am sure other areas of the sea or land could be used for this purpose.

Thanks,
Ron Zocki

RONALD J. ZOCKI
445 E. 14th. ST.
NEW YORK CITY 10009

PM 8/31/88

Gentlemen,

Please don't use the dredge holes off Northern New Jersey in the New York Bight for dumping land fill. This is an extremely good fishing area and this dumping will destroy the area. In addition there has been enough beach/water pollution this year - we don't need more!

Thank you,

Ron Ford

RONALD FORD
1024 CAPSTAN DRIVE
FORKED RIVER, NEW JERSEY
08731

DATE: 09/01/88

Comment Letter 95

FROM: Patrick Pecora
764 Broadway
Bayonne, N.J. 07002

TO: Mario Paula
Army Corps. of Engineers
N.Y. District
Jacob Javits Federal Building
26 Federal Plaza
New York, N.Y. 10278

RE: AGAINST PROPOSED DISPOSAL OF SLUDGE IN NEW YORK HARBOR.

Sir,

I am writting to you to voice my opinion against the proposed burial of highly contaminated dredge waste. The use of subaqueous pits in N.Y. Harbor for burial should be reconsidered, this waste could be uncovered by shifting tides and currents. The harbor and bays of the N.Y. and N.J. area are used for recreational purposes by millions of people daily and already have enough problems. The trouble with our waterways was dramatically pointed out by the recent medical waste washups.

I think as a dedicated public servant you should be fighting total elimination of the use of our oceans and waterways as dumping grounds.

Thank You,

Patrick Pecora

Patrick Pecora

cc: File

LITTLE SILVER ANIMAL HOSPITAL

RICHARD YACOWITZ D.V.M.

675 BRANCH AVENUE
LITTLE SILVER, N.J. 07739
(201) 842-8266

Sept 1, 1988

Dear Mr. Panda,

Please note my firm opposition to the use of borrow pits for the disposal of toxic dredge spoils in Raritan Bay. The bay is finally showing signs of real improvement after years of being a polluted cesspool and now the Army Corps of Engineers wants to do something which will return water quality to its condition of twenty years ago. Raritan Bay has been abused enough its time to think about long term impact rather than short term solutions.

The vast majority of New Jerseyites are sick and tired of ocean pollution and are willing to pay for safer means of dredge spoils disposal even if they are more expensive.

Dumping in Raritan Bay is a big step backwards, a step we do not need to take.

Sincerely, Dr. R. Yacowitz

September 1, 1988

Mr. Mario Paula
Army Corps of Engineers
NY District
Jacob Javits Federal Building
26 Federal Plaza
New York, NY 10278

Dear Mr. Paula,

STOP! STOP! STOP! STOP! STOP! STOP! STOP! STOP! STOP! STOP! STOP!

THINK! THINK! THINK! THINK! THINK! THINK! THINK! THINK! THINK! THINK!

THIS IS THE ONLY EARTH WE HAVE. PLEASE DO NOT KILL IT! IT IS TIME TO START HEALING THE ILLS THAT WE HAVE BEEN INFLICTING ON OUR ENVIRONMENT. WE HAVE TO DO IT NOW, OR WE MAY BE RUNNING OUT OF TIME. WE MAY NOT HAVE ANOTHER CHANCE.... PLEASE STOP.

PLEASE STOP ANY FORM OF DUMPING INTO OUR OCEANS. PLEASE DO NOT SOIL OUR WATERS ANY MORE THAN WHAT IT IS NOW. AS IT IS, IT MAY BE GETTING BETTER. PLEASE GIVE IT A CHANCE.... PLEASE....

SUBAQUEOUS BURROW PITS FILLED WITH HIGHLY TOXIC DREDGE SPOILS IS NOT A SOLUTION TO OUR WASTE DISPOSAL PROBLEM, IT IS THE PROBLEM! THERE MUST BE OTHER WAYS. THERE'S GOT TO BE, OR WE ARE KILLING OURSELVES SLOWLY AND DELIBERATELY! PLEASE STOP!.....

THINK! THINK! THINK! THINK! THINK! THINK! THINK! THINK! THINK! THINK!

NOTE: This is a single copy of a form letter.
See Volume 2 for all such letters received.

Respectfully yours,

Joseph T. Kotz
345 Newgate Rd
Langhorne PA 19047

RM: 9/2/88

To whom it may concern: (ocean polluters)

I am vehemently opposed to your intended use of subaqueous borrow pits for the disposal of highly contaminated dredge spoils. a

I've had enough of this ocean dumping and it had better stop. This summers medical waste fiasco should have shown you that you can't take advantage of the ocean. You are ruining it and polluting it and it's absolutely disgusting! Who cares what it costs, explore some other alternatives. Enough with this ocean dumping and polluting. Why don't you worry more about cleaning up the oceans that we swim & fish in instead of polluting it. b

- thank you,

Kirk Williams (A very concerned taxpayer)
E.B., N.J., 08816

1 Sept 88

PM 9/1/88

ROB GROBARZ
62 S MAPLE AV
SPRINGFIELD NJ 07081

MR. MARIO PAULA,

JUST A NOTE TO TELL YOU WHAT I THINK ABOUT PUMPING HIGHLY TOXIC DREDGE SPOILS IN SUBAQUEOUS BORROW PITS. IT SINKS AND SO DOES PUMPING IN THE OCEAN ANYWHERE EVEN 106 mile ~~offshore~~ IT MUST STOP NO MATTER WHAT THE COST.

Sept. 5, 1988

830 Howard Ave #7A
Staten Is., NY
10301

Mario Paula
Army Corps of Engineers
NY District Jacob Javits Federal Bldg
26 Federal Plaza
New York, NY 10278

Dear Mr. Paula:

Though I missed the recent hearings on the Corps' proposal to fill in the dredge holes in Raritan Bay with toxic spoils, I would like to register my opposition. I am opposed to the use of subaqueous borrow pits for the disposal of highly contaminated dredge spoils. I'm also opposed to ocean dumping in all forms.

I own a small recreational boat which I use to fish the waters of Raritan Bay. Just the other day I caught some nice fluke from in and around these dredge holes. The possible destruction of this fine fishery which is threatened if the Corps' proposal is carried out appalls me. Please reconsider. Thank you.

Sincerely,

R. D. Franzwa

R. D. Franzwa

Comment Letter 101

17 Columbia Ave.
Cranford, N.J. 07016
Sept 6, 1988

Dr. Mr Paula,

Please don't allow the dumping of contaminated dredge spoils anywhere in our waters! I am referring to the Army Corps' plans to dump into the borrow pits in Raritan Bay.

I am opposed to ocean (& bay) dumping in all forms. Other alternatives to ocean dumping must be explored, no matter how much money it takes.

Help save our planet!

Sincerely,

Ron Baumann

C L Thompson III
Glencrest G-3
Slatington Pa.
18080

PM: 9/6

Mr. Paula

In the past I have seen or heard of the Army Corps of Engineers completing many worthwhile projects. But the plan to dispose of dredge spoils, so highly contaminated that they cannot even be legally dumped in the ocean, by the use of subaqueous burrow pits in Raritan Bay shows absolutely no concern for our nations bays, oceans and waterways. Raritan Bay has gradually become cleaner over the years, to dispose of toxic waste in the bay would have a devastating affect on the recovery of this area and anything living in or around it!

All disposal of garbage, toxic waste and sewage in our oceans and bays has got to be stopped! It is very evident that we are ruining our oceans with our wastes, some fish are already inedible and some areas of the ocean are already dead, such as the twelve mile dump grounds. With continued ocean dumping there will be no end to the destruction of marine life and soon life on shore. The Atlantic Ocean is not New York City's nor anyones personal sewer, given the chance I am sure she can make a miraculous come back on her own!

I'm positive that there are other alternatives to your toxic waste problem. use them!

Sincerely
Carl Thompson III

September 7, 1988

Mr. Mario Paula
Army Corps of Engineers
NY District
Jacob Javits Federal Building
26 Federal Plaza
New York, N.Y. 10278

Dear Mr. Paula:

The ocean must be kept clean for our children's children.

I am very concerned that this earth will have only a short future if polution is allowed to continue. I am opposed to the use of pits for the disposal of highly contiminated dredge spoils. Ocean dumping, no matter what form, must cease. You must explore other alternatives at any cost. Our future is at stake.

I am a sportsman and fisherman who saw your address as a concerned person in the September 1 issue of Fisherman magazine.

Sincerely yours,

D. P. Somers
32 Collinwood Road
Maplewood, N.J. 07040

Comment Letter 104

To Mr. Len Houston 9-8-88

U.S. Corps of Engrs.

26 Fed. Pl. N.Y.C.

Dear Mr. Houston.

I attended 'Kingsborough' Hearing on Borrow Pits Proposal.

This will advise that I, my family, + neighbors - are totally opposed to any use of Jamaica Bay, N.Y. Harbor or Atlantic Ocean for toxic dredged material. I agree with all opposition statements made at hearing.

Use landfill away from danger to people, wildlife or environment - with toxic material properly treated.

Encl. another 100+ signatures on petitions,

You have been caught in an administration - 8 years - of bizarre neglect of all human + natural environment. Sincerely

Arthur Shapiro

218 B. 121 St Belle Harbor N.Y.

Pendley
469 4 St
Brooklyn NY
11215

rec'd 9/26

Mr Houston

I am in opposition to the proposed plan of Disposing Toxic dredged material in Jamaica Bay and ocean areas off Rockaway Peninsula. In light of Posterity I am inclined to believe that we do not realize the slow death we are causing in America because our government gives liscence to progressive industrialist who live strickly for the moment. We need to consider beyond a reasonable doubt that there is no possible chance of contamination in the future. Therefore we should compensate now, as we cannot absolutely guaranty no problems with this dump. Lets help keep AMERICA THE BEAUTIFUL and not the enviormental sin of an INDUSTRIAL AGE. JP

6.4.5.2 Responses to Individuals

(64) Maida family (July 18, 1988)

<u>response:</u> We acknowledge your objection to the use of subaqueous borrow pits. Our research (as summarized in 2.2.2.2) has lead the Corps to strongly conclude that borrow pits provide a safe and secure disposal alternative that will not adversely impact water quality (see 4.2) or the biological community (see 4.3). We understand the fears that many have in view of past beach closings and health warnings, but wish to strongly emphasis that these disasters were in no way connected to disposal of dredged material. The contaminants associated with a small portion of dredged material are bound to the naturally occurring sediments removed from channels and berthing areas by dredging. Containing the sediments in a chemically inactive, depositional environment under the bay floor, safe from currents and storms, also effectively isolates the contaminants from the water column and biota. A full-scale monitoring program then guards against unforeseen problems, providing an alert early enough to correct the problem or terminate the operation and take remedial action. Please also see response to comment letter 66 below.

(65) Daniel Maher (July 26, 1988)

<u>response a:</u> We acknowledge your opposition to use of subaqueous borrow pits for disposal of dredged material.

<u>b:</u> Your understanding is not accurate. The material to be disposed is sediment, not waste. Some of the sediment contaminated with low levels of chemical agents, most often below toxic levels. The proposal calls for dumping dredged material from barges through about 20 feet of water into pits dug into the bay bottom. The Corps has extensively studied disposal operations, finding that 98-99% of the material is routinely expected to reach bottom within the site boundary (see 4.2.1 a-c), and that sand caps that would cover the filled site are extremely successful in preventing loss of material or leaching of contaminants (see 4.2.1 d,e)

<u>c:</u> A very extensive monitoring program is planned to address the concerns you raise and identify any problems well before any adverse impact would occur (see 2.3.4). However, it is important to stress that the material being considered for disposal in the borrow pit is naturally occurring sediment and not hazardous waste.

<u>d:</u> The borrow pit alternative was chosen precisely because it offers a sound containment and isolation site that would <u>not</u> adversely impact the ecosystem, and therefore not cause the loss of tourism that resulted from the uncontained and often illegal disposal of waste products. This conclusion is based on years of experience and study (see 4.2.1 and 4.3.2), and has been reiterated on three separate occasions (see 1.3).

<u>e:</u> As summarized in the goals of

the project (1.4), borrow pits are intended as a long-range alternative for the sole containment and isolation of contaminated sediments, and one that takes these sediments out of the ocean.

(66) S. Garos (July 26, 1988)

response: We acknowledge your objection to the use of the subaqueous borrow pits in Jamaica Bay. Our research (as summarized in 2.2.2.2) has lead the Corps to strongly conclude that borrow pits provide a safe and secure disposal alternative that will not adversely impact water quality (see 4.2) or the biological community (see 4.3). However, we have been alerted to concerns with respect to potential impacts to the bay from the extensive dredging and bridge alterations that use of the two Jamaica Bay pits (14 and 15), and to a lesser extent the Hoffman-Swinburn pit (2), might incur (see 2.3.1.3). In view of the existence of other suitable pits that do not require such access dredging, the Corps has dropped these pits from further active consideration as disposal sites for contaminated dredged material.

(67) Rose Lieberman (July 26, 1988)

response: See response to comment letter 66.

(68) Steven L. Shapiro (July 28, 1988)

response: See response to comment letter 66.

(69) Marilyn Gualtieri (July 29, 1988)

response: See response to comment letter 64.

(70) Marilyn Baratto (August 1, 1988)

response: See response to comment letter 66.

(71) Rose and Sidney Stenzler (August 2, 1988)

response: See response to comment letter 66. It should be further pointed out that the dredged material proposed for disposal in the pits outside Jamaica Bay is not a waste product. It is naturally occurring sediments some of which are contaminated with chemicals from other activities. It is not hazardous, nor does it contain sewage sludge, medical wastes, garbage, or hazardous materials that were to blame for the past beach closings and health warnings.

(72) Mr. and Mrs. Walter N. Wilson (August 2, 1988)

response: See response to comment letters 64 and 66.

(73) Elaine Smith (August 2, 1988)

response: See response to comment letters 64 and 66.

(74) Alton Waldon (August 4, 1988)

response: See response to comment letter 66. All the concerns/questions you identify were carefully considered in the SEIS (see Section 4); the borrow pit alternative was concluded not to adversely impact those resources and, by providing a secure isolated containment site, it would improve long-term conditions (see 2.2.3)

(75) Dan Mazza (August 4, 1988)

response a: Your comment is mistaken. Though this full-scale use of borrow pits has not been tested long-term, our research (as summarized in 2.2.2.2. and detailed in Section 4) has lead us to conclude that this alternative will not pose a threat to the environment, and will provide a long-term benefit in isolating and securing these sediment bound contaminants. With respect to leading to other abuses and encouraging wide-scale sand mining your conclusion ignores the very extensive environmental review and permits required for such actions.

b: We disagree. Artificial reefs are encouraged to promote fishing, and do so by attracting fish sportsmen seek to catch. They are seldom, if ever, espoused solely as a means to improve the marine ecosystem. While we do not mean to imply the degree of harvest is necessarily detrimental to the fishery, it is certainly not aiding its productivity. Resource agencies (such as NMFS) continue to have mixed feelings among their staff regarding the role of reefs to overall fishery success.

c: Your point regarding a pits ability to curtail illegal commercial activity may be valid. However, the harvest we referred to in the SEIS was mostly from sport fishermen and lobster-men. Though we do not mean to imply that such activity necessarily subjects fish to over harvest, we did have to identify a potential advantage to spreading fish out into their natural habitat. Taken in conjunction with the potential for a filled pit to remove a source of contamination for fish concentrating in these fine-ground sediment sinks the loss of the pit habitat does offer a chance for general long-term improvement for both the number and health of these fish. The "cost" for this improvement (which may be minimal) could be some reduction in fishing success.

d: The 106 site you mention is for disposal of sewage sludge, and is not under the management or jurisdiction of the Corp. The Mud Dump site, located some 12 miles off Rockaway, NY, is the disposal site at which category I and II material is now disposed (the latter being capped after disposal). It is the category II material (along with category III) that we are proposing to place into a secure borrow pit site instead. It is important to distinguish this dredge material from the garbage, sludge, medical waste and assorted other debris that has lead to beach closings, health warnings, and other troubles along and off the shores of NJ and NY.

e: Upland disposal was considered a viable alternative, but one whose problems and site availability make it a less certain alternative (2.2.2.4). Consequently, as an immediately available, environmentally safe and secure alternative, the borrow pits are being recommended as the environmentally preferred alternative (2.2.3).

(76) Mrs. Arnold Gottlieb (August 6, 1988)

response: See response to comment letter 66.

(77) Sydelle Brejensky (August 9, 1988)

response: See response to comment letter 66.

(78) Barbara Mines, June Holborow, Catherine McGillen (August 9, 1988)

response: See response to comment letter 66.

(79) Murray Weiner, PhD (August 10, 1988)

response: See response to comment letter 66.

(80) Mrs. Laura Cohen (August 10, 1988)

response: See response to comment letter 66.

(81) The Stein Family (August 11, 1988)

response: See response to comment letter 66.

(82) Rita Pollack (August 12, 1988)

response: See response to comment letter 71.

(83) Estelle Haft

response: See response to comment letter 66.

(84) Mrs. Eisner (August 15, 1988)

response: See response to comment letters 64 and 66.

(85) Noreen S. Schramm (August 18, 1988)

response a: With respect to potential impacts in Jamaica Bay, the NYD has reconsidered the use of those borrow pits and is no longer considering them as potential disposal sites (see response a, comment letter 7 and section 2.3.1.3).

b: See response a, comment letter 11

c: None of the new or existing pit locations are in the area between Ambrose Tower and Sandy Hook, in part because of the reason you site (2.3.2).

d: All category II dredge material is now allowed to be disposed at the ocean mud dump site if capped (2.1 i). The protected nature of a bay system affords greater from material loss during disposal and better protection from erosion after disposal.

e: The islands themselves are of insufficient size to accommodate the long-term volume of approximately 4 million cys, especially with the addition of dikes needed to contain the material and avoid adverse impacts on water quality that might result from uncontained disposal. In addition, the protected, depositional nature of a pit does afford some added protection to a disposal site, and has been identified as the environmentally preferred alternative for contaminated sediments (2.2.3).

f: The NYD has been in close touch with the Parks Service since the start of the DSEIS in 1985. They have strongly opposed the use of the Jamaica Bay sites, and, as indicated in response a above to your letter, these two sites are no longer being considered for use as a disposal area.

(86) Celia D'Apuzzo (August 20, 1988)

response: See response to comment letter 64.

(87) Jack I. Appel (August 21, 1988)

response: See response to comment letter 64.

(88) Robert P. Rait (August 23, 1988)

response: See response to comment letter 64.

(89) Martin Fink (August 24, 1988)

response: See response to comment letter 71.

(90) Hedda Pessin (August 28, 1988)

response: After careful study of all the alternatives (summarized in 2.2), the use of subaqueous borrow pits provides the most acceptable immediate and long-term solution to safe and secure containment of dredged material contaminated with less than hazardous levels of chemicals from man's past activities.

(91) Mark Fucle (August 29, 1988)

response: See response to comment letter 66.

(92) M. Grocco (August 29, 1988)

response: See response to comment letter 64.

(93) Ron D. Zocki (August 30, 1988)

response: See response to comment letter 64.

(94) Ronald Ford (August 31, 1988)

response: See response to comment letter 64.

(95) Patrick Pecora (September 1, 1988)

response: See response to comment letter 64.

(96) Richard Yacowitz D.V.M. Little Silver Animal Hospital (September 1, 1988)

response: See response to comment letter 64.

(97) Joseph T. Kooal (September 1, 1988)

response: See response to comment letter 64.

(98) Kirk Williams (September 2, 1988)

response a: See response comment letter 64.

b: Numerous alternatives (as summarized in 2.2.) have been carefully explored. The use of borrow pits was deemed environmentally preferable because it provides for an immediate isolation of the sediment-bound contaminant and provides a return of the area to its natural shoal habitat (2.2.3)

(99) Rob Grobarz (September 1, 1988)

response: See response to comment letter 64.

(100) R. D. Franzwa (September 5, 1988)

response: See response to comment letter 64.

(101) Ron Baumann (September 6, 1988)

response: See response to comment letter 98.

(102) Carol Piopson (September 6, 1988)

response a: This statement is in error in that category II material, which makes up the bulk of sediments to be place in a pit, can be dumped at the Mud Dump providing it is expeditiously capped (See 2.1). The borrow pit alternative provides as safer means of containing and isolating this type of sediment.

b: See response to comment letter 64

c: See response b, comment letter 98

(103) D. P. Somers (September 7, 1988)

response: See response to comment letter 64.

(104) Arthur Shapin (September 9, 1988)

response: See response to comment letters 64 and 66.

(105) Mr. Penley (September 26, 1988)

response: See response to comment letters 64 and 66.

7.0 References Cited

Allen, H. (1983). Siting of Areas for the Creation of Wetlands from Dredged Material in New York Harbor. WES DOTS rpt.

Berg, D.L. and J.S.Levinton (1985). The Biology of the Hudson-Raritan Estuary, With Emphasis on Fishes. NOAA Technical Memo. NOS OMA 16. 170 pp.

Brannon, J.M., R.H.Plumb Jr, and I.Smith (1976). Long-term Release of Contaminants from Dredged Material. WES Tech Rpt D-78-49.

Brannon, J.M., R.E.Hoeppel, T.C.Sturgis, I.Smith, and D.Gunnison (1985). Effectiveness of Capping in Isolating Contaminated Dredge Material from Biota and the Overlying Water. WES Tech Rpt D-85-10. 32 pp.

IBID (1986). Effectiveness of Capping in Isolating Dutch Kills Sediments from Biota and the overlying water. WES Misc Paper D-86-2. 53 pp.

Brinkhuis, B.H. (1980). Biological Effects of Sand and Gravel Mining in the Lower Bay of New York Harbor: An Assessment from the Literature. MSRC Spec Rpt 34, Sea Grant ref no 80-1. 193 pp.

Bokuniewicz, H.J. (1979). Stability and Fate of Dredged Material. Proc 11th Dredging Sem, CDS Rpt 219. 23pp.

IBID (1984). Behavior of Sand Caps on Subaqueous Dredge Sediment Disposal Sites. In: Wastes in the Ocean, Vol 3; D.R.Kester, P.K.Park, B.H.Ketchum, I.W.Duedall eds. John Wiley & Sons, publ.

IBID (1986). Subaqueous Borrow Pits as Fine-Grain Sediment Traps. Ltr (1Aug 1986) Plan Div, NYD. 2pp.

Bokuniewicz, H.J. and C.T.Fray (1979). The Volume of Sand and Gravel Resources in the Lower Bay of New York Harbor. MSRC Spec Pub 32. 34pp.

Bokuniewicz, H.J. and R.M.Cerrato (1985). Containment Islands in New York Harbor. MSRC Spec Rpt 61 (85-14). 44 pp.

Bokuniewicz, H.J. and D.Hirschberg (1982). Sediment Trapping Efficiency of an Estuary Floor. EOS 63:358.

Bokuniewicz, H.J., R.M.Cerrato, D.Hirschberg, and B.Brinkhuis (1981). Report on the Proposed Subaqueous Borrow Pit Disposal Demonstration Project. Ltr Rpt (17 July 1981) Water Qual Sec, NYD. 43 pp.

Bokuniewicz, H.J., M.J.Bowman, and A.Visser (1985). Predicted Changes in Tidal Conditions. MSRC Rpt for: NYD

Bokuniewicz, H.J., R.Cerrato, and D.Hirschberg (1986). Studies in the Lower Bay of New York Harbor Associated with the Burial of Dredged Sediment in Subaqueous Borrow Pits. MSRC Spec Rpt 74 (86-12) for: NYD. 67 pp.

Burke, S.A. and R.M.Engler (1978). Water Quality Impacts of Aquatic Dredge Material Disposal (Laboratory Investigations). WES Tech Rpt DS-78-4:35pp

Burns, R.E. and J.R.Schubel (1983). Proc. 2nd Pollution Transfer by Particulates Workshop. MSRC spec rpt 52, 83-8:53 pp

Cerrato, R.M. (1983). Effect of Borrow Pits on the Distribution and Abundance of Benthic Fauna in the Lower Bay of New York Harbor: An Addendum Covering Sampling in March and June 1983. MSRC Rpt for: NYD. 58 pp.

Cerrato, R.M. and F.T.Scheier (1983). Effect of Borrow Pits on the Distribution and Abundance of Benthic Fauna in the Lower Bay of New York Harbor. MSRC Rpt for: NYD. 255 pp.

Cerrato, R.M. and H.J.Bokuniewicz (1986). Benthic Studies Associated with the Siting of a Large Containment Island in the Lower Bay of New York Harbor -Preliminary Summer 1985 Survey. MSRC Rpt for: NYD.

Cerrato, R.M., H.J.Bokuniewicz, and M.H.Wiggins (1989). A Spatial and Seasonal Study of Benthic Fauna in the Lower Bay of New York Harbor. Final MSRC rpt for: NYD

Conover, D., R.Cerrato, H.Bokuniewicz, J.Bowsman, and F. Scheier (1983). Effect of Borrow Pits on the Abundance and Distribution of Fishes in the Lower Bay of New York Harbor. MSRC Rpt for: NYD. 42 pp.

Conover, D., R.Cerrato, and H.Bokuniewicz (1985). Effect of Borrow Pits on the Abundance and Distribution of Fishes in the Lower Bay of New York Harbor (Updated analysis including gut analysis of winter flounders). MSRC Rpt for: NYD. 60 pp.

Dayal, R., M.G.Heaton, M.Fuhrmann, and I.W.Duedall (1981). A Geochemical and Sedimentological Study of the Dredge Material Deposit in the New York Bight. NOAA Tech Memo OMPA-3. 174 pp.

Dean, D. (1975). Raritan Bay Macrobenthos Survey, 1957-60. NOAA, NMFS Data Rpt 99. 55 pp.

Figley, W. (1988). New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay, and Deleware Bay. NJDEP Tech Series 88-1. 39pp

Fitzpatrick, W.P.III (1983). Seasonal Variation of Trace Metal Levels in Polychaete Worms in New York Harbor. MS thesis; SUNY at Stonybrook: 96 pp

Gandarillas, F.E. and B.H.Brinkhuis (1981). Benthic Faunal Assemblages in the Lower Bay of New York Harbor. MSRC Spec Rpt 44. 129pp.

Grieg, R.A. and R.A.McGrath (1977). Trace Metals in Sediments of Raritan Bay. Mar Poll Bull 8:188-192.

Hansen, D.V. (1977). Circulation. MESA NY Bight Monograph 3: 23 pp.

Hirsch, N.D., L.H.DiSalvo, and R.Peddicord (1978). Effects of Dredging and Disposal on Aquatic Organisms. WES Tech Rpt DS-78-5.

Irish, J and H. Bokuniewicz (1988). Monitoring Discharge Operations at Open Water Disposal Sites. MSRC/U NH rpt for:NYD: 34pp.

Jones, C.R., C.T.Fray, and J.R.Schubel (1979). Textural Properties of Surficial Sediments of Lower Bay of New York Harbor. MSRC Spec Rpt 21. 113pp.

Kastens, K.A., C.T.Fray, and J.R.Schubel (1978). Environmental Effects of Sand Mining in the Lower Bay of New York Harbor. MSRC Spec Rpt 15 (78-3):139p

Kawamura, T. (1966). Distribution of Phytoplankton Populations in Sandy Hook Bay and Adjacent Areas in Relation to Hydrographic Conditions in June 1962. USFWS Tech Paper 1. 37 pp.

Kinsman, B., J.R.Schubel, G.E.Carrol, and M.Glackin-Sundell (1979). A Suggestion for Anticipating Alterations in Wave Action on Shores Consequent Upon Changes in Water Depths in Harbors and Coastal Waters. MSRC Spec Rpt 27 (79-10). 39 pp.

Malcolm Pirnie Inc (1986). Feasibility Study for Use of Dredged Material from NY/NJ Harbor as Sanitary Landfill Cover. Phase 2: Evaluation of Dewatering Sites, Upland Disposal Sites, and Sanitary Landfills. Rpt for: NYD. 2 vol.

Marine Science Research Center, SUNY at Stonybrook (1984). Large Containment Islands in the Lower Bay of New York Harbor. Rpt for: NYD.

McGrath, R.A. (1974). Benthic Macrofaunal Census of Raritan Bay - Preliminary Results. Proc 3rd Hudson Riv Ecol Sym. 27 pp.

Mitre Corp (1979). Disposal of Dredged Material Within the New York District. Vol 1; Present Practices and Candidate Alternatives. Rpt for: NYD (cont # DACW 51-C-77-0061). 215 pp.

IBID (1980). Disposal of Dredged Material Within the New York District. Vol 2; Preliminary Evaluation of Upland Disposal. Rpt for: NYD (Cont # DACW51-C-77-0061). 85pp

Morton, R.W. (1983). Precision Bathymetric Study of Dredged Material Capping Experiment in Long Island Sound. In: Wastes in the Ocean, Vol 2; Dredged Material Disposal in the Ocean.

D.R.Kester, B.H.Ketchum, I.W.Duedall, and P.K.Park, eds. John Wiley & Sons, publ:99-122.

Morton, R.W. and M.C.Miller (1980). Stamford-New Haven Disposal Operation Monitoring Survey. Sci Appl Inc (Newport RI) Rpt #7. 23pp.

National Marine Fisheries Service (1977). Physical, Chemical, and Biological Effects of Dredging in the Thames River (CT) and Spoil Disposal at the New London (CT) Dumping Ground. Final Rpt for: US Navy and Interagency Scientific Advisory Subcommittee.

IBID (1984). Seasonal Occurrence of Fin Fish and Larger Invertebrates at Eight Locations in Lower and Sandy Hook Bays 1983. Final Rpt for NYD:79

IBID (1987). Comments on Preliminary Working Draft of Subaqueous Borrow Pit DSEIS. Ltr dated Oct 22, 1987 to: NYD , 2 pp.

National Park Service (1986). Response to Scope of Work for Borrow Pit EIS. Ltr (Jan 14, 1986). 2pp.

National Oceanic and Atmospheric Administration (1980). Report to the Congress on Ocean Dumping Monitoring and Research, Jan - Dec, 1978. US Dept Commer. 42 pp.

New York Bight Restoration Group (1984). An Alternative Strategy for Disposal of Dredged Materials from the Greater New York Harbor Region: A Citizen's Proposal. Rpt for: PICG and SC. 101 pp.

New York District. Army Corps of Engineers (1981). Experimental Disposal of Dredge Material in the Subaqueous Borrow Pit, as Announced in the public Notice 10665. Trans. Public Hearing 6/18/81; Staten Is, NY. 129 pp.

IBID (1983). Disposal of Dredge Material from the Port of New York and New Jersey. Final EIS. March 1983. 207 pp.

IBID (1984). Subaqueous Borrow Pit Demonstration Project. Lower Bay of New York Harbor. Richmond County. NY. Draft EIS. Oct 1984. 131 pp

IBID (1985) Maintenance Dredging of Newtown Creek. New York Navigation Project.. Final EIS. June 1985 55pp

IBID (1986a). Dredge Material Disposal Management Plan for the Port of New York and New Jersey. NYD, Water Quality Management Report. December 1986. 27pp.

IBID (1986b). A preliminary Assessment of Cultural Resources Sensitivity for the Lower NY Bay Complex, New York and New Jersey. NYD, Envir Anal Br. rpt: 28 pp. .

IBID (1990). Managing Dredge Material; Evaluation of Disposal

Alternatives in the New York-New Jersey Metropolitan Region. DMMP rpt: 123pp.

New York District Corps of Engineers and Region 2, US Environmental protection Agency (1984). Guidance for Performing Tests of Dredged Material to be Disposed of In Ocean Waters. Sed Test Manual (12/21/84). 48 pp.

O'Brien and Gere Inc (1980). Environmental Monitoring program, Hudson River Maintenance Dredging. For: NYD. April 1980 rpt. 40 pp.

Ocean Surveys Inc (1989). Final Report; Archaeological Survey of East Bank and Lower Bay Areas, New York Harbor. Rpt DACW51-087-D-0004, <u>for</u>: NYD. 25 pp.

O'Connor, J.M. (1982). Evaluation of Capping Operations at the Experimental Mud Dump Site, NY Bight Apex. NYU Med Center. Inst Envir Med, <u>For</u>: NYD. Cont #DACW39-82-2544. 70pp.

O'Connor, J.M. and S.G. O'Connor (1983). Evaluation of the 1980 Capping Operations at the Experimental Mud Dump Site, New York Bight Apex. WES Tech Rpt D-83-3, Oct 1983. 76 pp.

O'Connor, J.M. and M. Moese (1985). Distribution of Contaminants in Experimentally Capped Dredged Material Deposits. <u>For:</u> NYD.

O'Connor, J.M., D.A.Neumann, and J.A.Sherk, Jr.(1976). Lethal Effects of Suspended Sediments on Estuarine Fish. CERC Tech Paper TP76-20: 38pp.

IBID (1977). Sublethal Effects of Suspended Sediments on Estuarine Fish. CERC Tech Paper TP77-3. 90 pp.

Olsen.,C.R., I.L.Larsen, N.H.Cutshall, R.F.Bopp, and H. J.Simpson (1984). A Geochemical Assessment of Sedimentation and Contaminant Distribution in the Hudson-Raritan Estuary. NOAA Tech Rpt NOS OMS 2, July 1984. 101 pp.

O'Reilly, J.E., J.P.Thomas, and C.Evans (1976). Annual Primary production (Nanno planklon, Net Plankton, Dissolved Organic Matter) in the Lower New York Bay. <u>In</u>: proc 4th Symp Hudson River Ecol; ed. W H.McKeon and G.J.Lauer. No.19:39 pp.

Pacheco, A.L. (1983). Seasonal Occurrence of Finfish and Larger Invertebrates at Three Sites in Lower New York Harbor. NMFS, Sandy Hook Lab; Final Rpt (Nov 1983). <u>For</u>: NYD (Supp Agr 82-88(C)). 54 pp.

Parker, J.H. and R.M. Valente (1988). Long-Term Cap Stability: New York Dredged Material Disposal Site. WES rpt CERC-88-2; 29 pp.

Pearce, J.8., D.J.Radosh, J.W.Caracciola, and F.W.Steimle (1981). Benthic Fauna. MESA NY Bight Atlas Monog 14; NY Seagrant Inst. 79 pp.

Radosh, D.J. and R.N. Reid (1980). Benthic Macrofauna of Romer Shoal (Raritan Bay) in Relation to Sand Mining. NMFS, Sandy Hook Tech Rpt 80-2. 14pp.

Rhodes, D.C., P.L.McCall, and J.Y.Yingst (1978). Distribution and Production on the Estuarine Floor. Am Sci. 66:577 586.

Rosen, P.S. (1977). Increases in Shoreline Erosion Rates with Decreases in the Tidal Range in the Virginia Chesepaeke Bay. Ches. Sci. 18:383-386.

Schubel, J.R., H.H.Carter, R.E.Wilson, W.M.Wise, M.G.Heaton, and M.G.Gross (1978). Field Investigations of the Nature. Degree. and Extent of Turbidity Generated by Open Water Pipeline Disposal Operations. WES Tech Rpt D-78-80.

Sherk, J.A., J.M.O'Connor, and D.A.Newman (1975). Effects of Suspended and Deposited Sediments on Estuarine Environments. <u>In</u>: Estuarine Research, Vol 2; L.F.Cronin ed: 541-548.

Stark, T.D. (1989). Planning-Level Opinion Regarding Dredged Material Containment Islands in New York Harbor. WES rpt <u>for:</u> NYD. 14pp.

Steimle, F.W. and R.B.Stone (1973). Abundance and Distribution of Inshore Benthic Fauna Off Southwestern Long Island, New York. NOAA Tech Rpt SSFS-678; NMFS. 60pp

Swartz, S.M. and B.H.Brinkhuis (1978). The Impact of Dredged Holes on Oxygen Demand in the Lower Bay, New York Harbor. MSRC Spec Rpt 17. 80 pp.

Sumeri, A. (1988). Duwamish Waterway Confined Aquatic Disposal (CAD) of Contaminated Dredged Material - Five Years Later. COE, Seattle Dist: 1 p

Sustar, J. and T.Wakeman (1977). Dredge Material Study, San Francisco Bay and Estuary. Main Report, San Francisco Dist, Corps of Eng. 130 pp

Tavolaro, J.F. (1982). Sediment Budget Study for Clamshell Dredging and Disposal Activities. NYD Rpt. 27pp

Truitt, C.L. (1986). The Duwamish Waterway Capping Demonstration project: Engineering Analysis and Results of physical Monitoring. WES Tech Rpt D-86-2. 49pp.

Turano, F.J. (1968). Oxygen Consumption in Selected Sediments of Great South Bay and Some of Its Tributaries. MS thesis, Adelphi Univ. 26pp.

U S Army Corps of Engineers (1979). Effects of Dredging and Disposal on Aquatic Organisms. Eng Man 1110-2-5013; COE. 88 pp.

U S Environmental Protection Agency (1982). Environmental Impact Statement for the New York Dredged Material Disposal Site Designation. Final EIS (Aug 1982); Off Water Crit & Std. 130 pp.

U S Environmental Protection Agency and U S Army Corps of Engineers (1977). Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters: Implementation Manual for Section 103 of Public Law 92-532 (MPRSA). WES rpt.

IBID (1990). Draft Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters. Draft Testing manual

U S Fish and Wildlife Service (1982). Assessment of Open Water and/or Shoreline Areas in New York Harbor for Disposal of Dredged Material. Rpt <u>for</u>: NYD

IBID (1987). Comments on Preliminary Working Draft of Subaqueous Borrow Pit DSEIS. Ltr dated Nov 13, 1987 <u>to:</u> NYD, 3pp.

Walford, L.A. (1971). Review of Aquatic Resources and Hydrographic Characteristics of Raritan, Lower New York, and Sandy Hook Bays. NMFS Sandy Hook Lab Rpt, <u>for</u>: Battelle Mem Inst. 8 pp.

Waterways Experimental Laboratory, Corps of Engineers (1985) Planning Level Cost Estimates of Dredge Material Containment Islands in New York Harbor. Rpt for: NYD.

IBID (I986). Fate of Dredge Material During Open Water Disposal. Env Effects Dred Tech Note EEDP-01-2. 12 pp.

Wilk, S.J. and M.J.SIlverman (1976). Summer Benthic Fish Fauna of Sandy Hook Bay. New Jersey NOAA Tech Rpt SSRF-698; NMFS. 16 pp.

Wilk, S.J., W.W.Morse, D.E.Ralph, and T.R.Azarovitz (1977) Fishes and Associated Environmental data Collected in the New York Bight, June 1974 - June 1976. NOAA Tech Rpt SSRF-716; NMFS. 58 pp.

Wong, K. and R.W.Wilson (1979). An Assessment of the Effects of Bathymetric Changes Associated with Sand and Gravel Mining on Tidal Circulation in the Lower Bay of New York Harbor. MSRC Spec Rpt 18 (NY Seagrant Inst. No 79-1). 84pp

Woodhead, P.M.J. and S.S.McCafferty (1986). Report on the Fish Community of Lower New York Harbor in Relation to Borrow Pit Sites. MSRC Rpt <u>for</u>: NYD. 95 pp

Woodhead, P.M.J., J.H.Parker, and I.W.Duedall (1985). The Use of By-Products from Coal Combustion for Artificial Reef Construction. In: Artificial Reefs: Marine and Freshwater Applications; F.M.D'ltri ed, Lewls Publ, Chelsea, Mich.

Woodward and Clyde Inc (1975). Rockaway Beach Erosion Control project. Dredge Material Research program-Off Shore Borrow Area:

Results of Phase 1 Pre-Dredging Study and phase 2 Dredging Study. Two rpts, <u>for</u>: NYD

Yentsch, C.S. (1982). Plankton Production. MESA NY Bight Atlas Mongr 15 (NY Sea Grant Inst).

TABLE 1

TOTAL* ANNUAL VOLUME** OF MATERIAL DREDGED 1970-1980

(WITH COMPARISON OF FEDERAL AND NON-FEDERAL PROJECTS)

Year	Federal Projects	% of Total	Non-Federal	% of Total	Total Volume
1970	6,309,800	79%	1,663,500	21%	7,973,300
1971	12,969,500	67%	6,508,800	33%	19,478,300
1972	14,424,100	83%	2,990,400	17%	17,414,500
1973	12,755,000	79%	3,454,900	21%	16,209,900
1974	6,636,300	64%	3,706,500	36%	10,342,800
1975	10,708,600	75%	3,522,800	25%	14,231,400
1976	10,416,900	86%	1,673,100	14%	12,090,000
1 77	4,378,788	77%	1,313,219	23%	5,692,007
1978	6,913,972	70%	2,987,671	30%	9,901,643
1979	7,143,346	69%	3,161,225	31%	10,304,571
1980	1,894,432	57%	1,410,530	43%	3,304,962
Totals	94,550,738		32,392,645		126,943,383
					yearly average = 12,694,338

* Total includes both Federal and Non-Federal as well as Ocean and Non-Ocean Disposal.

** All volumes in yd^3.

Sources: 1970-1977 from Mitre, 1979.
1977-1980 from COE reports to Congress and COE permit files.

Ta   ɛ. Dredged Material Capped at the Mud Dump fro   80 - 1990 (page 1 of 16)

PMT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING	REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE)	YR-TO-DATE (FEDERAL)	YR-TO-DATE (PRIV+FED)
104		CPC INTERNATIONAL	HUDSON R				02-Jan-80	07-Jan-80		16,000	16,000	16,000	0	16,000	0	16,000
372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				08-Mar-80	07-Apr-80	80-14	252,000	268,000	252,000	0	268,000	0	268,000
323		US GYPSUM CO	HUDSON R				18-Mar-80	25-Apr-80	80-16	186,580	454,580	186,580	0	454,580	0	454,580
232		PA OF NY & NJ (PT NEWARK & ELIZ TERM)	NEWARK BAY				17-Apr-80	16-May-80	80-12	97,200	551,780	97,200	0	551,780	0	551,780
244		SEATRAIN REALTY CORP	HUDSON R				23-Apr-80	01-May-80	80-13	86,400	638,180	86,400	0	638,180	0	638,180
571		CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL				29-Apr-80	06-May-80		24,600	662,780	24,600	0	662,780	0	662,780
284		GETTY OIL CO	PASSAIC R				08-May-80	09-May-80		10,800	673,580	10,800	0	673,580	0	673,580
552		JACKSON ENGINEERING	KILL VAN KULL				23-May-80	18-Jun-80	80-17	133,980	807,560	133,980	0	807,560	0	807,560
351		NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL				29-May-80	19-Sep-80		121,300	926,860	121,300	0	928,860	0	928,860
570		MONSANTO CO	PASSAIC R				02-Jun-80	03-Jun-80	80-15	8,000	936,860	8,000	0	936,860	0	936,860
153		WESTCHESTER CTY DEPT ENV FACILITIES	HUDSON R				10-Jun-80	10-Jun-80	80-11	4,000	940,860	4,000	0	940,860	0	940,860
	8	BRONX RIVER	BRONX R				22-Jul-80	11-Aug-80	80-1A	153,735	1,094,595	0	153,735	940,860	153,735	1,094,595
	7	WESTCHESTER CREEK	WESTCHESTER CREEK				12-Aug-80	25-Aug-80	80-1B	94,390	1,188,985	0	94,390	940,860	248,125	1,188,985
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE & RED HOOK CHAN				19-Aug-80	31-Aug-80		112,964	1,301,949	0	112,964	940,860	361,087	1,301,949
	62	NEW YORK HARBOR	AMBROSE CHAN				31-Aug-80	30-Sep-80	80-1C	699,819	2,001,768	0	699,819	940,860	1,060,908	2,001,768
	7	WESTCHESTER CREEK	WESTCHESTER CREEK				03-Sep-80	30-Sep-80		161,995	2,163,763	0	161,995	940,960	1,222,903	2,163,763
	7	WESTCHESTER CREEK	WESTCHESTER CREEK				01-Oct-80	04-Oct-80		15,536	2,179,299	0	15,536	940,660	1,238,439	2,179,299
	62	NEW YORK HARBOR	AMBROSE CHAN				01-Oct-80	15-Nov-80	80-1C	833,602	3,012,901	0	833,602	940,860	2,072,041	3,012,901
	8	BRONX RIVER	BRONX R				05-Oct-80	27-Oct-80		58,831	3,071,732	0	58,831	940,860	2,130,872	3,071,732
317		NYC DEPT PORTS & TERMINALS	GOWANUS BAY				06-Oct-80	29-Oct-80		193,200	3,264,932	193,200	0	1,134,060	2,130,872	3,264,932
325		AMERADA HESS CORP	KILL VAN KULL				27-Oct-80	18-Dec-80		96,800	3,361,732	96,800	0	1,230,860	2,130,872	3,361,732
544		EXXON CO, US	ARTHUR KILL				05-Nov-80	15-Nov-80		32,400	3,394,132	32,400	0	1,263,260	2,130,972	3,394,132
653		SMIT INTERNATIONAL, INC (NORCEM)	EAST R				09-Nov-80	19-Nov-80	80-21	70,600	3,464,732	70,600	0	1,333,860	2,130,872	3,464,732
593		GORDON TERMINAL SERVICE CO	KILL VAN KULL				14-Nov-80	16-Nov-80		3,600	3,468,332	3,600	0	1,337,460	2,130,872	3,468,332
	37	EAST RIVER	SOUTH BROS ISLAND CHAN				22-Dec-80	19-Mar-81	80-2A	420,830	3,689,162	0	420,830	1,337,460	2,551,702	3,889,162

Capped material is designated by a number following the year (eg 80-14) in column 7 (CAP) or by the designation CAPPED in the same column (for years 1989 - 90)

NOTE: The presence of a letter following the cap number signifies material used to cap (eg 80-1A) and not material that was capped.

Table 2 continued (page 2 of 16)

PERMIT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING	REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE)	YR-TO-DATE (FEDERAL)	YR-TO-DATE (PRIV+FED)
7104		CPC-INTERNATIONAL	HUDSON R				02-Jan-80	07-Jan-80		16,000	16,000	16,000	0	16,000	0	16,000
7372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				08-Mar-80	07-Apr-80	80-14	252,000	268,000	252,000	0	268,000	0	268,000
1323		US GYPSUM CO	HUDSON R				18-Mar-80	25-Apr-80	80-16	186,580	454,580	186,580	0	454,580	0	454,580
7232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				17-Apr-80	16-May-80	80-12	97,200	551,780	97,200	0	551,780	0	551,780
9244		SEATRAIN REALTY CORP	HUDSON R				23-Apr-80	01-May-80	80-13	86,400	638,180	86,400	0	638,180	0	638,180
9571		CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL				29-Apr-80	06-May-80		24,600	662,780	24,600	0	662,780	0	662,780
1284		GETTY OIL CO	PASSAIC R				08-May-80	09-May-80		10,800	673,580	10,800	0	673,580	0	673,580
1392		JACKSON ENGINEERING	KILL VAN KULL				23-May-80	18-Jun-80	80-17	133,960	807,560	133,980	0	807,560	0	807,560
1351		NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL				29-May-80	19-Sep-80		121,300	928,860	121,300	0	928,860	0	928,860
9570		MONSANTO CO	PASSAIC R				02-Jun-80	03-Jun-80	80-15	8,000	936,860	8,000	0	936,860	0	936,860
0153		WESTCHESTER CTY DEPT ENV FACILITIES	HUDSON R				10-Jun-80	10-Jun-80	80-11	4,000	940,860	4,000	0	940,860	0	940,860
	8	BRONX RIVER	BRONX R				22-Jul-80	11-Aug-80	80-1A	153,735	1,094,595	0	153,735	940,860	153,735	1,094,595
	7	WESTCHESTER CREEK	WESTCHESTER CREEK				12-Aug-80	25-Aug-80	80-1B	94,390	1,188,985	0	94,390	940,860	248,125	1,188,985
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE & RED HOOK CHAN				19-Aug-80	31-Aug-80		112,964	1,301,949	0	112,964	940,860	361,087	1,301,949
	62	NEW YORK HARBOR	AMBROSE CHAN				31-Aug-80	30-Sep-80	80-1C	699,819	2,001,768	0	699,819	940,860	1,060,908	2,001,768
	7	WESTCHESTER CREEK	WESTCHESTER CREEK				03-Sep-80	30-Sep-80		161,995	2,163,763	0	161,995	940,860	1,222,903	2,163,763
	7	WESTCHESTER CREEK	WESTCHESTER CREEK				01-Oct-80	04-Oct-80		15,536	2,179,299	0	15,536	940,860	1,238,439	2,179,299
	62	NEW YORK HARBOR	AMBROSE CHAN				01-Oct-80	15-Nov-80	80-1C	833,602	3,012,901	0	833,602	940,860	2,072,041	3,012,901
	8	BRONX RIVER	BRONX R				05-Oct-80	27-Oct-80		58,831	3,071,732	0	58,831	940,860	2,130,872	3,071,732
11317		NYC DEPT PORTS & TERMINALS	GOWANUS BAY				06-Oct-80	29-Oct-80		193,200	3,264,932	193,200	0	1,134,060	2,130,872	3,264,932
11525		AMERADA HESS CORP	KILL VAN KULL				27-Oct-80	18-Dec-80		96,800	3,361,732	96,800	0	1,230,860	2,130,872	3,361,732
11544		EXXON CO, USA	ARTHUR KILL				05-Nov-80	15-Nov-80		32,400	3,394,132	32,400	0	1,263,260	2,130,872	3,394,132
11653		SMIT INTERNATIONAL, INC (NORCEM)	EAST R				09-Nov-80	19-Nov-80	80-21	70,600	3,464,732	70,600	0	1,333,860	2,130,872	3,464,732
11593		GORDON TERMINAL SERVICE CO	KILL VAN KULL				14-Nov-80	16-Nov-80		3,600	3,468,332	3,600	0	1,337,460	2,130,872	3,468,332
	37	EAST RIVER	SOUTH BROS ISLAND CHAN				22-Dec-80	19-Mar-81	80-2A	420,830	3,889,162	0	420,830	1,337,460	2,551,702	3,889,162

Table 2 continued (page 3 of 16)

PMIT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING	REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE)	YR-TO-DATE (FEDERAL)	YR-TO-DATE (PRIV+FED)
	30	JAMAICA BAY	ROCKAWAY INLET				20-Jan-81	02-Jan-81		159,270	159,270	0	159,270	0	159,270	159,270
1471		EI DUPONT DENEMOURS, INC	ARTHUR KILL				03-Mar-81	03-Mar-81		4,000	163,270	4,000	0	4,000	159,270	163,270
~~1618~~		~~AMERADA HESS CORP~~	~~PASSAIC R~~				~~03-Mar-81~~	~~03-Mar-81~~		~~2,000~~	~~165,270~~	~~2,000~~	~~0~~	~~6,000~~	~~159,270~~	~~165,270~~
1016		CITY OF PERTH AMBOY	ARTHUR KILL				04-Mar-81	11-Mar-81		38,800	204,070	38,800	0	44,800	159,270	204,070
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				01-Apr-81	10-May-81		233,200	437,270	233,200	0	278,000	159,270	437,270
	~~2~~	~~MAMARONECK HARBOR~~	~~MAMARONECK HARBOR~~				~~07-Apr-81~~	~~02-May-81~~		~~19,361~~	~~456,631~~	~~0~~	~~19,361~~	~~278,000~~	~~178,631~~	~~456,631~~
11835		CIRCLE LINES SS YACHTS, INC	HUDSON R				26-Apr-81	08-May-81		131,600	588,231	131,600	0	409,600	178,631	588,231
11658		CONRAIL	ARTHUR KILL				14-May-81	19-May-81		20,000	608,231	20,000	0	429,600	178,631	608,231
~~9232~~		~~PA OF NY & NJ (PT. NEWARK & ELIZ TERM)~~	~~NEWARK BAY~~				~~18-May-81~~	~~13-Jul-81~~		~~111,600~~	~~719,831~~	~~111,600~~	~~0~~	~~541,200~~	~~178,631~~	~~719,831~~
9104		CPC INTERNATIONAL	HUDSON R				20-May-81	31-May-81		64,400	784,231	64,400	0	605,600	178,631	784,231
9466		PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)				05-Jun-81	09-Jul-81		248,400	1,032,631	248,400	0	854,000	178,631	1,032,631
~~10613~~		~~BAYONNE INDUSTRIES (IMTT-BAYONNE)~~	~~KILL VAN KULL~~				~~10-Jun-81~~	~~14-Aug-81~~	~~81-1A~~	~~98,400~~	~~1,131,031~~	~~98,400~~	~~0~~	~~952,400~~	~~178,631~~	~~1,131,031~~
11971		US METALS REFINING CO	ARTHUR KILL				20-Jun-81	28-Jun-81	81-11	56,000	1,187,031	56,000	0	1,008,400	178,631	1,187,031
	63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL				26-Jun-81	21-Aug-81		386,263	1,573,294	0	386,263	1,008,400	564,894	1,573,294
~~11957~~		~~GATX TERMINALS, CORP~~	~~ARTHUR KILL~~				~~29-Jun-81~~	~~15-Jul-81~~	~~81-1B~~	~~48,400~~	~~1,621,694~~	~~48,400~~	~~0~~	~~1,056,800~~	~~564,894~~	~~1,621,694~~
10928		MOBIL OIL CORP	ARTHUR KILL				20-Jul-81	08-Sep-81		48,000	1,669,694	48,000	0	1,104,800	564,894	1,669,694
11392		JACKSON ENGINEERING	KILL VAN KULL				28-Jul-81	01-Aug-81	80-17	36,000	1,705,694	36,000	0	1,140,800	564,894	1,705,694
~~12007~~		~~LINDEN ROSELLE SEWERAGE AUTH~~	~~ARTHUR KILL~~				~~03-Aug-81~~	~~05-Aug-81~~		~~18,000~~	~~1,723,694~~	~~18,000~~	~~0~~	~~1,158,800~~	~~564,894~~	~~1,723,694~~
	63	NEW YORK & NEW JERSEY CHANNELS	WARDS PT BEND CHAN				20-Aug-81	01-Sep-81		221,425	1,945,119	0	221,425	1,158,800	786,319	1,945,119
10716		HILLS BROTHERS COFFEE	HUDSON R				23-Sep-81	27-Sep-81		16,000	1,961,119	16,000	0	1,174,800	786,319	1,961,119
~~9118~~		~~CELANESE CHEMICAL CO~~	~~PASSAIC R~~				~~20-Oct-81~~	~~24-Oct-81~~		~~36,000~~	~~1,997,119~~	~~36,000~~	~~0~~	~~1,210,800~~	~~786,319~~	~~1,997,119~~
	36	BUTTERMILK CHANNEL	BUTTERMILK CHAN				31-Oct-81	[illegible]		88,207	2,085,326	0	88,207	1,210,800	874,526	2,085,326
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE & RED HOOK CHAN				10-Nov-81	24-Nov-81		220,583	2,305,909	0	220,583	1,210,800	1,095,109	2,305,909
~~9212~~		~~EXXON CO, USA~~	~~KILL VAN KULL~~				~~16-Dec-81~~	~~21-Dec-81~~	~~81-21~~	~~25,200~~	~~2,331,109~~	~~25,200~~	~~0~~	~~1,236,000~~	~~1,095,109~~	~~2,331,109~~

Table 2 continued (page 4 of 16)

PERMIT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE)	YR-TO-DATE (FEDERAL)	YR-TO-DATE (PRIV+FED)
	63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL			02-Jan-82	08-Jan-82		17,088	17,088	0	17,088	0	17,088	17,088
9172		CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL			08-Jan-82	18-Jan-82		36,000	53,088	36,000	0	36,000	17,088	53,088
12225		BELCHER CORP	KILL VAN KULL			09-Jan-82	12-Feb-82	82-11	37,200	90,288	37,200	0	73,200	17,088	90,288
9575		CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL			13-Jan-82	16-Jan-82		18,000	108,288	18,000	0	91,200	17,088	108,288
11285		NYC DEPT OF SANIT (HAMILTON AVE MTS)	GOWANUS CREEK			02-Feb-82	03-Dec-82		7,920	116,208	7,920	0	99,120	17,088	116,208
9093		AMERADA-HESS CORP	ARTHUR KILL			14-Feb-82	24-Feb-82	82-1A	23,300	139,508	23,300	0	122,420	17,088	139,508
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R			25-Feb-82	20-May-82	82-1C	360,000	499,508	360,000	0	482,420	17,088	499,508
12297		UNION DRYDOCK	HUDSON R			01-Mar-82	11-Mar-82	82-1B	46,000	545,508	46,000	0	528,420	17,088	545,508
12236		NYC DEPT OF ENV. PROTECTION	EAST R			26-Mar-82	27-Mar-82		14,400	559,908	14,400	0	542,820	17,088	559,908
11945		PERTH AMBOY DRYDOCK CO	ARTHUR KILL			27-Mar-82	30-Mar-82		18,000	577,908	18,000	0	560,820	17,088	577,908
11392		JACKSON ENGINEERING	KILL VAN KULL			30-Mar-82	08-Jul-82	80-17	45,000	622,908	45,000	0	605,820	17,088	622,908
12198		NYC DEPT OF SANIT (E. 91st ST MTS)	EAST R			14-May-82	14-May-82		1,800	624,708	1,800	0	607,620	17,088	624,708
12094		NYC DEPT OF SANIT (GREENPOINT MTS)	NEWTOWN CREEK			27-May-82	12-Jun-82		3,600	628,308	3,600	0	611,220	17,088	628,308
11705		NYC DEPT PORTS & TERMINALS	HUDSON R			07-Jun-82	13-Jun-82		52,400	680,708	52,400	0	663,620	17,088	680,708
	9	FLUSHING BAY & CREEK	FLUSHING BAY & CREEK			14-Jun-82	25-Aug-82		404,057	1,084,765	0	404,057	663,620	421,145	1,084,765
9571		CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL			25-Jun-82	27-Jun-82		21,600	1,106,365	21,600	0	685,220	421,145	1,106,365
12352		ATLANTIC RICHFIELD CO (ARCO)	NEWARK BAY			28-Jun-82	03-Jul-82		41,800	1,148,165	41,800	0	727,020	421,145	1,148,165
12425		GREATER NEW YORK TERMINALS	EAST R			03-Jul-82	15-Jul-82		108,000	1,256,165	108,000	0	835,020	421,145	1,256,165
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY			08-Jul-82	29-Nov-82		552,781	1,808,946	0	552,781	835,020	973,926	1,808,946
	62	NEW YORK HARBOR	SANDY HOOK CHAN			11-Jul-82	15-Jul-82		44,832	1,853,778	0	44,832	835,020	1,018,758	1,853,778
12159		COLGATE-PALMOLIVE CO	HUDSON R			23-Jul-82	25-Jul-82		14,200	1,867,978	14,200	0	849,220	1,018,758	1,867,978
	63	NEW YORK & NEW JERSEY CHANNELS	NO SHOOTERS IS CHAN			31-Jul-82	16-Sep-82		638,109	2,506,087	0	638,109	849,220	1,656,867	2,506,087
	63	NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE			08-Aug-82	31-Dec-82		971,455	3,477,542	0	971,455	849,220	2,628,322	3,477,542
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY			16-Aug-82	08-Nov-82		180,000	3,657,542	180,000	0	1,029,220	2,628,322	3,657,542
11063		NORTHVILLE LINDEN TERM CORP	ARTHUR KILL			23-Aug-82	26-Aug-82		24,000	3,681,542	24,000	0	1,053,220	2,628,322	3,681,542
12275		PROCTOR & GAMBLE	ARTHUR KILL			11-Sep-82	18-Sep-82		10,800	3,692,342	10,800	0	1,064,020	2,628,322	3,692,342
12597		GULF OIL CO	ARTHUR KILL			24-Sep-82	27-Sep-82		25,200	3,717,542	25,200	0	1,089,220	2,628,322	3,717,542
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE & RED HOOK CHAN			27-Sep-82	22-Nov-82		331,300	4,048,842	0	331,300	1,089,220	2,959,622	4,048,842
9466		PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)			01-Oct-82	16-Oct-82		88,000	4,136,842	88,000	0	1,177,220	2,959,622	4,136,842
9104		CPC INTERNATIONAL	HUDSON R			17-Oct-82	20-Oct-82		25,200	4,162,042	25,200	0	1,202,420	2,959,622	4,162,042
12639		BP OIL, INC	ARTHUR KILL			26-Oct-82	05-Nov-82		39,600	4,201,642	39,600	0	1,242,020	2,959,622	4,201,642
12399		NYC DEPT OF SANIT (GANSVOORT ST MTS)	HUDSON R			11-Nov-82	03-Dec-82		12,090	4,213,732	12,090	0	1,254,110	2,959,622	4,213,732
12676		TENNECO OIL CO	PASSAIC R			18-Nov-82	22-Nov-82		30,900	4,244,632	30,900	0	1,285,010	2,959,622	4,244,632
12697		MOBIL OIL CORP	ARTHUR KILL			10-Dec-82	29-Dec-82		120,400	4,365,032	120,400	0	1,405,410	2,959,622	4,365,032

Table 2 continued (page 5 of 16)

PMIT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING	REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE)	YR-TO-DATE (FEDERAL)	YR-TO-DATE (PRIV+FED)
	63	NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE				03-Jan-83	12-Jan-83		120,900	120,900	0	120,900	0	120,900	120,900
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				25-Jan-83	26-Jan-83		7,200	128,100	7,200	0	7,200	120,900	128,100
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				02-Feb-83	02-Feb-83		3,600	131,700	3,600	0	10,600	120,900	131,700
2200		BP OIL, INC	ARTHUR KILL				24-Feb-83	01-Mar-83		10,800	142,500	10,800	0	21,600	120,900	142,500
2697		MOBIL OIL CORP	ARTHUR KILL				01-Mar-83	01-Mar-83		3,600	146,100	3,600	0	25,200	120,900	146,100
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				04-Mar-83	05-Mar-83		7,200	153,300	7,200	0	32,400	120,900	153,300
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				05-Mar-83	31-Mar-83		230,400	383,700	230,400	0	262,800	120,900	383,700
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				01-Apr-83	05-Apr-83		18,000	401,700	18,000	0	280,800	120,900	401,700
1945		PERTH AMBOY DRYDOCK CO	ARTHUR KILL				04-Apr-83	30-Apr-83		24,000	425,700	24,000	0	304,800	120,900	425,700
2843		NYC DEPT PORTS & TERMINALS	EAST R				14-Apr-83	26-Apr-83		8,000	433,700	8,000	0	312,800	120,900	433,700
11945		PERTH AMBOY DRYDOCK CO	ARTHUR ?ILL				02-May-83	14-May-83		14,000	447,700	14,000	0	326,800	120,900	447,700
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT NEWARK CHAN				24-May-83	15-Jul-83	83-11	469,400	916,100	0	466,400	326,800	587,300	916,100
9466		PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)				20-Jun-83	27-Jun-83		32,400	948,500	32,400	0	359,200	589,300	948,500
12807		NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL				27-Jun-83	30-Jun-83		15,600	964,100	15,600	0	374,800	589,300	964,100
12807		NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL				01-Jul-83	28-Jul-83		187,200	1,151,300	187,200	0	562,000	589,300	1,151,300
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PASSAIC R				15-Jul-83	14-Oct-83	83-12	702,400	1,?53,700	0	702,400	562,000	1,291,700	1,853,700
12908		EXXON CO, USA	KILL VAN KULL				01-Aug-83	31-Aug-83		61,200	1,914,900	61,200	0	623,200	1,291,700	1,?14,900
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				01-Aug-83	05-Aug-83		36,000	1,950,900	36,000	0	659,200	1,291,700	1,950,900
12807		NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL				05-Aug-83	17-Aug-83		45,600	1,996,500	45,600	0	704,800	1,291,700	1,9?6,500
12976		NYC DEPT OF SANIT (52nd ST, BKLN HTS)	NEW YORK HARBOR				05-Aug-83	26-Aug-83		14,400	2,010,900	14,400	0	719,200	1,291,700	2,010,900
12883		EXXON CO, USA	ARTHUR KILL				17-Aug-83	19-Aug-83		12,000	2,022,900	12,000	0	731,200	1,291,700	2,022,900
9118		CELANESE CHEMICAL CO	PASSAIC R				25-Aug-83	27-Aug-83		23,100	2,046,000	23,100	0	754,300	1,291,700	2,046,000
12908		EXXON CO, USA	KILL VAN KULL				01-Sep-83	09-Sep-83		39,602	2,085,602	39,602	0	793,902	1,291,700	2,085,602
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				01-Sep-83	23-Sep-83		109,500	2,195,102	109,500	0	903,402	1,291,700	2,195,102
9466		PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)				23-Sep-83	29-Sep-83		72,040	2,267,142	72,040	0	975,442	1,291,700	2,267,142
12908		EXXON CO, USA	KILL VAN KULL				01-Oct-83	07-Oct-83		14,800	2,281,942	14,800	0	990,242	1,291,700	2,281,942
9466		PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)				01-Oct-83	10-Oct-83		50,400	2,332,342	50,400	0	1,040,642	1,291,700	[illegible]
13013		GETTY OIL CO	NEWTOWN CREEK				04-Oct-83	06-Oct-83		23,100	2,355,442	23,100	0	1,063,742	1,291,700	2,355,442
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				05-Oct-83	07-Oct-83		21,600	2,377,042	21,600	0	1,085,342	1,291,700	2,377,042
	62	NEW YORK HARBOR	RED HOOK ANCHORAGE				19-Oct-83	20-Dec-83	83-1A	749,000	3,126,042	0	749,000	1,085,342	2,040,700	3,126,042
13036		OIL CO	ARTHUR KILL				17-Oct-83	21-Oct-83		18,000	3,144,042	18,000	0	1,103,342	2,040,700	3,144,042
	9	?????ING BAY & CREEK	FLUSHING BAY & CREEK				26-Oct-83	31-Oct-83		34,200	3,178,242	0	34,200	1,103,342	2,074,900	3,178,242
	9	FLUSHING BAY & CREEK	FLUSHING BAY & CREEK				01-Nov-83	30-Nov-83		220,600	3,398,842	0	220,600	1,103,342	2,295,500	3,398,64?
11969		COASTAL DRYDOCK & REPAIR CO	EAST R				03-Nov-83	07-Nov-83		86,400	3,485,242	86,400	0	1,189,742	2,295,500	3,485,242
11969		COASTAL DRYDOCK & REPAIR CO	EAST R				01-Dec-83	15-Dec-83		21,600	3,506,842	21,600	0	1,211,342	2,295,500	3,506,842
	9	FLUSHING BAY & CREEK	FLUSHING BAY & CREEK				01-Dec-83	28-Dec-83		656,000	4,162,842	0	656,000	1,211,342	2,951,500	4,162,842

MIT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE)	YR-TO-DATE (FEDERAL)	YR-TO-DATE (PRIV+FED)
	9	FLUSHING BAY & CREEK	FLUSHING BAY & CREEK			01-Jan-84	30-Jan-84		174,000	174,000	0	174,000	0	174,000	174,000
3104		CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL			11-Jan-84	12-Jan-84		15,400	189,400	15,400	0	15,400	174,000	187,400
	63	NEW YORK & NEW JERSEY CHANNELS	ARTHUR KILL			13-Jan-84	31-Jan-84		320,400	509,800	0	320,400	15,400	494,400	509,800
	63	NEW YORK & NEW JERSEY CHANNELS	ARTHUR KILL			01-Feb-84	24-Feb-84		288,000	797,800	0	288,000	15,400	782,400	797,800
	9	FLUSHING BAY & CREEK	FLUSHING BAY & CREEK			01-Feb-84	01-Feb-84		4,000	801,800	0	4,000	15,400	786,400	801,800
2695		UNION DRYDOCK	HUDSON R			08-Feb-84	23-Feb-84		47,600	849,400	47,600	0	63,000	786,400	849,400
	63	NEW YORK & NEW JERSEY CHANNELS	SO SHOOTERS IS CHAN			15-Feb-84	29-Feb-84		194,400	1,043,800	0	194,400	63,000	980,800	1,043,800
2676		TENNECO OIL CO	PASSAIC R			24-Feb-84	29-Feb-84		16,000	1,059,800	16,000	0	79,000	980,800	1,059,800
1945		PERTH AMBOY DRYDOCK CO	ARTHUR KILL			01-Mar-84	31-Mar-84		21,600	1,081,400	21,600	0	100,600	980,800	1,081,400
	63	NEW YORK & NEW JERSEY CHANNELS	SO SHOOTERS IS CHAN			01-Mar-84	31-Mar-84		255,000	1,336,400	0	255,000	100,600	1,235,800	1,336,400
	63	NEW YORK & NEW JERSEY CHANNELS	ARTHUR KILL			04-Mar-84	31-Mar-84		183,600	1,520,000	0	183,600	100,600	1,419,400	1,520,000
	999	MORRIS CANAL	HUDSON R			06-Mar-84	22-Mar-84		36,000	1,556,000	0	36,000	100,600	1,455,400	1,556,000
12911		CONSOLIDATED EDISON CO	HUDSON R			07-Mar-84	10-Mar-84		36,000	1,592,000	36,000	0	136,600	1,455,400	1,592,000
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R			11-Mar-84	31-Mar-84		227,200	1,819,200	227,200	0	363,800	1,455,400	1,819,200
13150		AMERADA-HESS CORP	HACKENSAC R			15-Mar-84	16-Mar-84		2,000	1,821,200	2,000	0	365,800	1,455,400	1,821,200
11323		US GYPSUM CO	HUDSON R			16-Mar-84	31-Mar-84	80-16	47,000	1,868,200	47,000	0	412,800	1,455,400	1,868,200
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R			01-Apr-84	26-Apr-84		194,400	2,062,600	194,400	0	607,200	1,455,400	2,062,600
	63	NEW YORK & NEW JERSEY CHANNELS	SO SHOOTERS IS CHAN			01-Apr-84	03-Apr-84		32,400	2,095,000	0	32,400	607,200	1,487,800	2,095,000
12911		CONSOLIDATED EDISON CO	HUDSON R			02-Apr-84	07-Apr-84		46,800	2,141,800	46,800	0	654,000	1,487,800	2,141,800
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE & RED HOOK CHAN			03-Apr-84	15-Apr-84	84-1A	402,200	2,544,000	0	402,200	654,000	1,890,000	2,544,000
	63	NEW YORK & NEW JERSEY CHANNELS	SEGUINE POINT REACH			07-Apr-84	30-Apr-84		174,225	2,718,225	0	174,225	654,000	2,064,225	2,718,225
11323		US GYPSUM CO	HUDSON R			21-Apr-84	30-Apr-84	80-16	109,600	2,827,825	109,600	0	763,600	2,064,225	2,827,825
9104		CPC INTERNATIONAL	HUDSON R			23-Apr-84	30-Apr-84		56,000	2,883,825	56,000	0	819,600	2,064,225	2,883,825
12947		CONSOLIDATED EDISON CO	EAST R			26-Apr-84	27-Apr-84	84-11	7,200	2,891,025	7,200	0	826,800	2,064,225	2,891,025
	62	NEW YORK HARBOR	AMBROSE CHAN			01-May-84	08-May-84		51,055	2,942,080	0	51,055	826,800	2,115,280	2,942,080
	63	NEW YORK & NEW JERSEY CHANNELS	SEGUINE POINT REACH			01-May-84	01-May-84		6,162	2,948,242	0	6,162	826,800	2,121,442	2,948,242
10713		EL DORADO TERMINAL, INC	KILL VAN KULL			17-May-84	17-May-84		7,200	2,955,442	7,200	0	834,000	2,121,442	2,955,442
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY			17-May-84	28-May-84		82,800	3,038,242	82,800	0	916,800	2,121,442	3,038,242
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR			21-May-84	31-May-84		130,900	3,169,142	130,900	0	1,047,700	2,121,442	3,169,142
12953		BAYONNE INDUSTRIES (INTT-BAYONNE)	KILL VAN KULL			23-May-84	27-May-84		43,200	3,212,342	43,200	0	1,090,900	2,121,442	3,212,342
12953		BAYONNE INDUSTRIES (INTT-BAYONNE)	KILL VAN KULL			01-Jun-84	30-Jun-84		90,000	3,302,342	90,000	0	1,180,900	2,121,442	3,302,342
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR			02-Jun-84	30-Jun-84		588,350	3,890,692	588,350	0	1,769,250	2,121,442	3,890,692
13218		UNITED STATES LINES, INC	ARTHUR KILL			07-Jun-84	18-Jun-84		82,800	3,973,492	82,800	0	1,852,050	2,121,442	3,973,492
	62	NEW YORK HARBOR	AMBROSE CHAN			12-Jun-84	29-Jun-84		233,585	4,207,077	0	233,585	1,852,050	2,355,027	4,207,077
12695		UNION DRYDOCK	HUDSON R			16-Jun-84	17-Jun-84		6,000	4,213,077	6,000	0	1,858,050	2,355,027	4,213,077
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY			19-Jun-84	25-Jun-84		18,800	4,231,877	18,800	0	1,876,850	2,355,027	4,231,877
	62	NEW YORK HARBOR	GRAVESEND BAY ANCHORAGE			30-Jun-84	30-Jun-84		4,282	4,236,159	0	4,282	1,876,850	2,359,309	4,236,159
	62	NEW YORK HARBOR	GRAVESEND BAY ANCHORAGE			01-Jul-84	31-Jul-84		192,445	4,428,604	0	192,445	1,876,850	2,551,754	4,428,604
12953		BAYONNE INDUSTRIES (INTT-BAYONNE)	KILL VAN KULL			01-Jul-84	31-Jul-84		108,000	4,536,604	108,000	0	1,984,850	2,551,754	4,536,604
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR			01-Jul-84	30-Jul-84		618,650	5,155,254	618,650	0	2,603,500	2,551,754	5,155,254
13175		EDO CORPORATION	FLUSHING BAY			26-Jul-84	27-Jul-84		7,200	5,162,454	7,200	0	2,610,700	2,551,754	5,162,454
	62	NEW YORK HARBOR	GRAVESEND BAY ANCHORAGE			01-Aug-84	21-Aug-84		103,635	5,266,089	0	103,635	2,610,700	2,655,389	5,266,089
9372		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R			01-Aug-84	14-Aug-84		151,200	5,417,289	151,200	0	2,761,900	2,655,389	5,417,289
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR			01-Aug-84	31-Aug-84		505,350	5,922,639	505,350	0	3,267,250	2,655,389	5,922,639
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	N CHANNEL REACH			14-Aug-84	31-Aug-84		198,000	6,120,639	0	198,000	3,267,250	2,853,389	6,120,639
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY			14-Aug-84	31-Aug-84		1[illegible],000	6,318,639	0	198,000	3,267,250	3,051,389	6,318,639
12953		BAYONNE INDUSTRIES (INTT-BAYONNE)	KILL VAN KULL			15-Aug-84	15-Aug-84		3,600	6,322,239	3,600	0	3,270,850	3,051,389	6,322,239
	62	NEW YORK HARBOR	SANDY HOOK CHAN			22-Aug-84	27-Aug-84		71,362	6,393,601	0	71,362	3,270,850	3,122,751	6,393,601
12102		REVERE SUGAR CORP	NEW YORK HARBOR			01-Sep-84	06-Sep-84		16,000	6,409,601	16,000	0	3,286,850	3,122,751	6,409,601
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR			01-Sep-84	10-Sep-84		60,050	6,469,651	60,050	0	3,346,900	3,122,751	6,469,651
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY			01-Sep-84	30-Sep-84		487,800	6,957,451	0	487,800	3,346,900	3,610,551	6,957,451
	62	NEW YORK HARBOR	SANDY HOOK CHAN			01-Sep-84	03-Sep-84		20,071	6,977,522	0	20,071	3,346,900	3,630,622	6,977,522
12953		BAYONNE I[illegible]ES (INTT-BAYONNE)	KILL VAN KULL			07-S[illegible] 84	15-Sep-84		36,800	7,014,322	36,800	0	3,383,700	3,630,622	7,014,322

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2094		NYC DEPT OF SANIT (GREENPOINT MTS)	NEWTOWN CREEK	10-Sep-84	22-Sep-84	4,000	7,018,322	4,000	0	3,387,700	3,630,622	7,018,322
13218		UNITED STATES LINES, INC	ARTHUR KILL	12-Sep-84	24-Sep-84	34,200	7,052,522	34,200	0	3,421,900	3,630,622	7,052,522
9232		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY	23-Sep-84	23-Sep-84	3,000	7,055,522	3,000	0	3,424,900	3,630,622	7,055,522
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	01-Oct-84	29-Oct-84	180,800	7,236,322	0	180,800	3,424,900	3,811,422	7,236,322
10713		EL DORADO TERMINAL, INC	KILL VAN KULL	04-Oct-84	04-Oct-84	1,800	7,238,122	1,800	0	3,426,700	3,811,422	7,238,122
13104		CITIES-SERVICE-OIL-CO-(CITGO)	ARTHUR KILL	11-Oct-84	16-Oct-84	18,000	7,256,122	18,000	0	3,444,700	3,811,422	7,256,122
9466		PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)	24-Oct-84	24-Oct-84	7,200	7,263,322	7,200	0	3,451,900	3,811,422	7,263,322
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	01-Nov-84	05-Nov-84	7,200	7,270,522	0	7,200	3,451,900	3,818,622	7,270,522
13403		COASTAL DRYDOCK & REPAIR CO	EAST R	02-Nov-84	04-Nov-84	18,000	7,288,522	18,000	0	3,469,900	3,818,622	7,288,522
	63	NEW YORK & NEW JERSEY CHANNELS	ARTHUR KILL	05-Nov-84	05-Nov-84	3,600	7,292,122	0	3,600	3,469,900	3,822,222	7,292,122
12695		UNION DRYDOCK	HUDSON R	15-Nov-84	21-Nov-84	24,000	7,316,122	24,000	0	3,493,900	3,822,222	7,316,122
13078		US-ARMY-MIL-TRF-MGMT-COM-(MOTBY)	NEW YORK HARBOR	23-Nov-84	30-Nov-84	23,100	7,339,222	23,100	0	3,517,000	3,822,222	7,339,222
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR	01-Dec-84	10-Dec-84	15,400	7,354,622	15,400	0	3,532,400	3,822,222	7,354,622
	64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	01-Dec-84	01-Dec-84	3,600	7,358,222	0	3,600	3,532,400	3,825,822	7,358,222
	63	NEW YORK & NEW JERSEY CHANNELS	ARTHUR KILL	02-Dec-84	04-Dec-84	25,200	7,383,422	0	25,200	3,532,400	3,851,022	7,383,422
13078		US ARMY MIL TRF MGMT COM (MOTBY)	NEW YORK HARBOR	17-Dec-84	18-Dec-84	7,700	7,391,122	7,700	0	3,540,100	3,851,022	7,391,122

Table 2 continued (page 8 of 16)

ERMIT #	PROJ #	PERMITTEE/PROJECT NAME	WATERWAY	DEEPENING	REACH	BUOY	BEGIN DATE	END DATE	CAP #	VOLUME DUMPED	YEAR TO DATE	PRIVATE VOLUME	FEDERAL VOLUME	YR-TO-DATE (PRIVATE) [Check]	YR-TO-DATE (FEDERAL) [Check]	YR-TO-DATE (PRIV+FED) [Check]
	36	BUTTERMILK CHANNEL	BUTTERMILK CHAN				09-Jan-85	31-Jan-85		209,200	209,200	0	209,200	0	209,200	209,200
13609		PROLERIZED SCHIABO NEU CO	NEW YORK HARBOR				23-Jan-85	23-Jan-85		1,500	210,700	1,500	0	1,500	209,200	210,700
	36	BUTTERMILK CHANNEL	BUTTERMILK CHAN				01-Feb-85	28-Feb-85		45,600	256,300	0	45,600	1,500	254,800	256,300
12695		UNION DRYDOCK	HUDSON R				06-Feb-85	06-Feb-85		2,000	258,300	2,000	0	3,500	254,800	258,300
	79	SANDY HOOK BAY	ATLANTIC HIGHLANDS ANCHORAGE				13-Feb-85	28-Feb-85		106,600	364,900	0	106,600	3,500	361,400	364,900
	79	SANDY HOOK BAY	ATLANTIC HIGHLANDS ANCHORAGE				01-Mar-85	31-Mar-85		331,400	696,300	0	331,400	3,500	692,800	696,300
	62	NEW YORK HARBOR	CHAPEL HILL CHAN				08-Mar-85	25-Mar-85		185,601	881,901	0	185,601	3,500	878,401	881,901
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN				12-Mar-85	31-Mar-85		367,200	1,249,101	0	367,200	3,500	1,245,601	1,249,101
13465		EXXON CO, USA	ARTHUR KILL				18-Mar-85	22-Mar-85		43,200	1,292,301	43,200	0	46,700	1,245,601	1,292,301
13524		CHEVRON USA, INC	ARTHUR KILL				23-Mar-85	24-Mar-85		10,800	1,303,101	10,800	0	57,500	1,245,601	1,303,101
13527		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				24-Mar-85	31-Mar-85		76,200	1,379,301	76,200	0	133,700	1,245,601	1,379,301
	79	SANDY HOOK BAY	ATLANTIC HIGHLANDS ANCHORAGE				01-Apr-85	30-Apr-85		401,200	1,780,501	0	401,200	133,700	1,646,801	1,780,501
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN				01-Apr-85	30-Apr-85		464,400	2,244,901	0	464,400	133,700	2,111,201	2,244,901
13527		PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R				01-Apr-85	17-Apr-85		288,600	2,533,501	288,600	0	422,300	2,111,201	2,533,501
	63	NEW YORK & NEW JERSEY CHANNELS	WARDS PT BEND CHAN				04-Apr-85	30-Apr-85		165,418	2,698,919	0	165,418	422,300	2,276,619	2,698,919
12697		MOBIL OIL CORP	ARTHUR KILL				22-Apr-85	29-Apr-85		36,000	2,734,919	36,000	0	458,300	2,276,619	2,734,919
12697		MOBIL OIL CORP	ARTHUR KILL				01-May-85	21-May-85		25,200	2,760,119	25,200	0	483,500	2,276,619	2,760,119
	79	SANDY HOOK BAY	ATLANTIC HIGHLANDS ANCHORAGE				01-May-85	22-May-85		285,000	3,045,119	0	285,000	483,500	2,561,619	3,045,119
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE & RED HOOK CHAN				01-May-85	31-May-85		410,400	3,455,519	0	410,400	483,500	2,972,019	3,455,519
	63	NEW YORK & NEW JERSEY CHANNELS	WARDS PT BEND CHAN				01-May-85	02-May-85		14,038	3,469,557	0	14,038	483,500	2,986,057	3,469,557
	62	NEW YORK HARBOR	CHAPEL HILL CHAN				02-May-85	29-May-85		177,273	3,646,830	0	177,273	483,500	3,163,330	3,646,830
13584		STOLT TERMINALS INC	ARTHUR KILL				[illegible]	[illegible]		14,400	3,661,230	14,400	0	497,900	3,163,330	3,661,230
	63	NEW YORK & NEW JERSEY CHANNELS	WARDS PT BEND CHAN				23-May-85	31-May-85		30,810	3,692,040	0	30,810	497,900	3,194,140	3,692,040
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN				01-Jun-85	30-Jun-85		615,600	4,307,640	0	615,600	497,900	3,809,740	4,307,640
	37	EAST RIVER	SOUTH BROS ISLAND CHAN				03-Jun-85	30-Jun-85		226,600	4,534,240	0	226,600	497,900	4,036,340	4,534,240
	34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN				01-Jul-85	12-Jul-85		262,800	4,797,040	0	262,800	497,900	4,299,140	4,797,040
	30	JAMAICA BAY	ROCKAWAY INLET				01-Jul-85	26-Jul-85		188,169	4,985,209	0	188,169	497,900	4,487,309	4,985,209
	37	EAST RIVER	SOUTH BROS ISLAND CHAN				01-Jul-85	13-Jul-85		118,400	5,103,609	0	118,400	497,900	4,605,709	5,103,609
13629		GATX TERMINALS, CORP	ARTHUR KILL				13-Jul-85	21-Jul-85	85-11	82,800	5,186,409	82,800	0	580,700	4,605,709	5,186,409
12908		EXXON CO, USA	KILL VAN KULL				19-Jul-85	25-Jul-85		46,800	5,233,209	46,800	0	627,500	4,605,709	5,233,209
13628		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				11-Aug-85	22-Aug-85		104,400	5,337,609	104,400	0	731,900	4,605,709	5,337,609
12908		EXXON CO, USA	KILL VAN KULL				23-Aug-85	23-Aug-85		3,600	5,341,209	3,600	0	735,500	4,605,709	5,341,209
12676		TENNECO OIL CO	PASSAIC R				26-Aug-85	30-Aug-85		15,200	5,356,409	15,200	0	750,700	4,605,709	5,356,409
13628		PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				03-Sep-85	07-Sep-85		43,200	5,399,609	43,200	0	793,900	4,605,709	5,399,609
13636		US COAST GUARD (BATTERY MARITIME BLDG)	NEW YORK HARBOR				20-Sep-85	25-Sep-85		6,000	5,405,609	6,000	0	799,900	4,605,709	5,405,609
13702		US COAST GUARD (GOVERNERS ISLAND)	NEW YORK HARBOR				01-Oct-85	08-Oct-85		8,000	5,413,609	8,000	0	807,900	4,605,709	5,413,609
13636		US COAST GUARD (BATTERY MARITIME BLDG)	NEW YORK HARBOR				19-Oct-85	19-Oct-85		2,000	5,415,609	2,000	0	809,900	4,605,709	5,415,609
13104		CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL				24-Oct-85	28-Oct-85		18,000	5,433,609	18,000	0	827,900	4,605,709	5,433,609
13686		PERTH AMBOY DRYDOCK CO	ARTHUR KILL				01-Nov-85	21-Nov-85		61,600	5,495,209	61,600	0	889,500	4,605,709	5,495,209
13609		PROLERIZED SCHIABO NEU CO	NEW YORK HARBOR				01-Nov-85	21-Nov-85		50,400	5,545,609	50,400	0	939,900	4,605,709	5,545,609
13801		REFINED SUGARS INC	HUDSON R				29-Nov-85	30-Nov-85		10,800	5,556,409	10,800	0	950,700	4,605,709	5,556,409
13801		REFINED SUGARS INC	HUDSON R				01-Dec-85	16-Dec-85		46,800	5,603,209	46,800	0	997,500	4,605,709	5,603,209

Table 2 continued (page 9 of 16)

39	GLOBAL TERMINAL & CONTAINER SERV. INC	NEW YORK HARBOR
86	PERTH AMBOY DRYDOCK CO	ARTHUR KILL
23	CATA TERMINALS, CORP	ARTHUR KILL
08	PROLERIZED SCHIABO NEO CO	NEW YORK HARBOR
86	PERTH AMBOY DRYDOCK CO	ARTHUR KILL
01	NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL
07	NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL
39	GLOBAL TERMINAL & CONTAINER SERV. INC	NEW YORK HARBOR
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	HACKENSACK R
07	NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	HACKENSACK R
07	NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL
07	NYC DEPT OF SANIT (FRESH KILLS)	ARTHUR KILL
21	US NAVY (EARLE)	SANDY HOOK BAY AT LEONARDO
20	CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL
527	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R
27	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R
21	US NAVY (EARLE)	SANDY HOOK BAY AT LEONARDO
20	CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL
	62 NEW YORK HARBOR	CHAPEL HILL CHAN
20	CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL
	62 NEW YORK HARBOR	RED HOOK ANCHORAGE
514	PORT LIBERTE PARTNERS	NEW YORK HARBOR
527	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R
514	PORT LIBERTE PARTNERS	NEW YORK HARBOR
28	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY
	62 NEW YORK HARBOR	RED HOOK ANCHORAGE
96	PERTH AMBOY DRYDOCK CO	ARTHUR KILL
	63 NEW YORK & NEW JERSEY CHANNELS	SEGUINE POINT REACH
376	NJ DIV. OF PARKS & FORESTRY	NEW YORK HARBOR (MORRIS CANAL)
76	NJ DIV. OF PARKS & FOREST	NEW YORK HARBOR (MORRIS CANAL)
361	SHELL OIL CO	ARTHUR KILL
	62 NEW YORK HARBOR	RED HOOK ANCHORAGE
	63 NEW YORK & NEW JERSEY CHANNELS	RARITAN BAY REACH EAST CHAN
4020	[illegible] BOROUGH COMM COLLEGE	JAMAICA BAY (SHEEPSHEAD BAY)
514	PORT LIBERTE PARTNERS	NEW YORK HARBOR
514	PORT LIBERTE PARTNERS	NEW YORK HARBOR
376	NJ DIV. OF PARKS & FORESTRY	NEW YORK HARBOR (MORRIS CANAL)
	7 WESTCHESTER CREEK	WESTCHESTER CREEK
	7 WESTCHESTER CREEK	WESTCHESTER CREEK
	8 BRONX RIVER	BRONX R
3628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY
	7 WESTCHESTER CREEK	WESTCHESTER CREEK
3628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY
	7 WESTCHESTER CREEK	WESTCHESTER CREEK
3831	NYC DEPT OF SANIT (135th ST MTS)	HUDSON R
	8 BRONX RIVER	BRONX R
	8 BRONX RIVER	BRONX R
3820	CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL
	7 WESTCHESTER CREEK	WESTCHESTER CREEK
	34 BAY RIDGE & RED HOOK CHANNELS	RED HOOK CHAN
4183	DELBAY CORP	PASSAIC R
4183	DELBAY CORP	PASSAIC R
	34 BAY RIDGE & RED HOOK CHANNELS	RED HOOK CHAN
	8 BRONX RIVER	BRONX R
4183	DELBAY CORP	PASSAIC R
3823	PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)
4174	[illegible] TERM CORP	ARTHUR KILL
	34 BAY RIDGE & RED HOOK CHANNELS	RED HOOK CHAN

13-Jan-86	23-Jan-86		61,200	61,200	61,200	0	61,200	0	61,200
22-Jan-86	22-Jan-86		4,000	65,200	4,000	0	65,200	0	65,200
23-Jan-86	23-Jan-86	86-11	2,000	67,200	2,000	0	67,200	0	67,200
23-Jan-86	23-Jan-86		1,500	68,700	1,500	0	68,700	0	68,700
24-Jan-86	24-Jan-86		4,000	72,700	4,000	0	72,700	0	72,700
30-Jan-86	31-Jan-86		10,800	83,500	10,800	0	83,500	0	83,500
01-Feb-86	28-Feb-86		400,650	484,150	400,650	0	484,150	0	484,150
01-Feb-86	05-Feb-86		14,400	498,550	14,400	0	498,550	0	498,550
27-Feb-86	28-Feb-86		25,200	523,750	0	25,200	498,550	25,200	523,750
01-Mar-86	01-Mar-86		6,600	530,350	6,600	0	505,150	25,200	530,350
01-Mar-86	17-Mar-86		223,200	753,550	0	223,200	505,150	248,400	753,550
02-Mar-86	02-Mar-86		9,600	763,150	9,600	0	514,750	248,400	763,150
03-Mar-86	03-Mar-86		3,600	766,750	3,600	0	518,350	248,400	766,750
09-Mar-86	31-Mar-86		234,759	1,001,509	234,759	0	753,109	248,400	1,001,509
17-Mar-86	25-Mar-86		64,000	1,065,509	64,000	0	817,109	248,400	1,065,509
24-Mar-86	31-Mar-86		62,900	1,128,409	62,900	0	880,009	248,400	1,128,409
01-Apr-86	30-Apr-86		324,000	1,452,409	324,000	0	1,204,009	248,400	1,452,409
01-Apr-86	14-Apr-86		273,262	1,725,671	273,262	0	1,477,271	248,400	1,725,671
07-Apr-86	07-Apr-86		3,000	1,728,671	3,000	0	1,480,271	248,400	1,728,671
11-Apr-86	20-May-86		341,690	2,070,361	0	341,690	1,480,271	590,090	2,070,361
18-Apr-86	18-Apr-86		3,000	2,073,361	3,000	0	1,483,271	590,090	2,073,361
22-Apr-86	30-Apr-86		140,200	2,213,561	0	140,200	1,483,271	730,290	2,213,561
[illegible]	[illegible]		42,800	2,256,361	42,800	0	1,526,071	730,290	2,256,361
01-May-86	03-May-86		28,000	2,284,361	28,000	0	1,554,071	730,290	2,284,361
01-May-86	05-May-86		17,000	2,301,361	17,000	0	1,571,071	730,290	2,301,361
01-May-86	29-May-86		117,200	2,418,561	117,200	0	1,688,271	730,290	2,418,561
01-May-86	31-May-86		270,200	2,688,761	0	270,200	1,688,271	1,000,490	2,688,761
14-May-86	28-May-86		6,000	2,694,761	6,000	0	1,694,271	1,000,490	2,694,761
20-May-86	05-Jun-86		61,717	2,756,478	0	61,717	1,694,271	1,062,207	2,756,478
30-May-86	31-May-86		18,000	2,774,478	18,000	0	1,712,271	1,062,207	2,774,478
01-Jun-86	13-Jun-86		111,600	2,886,078	111,600	0	1,823,871	1,062,207	2,886,078
05-Jun-86	10-Jun-86		8,600	2,894,678	8,600	0	1,832,471	1,062,207	2,894,678
05-Jun-86	20-Jun-86		3,000	2,897,678	0	3,000	1,832,471	1,065,207	2,897,678
05-Jun-86	07-Jul-86		213,532	3,111,210	0	213,532	1,832,471	1,278,739	3,111,210
13-Jun-86	20-Jun-86		10,000	3,121,210	10,000	0	1,842,471	1,278,739	3,121,210
26-Jun-86	30-Jun-86		20,000	3,141,210	20,000	0	1,862,471	1,278,739	3,141,210
01-Jul-86	09-Jul-86		8,000	3,149,210	8,000	0	1,870,471	1,278,739	3,149,210
10-Jul-86	10-Jul-86		7,200	3,156,410	7,200	0	1,877,671	1,278,739	3,156,410
22-Jul-86	31-Jul-86		71,775	3,228,185	0	71,775	1,877,671	1,350,514	3,228,185
01-Aug-86	11-Aug-86		63,890	3,292,075	0	63,890	1,877,671	1,414,404	3,292,075
11-Aug-86	20-Aug-86		58,250	3,350,325	0	58,250	1,877,671	1,472,654	3,350,325
25-Aug-86	31-Aug-86		50,400	3,400,725	50,400	0	1,928,071	1,472,654	3,400,725
27-Aug-86	31-Aug-86		11,800	3,412,525	0	11,800	1,928,071	1,484,454	3,412,525
01-Sep-86	02-Sep-86		12,000	3,424,525	12,000	0	1,940,071	1,484,454	3,424,525
02-Sep-86	24-Sep-86		54,200	3,478,725	0	54,200	1,940,071	1,538,654	3,478,725
21-Sep-86	24-Sep-86	CAPPED	6,000	3,484,725	6,000	0	1,946,071	1,538,654	3,484,725
26-Sep-86	30-Sep-86		15,600	3,500,325	0	15,600	1,946,071	1,554,254	3,500,325
02-Oct-86	14-Oct-86		42,300	3,542,625	0	42,300	1,946,071	1,596,554	3,542,625
14-Oct-86	14-Oct-86		4,000	3,546,625	4,000	0	1,950,071	1,596,554	3,546,625
19-Oct-86	30-Oct-86		11,700	3,558,325	0	11,700	1,950,071	1,608,254	3,558,325
25-Oct-86	31-Oct-86		79,116	3,637,441	0	79,116	1,950,071	1,687,370	3,637,441
30-Oct-86	31-Oct-86	86-21	4,000	3,641,441	4,000	0	1,954,071	1,687,370	3,641,441
01-Nov-86	03-Nov-86	86-21	13,000	3,654[illegible]	13,000	0	1,967,071	1,687,370	3,654,441
01-Nov-86	30-Nov-86		142,519	3,796,[illegible]	0	142,519	1,967,071	1,829,889	3,796,960
05-Nov-86	22-Nov-86		15,900	3,812,860	0	15,900	1,967,071	1,845,789	3,812,860
06-Nov-86	06-Nov-86	86-21	2,000	3,814,860	2,000	0	1,969,071	1,845,789	3,814,860
10-Nov-86	25-Nov-86		133,200	3,948,060	133,200	0	2,102,271	1,845,789	3,948,060
11-Nov-86	15-Nov-86		32,400	3,980,460	32,400	0	2,134,671	1,845,789	3,980,460
[illegible]	30-Dec-86		11[illegible]	4,099,318	0	118,858	2,134,671	1,964,647	4,099,318
[illegible]	12-[illegible]-86	86-31	4[illegible]	4,[illegible],718	4[illegible]	0	2,135,[illegible]	1,964,647	4,[illegible]

Table 2 continued (page 10 of 16)

3820	CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL	NE	07-Jan-87	14-Jan-87		23,760	23,760	23,760	0	23,760	0	23,760
34	BAY RIDGE & RED HOOK CHANNELS	RED HOOK CHAN	NE	07-Jan-87	24-Jan-87		42,635	66,395	0	42,635	23,760	42,635	66,395
34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN	NE	24-Jan-87	31-Jan-87		15,700	82,095	0	15,700	23,760	58,335	82,095
34	BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN	NE	01-Feb-87	23-Feb-87		101,563	183,658	0	101,563	23,760	159,898	183,658
8	BRONX RIVER	BRONX R	NE	06-Feb-87	06-Feb-87		1,200	184,858	0	1,200	23,760	161,098	184,858
3820	CADDELL DRYDOCK & REPAIR CO	KILL VAN KULL	NE	06-Feb-87	13-Feb-87		10,200	195,058	10,200	0	33,960	161,098	195,058
3227	NYC DEPT OF SANIT (HAMILTON AVE MTS)	GOWANUS CREEK	NE	12-Feb-87	17-Feb-87	86-31	14,400	209,458	14,400	0	48,360	161,098	209,458
3527	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R	NE	16-Mar-87	31-Mar-87		161,600	371,058	161,600	0	209,960	161,098	371,058
3527	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R	NE	01-Apr-87	19-Apr-87		189,490	560,548	189,490	0	399,450	161,098	560,548
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY	NE	24-Apr-87	30-Apr-87		47,550	608,098	47,550	0	447,000	161,098	608,098
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY	NE	01-May-87	10-May-87		74,300	682,398	74,300	0	521,300	161,098	682,398
13831	NYC DEPT OF SANIT (135th ST MTS)	HUDSON R	NE	01-May-87	11-May-87	CAPPED	8,000	690,398	8,000	0	529,300	161,098	690,398
63	NEW YORK & NEW JERSEY CHANNELS	NO SHOOTERS IS CHAN	NE BUOY (ABOVE PROJ)	11-May-87	31-May-87		207,295	897,693	0	207,295	529,300	368,393	897,693
14130	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR	BUOY SWITCH (OM/EVE)	23-May-87	31-May-87		35,900	933,593	35,900	0	565,200	368,393	933,593
14395	McCORMACK AGGREGATES	RARITAN BAY	OM	23-May-87	29-May-87		39,000	972,593	39,000	0	604,200	368,393	972,593
13297	NYC DEPT OF PORTS & TERMINALS	NEW YORK HARBOR	OM	31-May-87	31-May-87		3,000	975,593	3,000	0	607,200	368,393	975,593
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR	OM	01-Jun-87	30-Jun-87		443,546	1,419,139	443,546	0	1,050,746	368,393	1,419,139
13297	NYC DEPT OF PORTS & TERMINALS	RARITAN BAY	OM	01-Jun-87	08-Jun-87		36,000	1,455,139	36,000	0	1,096,746	368,393	1,455,139
14395	McCORMACK AGGREGATES	HUDSON R	OM	13-Jun-87	29-Jun-87		9,800	1,464,939	9,800	0	1,096,546	368,393	1,464,939
13801	REFINED SUGARS INC	HUDSON R	OM	24-Jun-87	28-Jun-87		51,800	1,516,739	51,800	0	1,148,346	368,393	1,516,739
13801	REFINED SUGARS INC	HUDSON R	OM	01-Jul-87	01-Jul-87		4,600	1,521,339	4,600	0	1,152,946	368,393	1,521,339
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR	OM	01-Jul-87	31-Jul-87		463,800	1,985,139	463,800	0	1,616,746	368,393	1,985,139
70	RARITAN RIVER	RARITAN R	OM	16-Jul-87	31-Jul-87		178,600	2,163,739	0	178,600	1,616,746	546,993	2,163,739
13319	NYC DEPT OF SANIT (SW BKLN INCINERATOR)	GRAVESEND BAY	OM	17-Jul-87	17-Jul-87		1,000	2,164,739	1,000	0	1,617,746	546,993	2,164,739
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	EVE	20-Jul-87	31-Jul-87		19,686	2,184,425	0	19,686	1,617,746	566,679	2,184,425
14480	NYC DEPT OF SANIT (NORTHSHORE MTS)	FLUSHING BAY	OM	28-Jul-87	28-Jul-87		2,205	2,186,630	2,205	0	1,619,951	566,679	2,186,630
70	RARITAN RIVER	RARITAN R	OM	31-Jul-87	31-Jul-87		4,000	2,190,630	0	4,000	1,619,951	570,679	2,190,630
14480	NYC DEPT OF SANIT (NORTHSHORE MTS)	FLUSHING BAY	OM	01-Aug-87	01-Aug-87		2,200	2,192,830	2,200	0	1,622,151	570,679	2,192,830
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR	OM	01-Aug-87	20-Aug-87		241,800	2,434,630	241,800	0	1,863,951	570,679	2,434,630
70	RARITAN RIVER	RARITAN R	OM	01-Aug-87	31-Aug-87		230,661	2,665,291	0	230,661	1,863,951	801,340	2,665,291
70	RARITAN RIVER	RARITAN R	OM	01-Aug-87	09-Aug-87		100,400	2,765,691	0	100,400	1,863,951	901,740	2,765,691
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	EVE	02-Aug-87	31-Aug-87		269,376	3,035,067	0	269,376	1,863,951	1,171,116	3,035,067
14480	NYC DEPT OF SANIT (NORTHSHORE MTS)	FLUSHING BAY	OM	05 Aug-87	05-Aug-87		2,200	3,037,267	2,200	0	1,866,151	1,171,116	3,037,267
14377	BP OIL, INC	ARTHUR KILL	OM	09-Aug-87	09-Aug-87		4,400	3,041,667	4,400	0	1,870,551	1,171,116	3,041,667
13364	US GYPSUM CO	HUDSON R	OM	21-Aug-87	31-Aug-87		104,800	3,146,467	104,800	0	1,975,351	1,171,116	3,146,467
13364	US GYPSUM CO	HUDSON R	OM	01-Sep-87	10-Sep-87		94,000	3,240,467	94,000	0	2,069,351	1,171,116	3,240,467
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	EVE	01-Sep-87	30-Sep-87		346,422	3,586,889	0	346,422	2,069,351	1,517,538	3,586,889
70	RARITAN RIVER	RARITAN R	OM	01-Sep-87	30-Sep-87		179,980	3,766,869	0	179,980	2,069,351	1,697,518	3,766,869
48	HUDSON RIVER	HAVERSTRAW BAY	OM	11-Sep-87	30-Sep-87		158,800	3,925,669	0	158,800	2,069,351	1,856,318	3,925,669
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT NEWARK CHAN	EVE	16-Sep-87	30-Sep-87		85,800	4,011,469	0	85,800	2,069,351	1,942,118	4,011,469
62	NEW YORK HARBOR	SANDY HOOK CHAN	OM	17-Sep-87	14-Oct-87		313,349	4,324,818	0	313,349	2,069,351	2,255,467	4,324,818
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY	OM	25-Sep-87	25-Sep-87		500	4,325,318	500	0	2,069,851	2,255,467	4,325,318
14546	PA OF NY & NJ (AUTOPORT)	NEW YORK HARBOR	OM	27-Sep-87	30-Sep-87		14,000	4,339,318	14,000	0	2,083,851	2,255,467	4,339,318
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	EVE	01-Oct-87	31-Oct-87		254,125	4,593,443	0	254,125	2,083,851	2,509,592	4,593,443
14546	PA OF NY & NJ (AUTOPORT)	NEW YORK HARBOR	OM	01-Oct-87	11-Oct-87		26,800	4,620,243	26,800	0	2,110,651	2,509,592	4,620,243
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT NEWARK CHAN	EVE	01-Oct-87	07-Oct-87		44,500	4,664,743	0	44,500	2,110,651	2,554,092	4,664,743
70	RARITAN RIVER	RARITAN R	OM	01-Oct-87	01-Oct-87		900	4,665,643	0	900	2,110,651	2,554,992	4,665,643
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY	OM	02-Oct-87	31-Oct-87		10,000	4,675,643	10,000	0	2,120,651	2,554,992	4,675,643
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	EVE	11-Oct-87	11-Oct-87	87-11	3,700	4,679,343	0	3,700	2,120,651	2,558,692	4,679,343
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT ELIZABETH CHAN	EVE	11-Oct-87	19-Oct-87		65,750	4,745,093	0	65,750	2,120,651	2,624,442	4,745,093
14467	EXXON CO, USA	KILL VAN KULL	OM	19-Oct-87	31-Oct-87		38,700	4,783,793	38,700	0	2,159,351	2,624,442	4,783,793
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	EVE	23-Oct-87	31-Oct-87	87-11	149,700	4,933,493	0	149,700	2,159,351	2,774,142	4,933,493
14479	MORANIA O[illegible]	KILL VAN KULL	OM	30-Oct-87	31-Oct-87		3,000	4,936,493	3,000	0	2,162,351	2,774,142	4,936,493
63	NEW YO[illegible] JERSEY CHANNELS	KILL VAN KULL	EVE	0[illegible]-87	30-Nov-87		525,478	5,461,971	0	525,478	2,162,351	3,299,620	5,461,971
64	NEWARK [illegible]NSACK,&PASSAIC RIVERS	PORT ELIZABETH CHAN	EVE	[illegible]87	09-Nov-87		72,400	5,534,371	0	72,400	2,162,351	3[illegible]20	5,534,371

4479	MOBANIA OIL	KILL VAN KULL	OM	02-Nov-87	13-Nov-87	12,000	5,546,371	12,000	0	2,174,351	3,372,020	5,546,371
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY	OM	04-Nov-87	27-Nov-87	9,200	5,555,571	9,200	0	2,183,551	3,372,020	5,555,571
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY	OM	07-Nov-87	30-Nov-87	80,800	5,636,371	80,800	0	2,264,351	3,372,020	5,636,371
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT NEWARK CHAN	EVE	23-Nov-87	28-Nov-87	16,500	5,652,871	0	16,500	2,264,351	3,388,520	5,652,871
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY	OM	01-Dec-87	23-Dec-87	9,800	5,662,671	9,800	0	2,274,151	3,388,520	5,662,671
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	EVE	01-Dec-87	31-Dec-87	419,793	6,082,464	0	419,793	2,274,151	3,808,313	6,082,464
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR	OM	01-Dec-87	31-Dec-87	65,100	6,147,564	65,100	0	2,339,251	3,808,313	6,147,564
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY	OM	02-Dec-87	08-Dec-87	13,200	6,160,764	13,200	0	2,352,451	3,808,313	6,160,764
14328	PA OF NY & NJ (JFK AIRPORT)	JAMAICA BAY (BERGEN BASIN)	OM	08-Dec-87	31-Dec-87	38,400	6,199,164	38,400	0	2,390,851	3,808,313	6,199,164
13823	PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)	OM	10-Dec-87	30-Dec-87	43,300	6,242,464	43,300	0	2,434,151	3,808,313	6,242,464
30	JAMAICA BAY	JAMAICA BAY	OM	12-Dec-87	31-Dec-87	82,766	6,325,230	[illegible]	82,766	2,434,151	3,891,079	6,325,230
14546	PA OF NY & NJ (AUTOPORT)	NEW YORK HARBOR	OM	17-Dec-87	17-Dec-87	1,400	6,326,630	1,400	0	2,435,551	3,891,079	6,326,630
14654	MOBIL OIL CORP	ARTHUR KILL	OM	24-Dec-87	31-Dec-87	26,600	6,353,230	26,600	0	2,462,151	3,891,079	6,353,230
14467	EXXON CO, USA	KILL VAN KULL	OM	31-Dec-87	31-Dec-87	2,100	6,355,330	2,100	0	2,464,251	3,891,079	6,355,330

14654	MOBIL OIL CORP	ARTHUR KILL		OM	01-Jan-88	05-Jan-88	30,500	30,500	30,500	0	30,500	0	30,500
30	JAMAICA BAY	JAMAICA BAY (ROCKAWAY INLET)		OM	01-Jan-88	31-Jan-88	126,469	156,969	0	126,469	30,500	126,469	156,969
14328	PA OF NY & NJ (JFK AIRPORT)	JAMAICA BAY (BERGEN BASIN)		OM	01-Jan-88	22-Jan-88	45,100	202,069	45,100	0	75,600	126,469	202,069
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	EVE	01-Jan-88	31-Jan-88	65,293	267,362	0	65,293	75,600	191,762	267,362
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY		OM	02-Jan-88	30-Jan-88	12,200	279,562	12,200	0	87,800	191,762	279,562
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		OM	05-Jan-88	05-Jan-88	2,200	281,762	2,200	0	90,000	191,762	281,762
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	05-Jan-88	31-Jan-88	82,800	364,562	82,800	0	172,800	191,762	364,562
13465	EXXON CO, USA	ARTHUR KILL		OM	06-Jan-88	11-Jan-88	22,600	387,162	22,600	0	195,400	191,762	387,162
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT NEWARK CHAN		EVE	08-Jan-88	19-Jan-88	21,000	408,162	0	21,000	195,400	212,762	408,162
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	EVE	01-Feb-88	29-Feb-88	203,829	611,991	0	203,829	195,400	416,591	611,991
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY		OM	05-Feb-88	05-Feb-88	1,400	613,391	1,400	0	196,800	416,591	613,391
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	05-Feb-88	26-Feb-88	42,000	655,391	42,000	0	238,800	416,591	655,391
13684	US COAST GUARD (FORT TILDEN)	JAMAICA BAY		OM	17-Feb-88	23-Feb-88	6,000	661,391	6,000	0	244,800	416,591	661,391
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY		OM	01-Mar-88	30-Mar-88	8,400	669,791	8,400	0	253,200	416,591	669,791
63	NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	EVE	01-Mar-88	31-Mar-88	101,539	771,330	0	101,539	253,200	518,130	771,330
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	05-Mar-88	05-Mar-88	2,200	773,530	2,200	0	255,400	518,130	773,530
14734	TARRYTOWN MARINA	HUDSON R		OM	08-Mar-88	31-Mar-88	58,300	831,830	58,300	0	313,700	518,130	831,830
13527	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R		OM	18-Mar-88	29-Mar-88	140,800	972,630	140,800	0	454,500	518,130	972,630
14663	NYC DEPT OF ENV. PROTECTION (OWLS HEAD)	NEW YORK HARBOR		OM	25-Mar-88	31-Mar-88	10,500	983,130	10,500	0	465,000	518,130	983,130
14755	CHEVRON USA, INC	ARTHUR KILL		OM	01-Apr-88	04-Apr-88	28,800	1,011,930	28,800	0	493,800	518,130	1,011,930
14734	TARRYTOWN MARINA	HUDSON R		OM	01-Apr-88	21-Apr-88	41,000	1,052,930	41,000	0	534,800	518,130	1,052,930
14663	NYC DEPT OF ENV. PROTECTION (OWLS HEAD)	NEW YORK HARBOR		OM	01-Apr-88	11-Apr-88	15,500	1,068,430	15,500	0	550,300	518,130	1,068,430
14395	McCORMACK AGGREGATES	RARITAN BAY		OM	01-Apr-88	30-Apr-88	21,900	1,090,330	21,900	0	572,200	518,130	1,090,330
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY		OM	02-Apr-88	16-Apr-88	6,400	1,096,730	6,400	0	578,600	518,130	1,096,730
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	04-Apr-88	07-Apr-88	21,000	1,117,730	21,000	0	599,600	518,130	1,117,730
14782	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R		OM	09-Apr-88	28-Apr-88	243,000	1,360,730	243,000	0	842,600	518,130	1,360,730
14783	CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL		OM	21-Apr-88	22-Apr-88	12,800	1,373,530	12,800	0	855,400	518,130	1,373,530
14395	McCORMACK AGGREGATES	RARITAN BAY		OM	01-May-88	22-May-88	19,500	1,393,030	19,500	0	874,900	518,130	1,393,030
14663	NYC DEPT OF ENV. PROTECTION (OWLS HEAD)	NEW YORK HARBOR		OM	04-May-88	07-May-88	22,400	1,415,430	22,400	0	897,300	518,130	1,415,430
14200	NYC DEPT OF ENV. PROTECTION	FLUSHING BAY		OM	05-May-88	06-May-88	2,800	1,418,230	2,800	0	900,100	518,130	1,418,230
37	EAST RIVER	SOUTH BROS ISLAND CHAN		OM	14-May-88	31-May-88	128,000	1,546,230	0	128,000	900,100	646,130	1,546,230
37	EAST RIVER	SOUTH BROS ISLAND CHAN		OM	01-Jun-88	03-Jun-88	22,400	1,568,630	0	22,400	900,100	668,530	1,568,630
14395	McCORMACK AGGREGATES	RARITAN BAY		OM	07-Jun-88	07-Jun-88	1,500	1,570,130	1,500	0	901,600	668,530	1,570,130
13628	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	07-Jun-88	21-Jun-88	118,400	1,688,530	118,400	0	1,020,000	668,530	1,688,530
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	EVE	22-Jun-88	30-Jun-88	110,800	1,799,330	0	110,800	1,020,000	779,330	1,799,330
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	EVE	01-Jul-88	21-Jul-88	410,600	2,209,930	0	410,600	1,020,000	1,189,930	2,209,930
14898	CASTLE TERMINALS, INC	EAST R		OM	11-Jul-88	27-Jul-88	141,015	2,350,945	141,015	0	1,161,015	1,189,930	2,350,945
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	26-Jul-88	29-Jul-88	45,400	2,396,345	45,400	0	1,206,415	1,189,930	2,396,345
14915	AMSTAR SUGAR	EAST R		OM	29-Jul-88	30-Jul-88	11,850	2,408,195	11,850	0	1,218,265	1,189,930	2,408,195
14395	McCORMACK AGGREGATES	RARITAN BAY		OM	30-Jul-88	31-Jul-88	9,000	2,417,195	9,000	0	1,227,265	1,189,930	2,417,195
14898	AMSTAR SUGAR	EAST R		OM	01-Aug-88	18-Aug-88	23,800	2,440,995	23,800	0	1,251,065	1,189,930	2,440,995
14395	McCORMACK AGGREGATES	RARITAN BAY		OM	01-Aug-88	01-Aug-88	1,500	2,442,495	1,500	0	1,252,565	1,189,930	2,442,495
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	EVE	01-Aug-88	31-Aug-88	403,800	2,846,295	0	403,800	1,252,565	1,593,730	2,846,295
14837	AMERADA HESS CORP	KILL VAN KULL		NW QU	09-Aug-88	27-Aug-88	31,585	2,877,880	31,585	0	1,284,150	1,593,730	2,877,880
9	FLUSHING BAY & CREEK	FLUSHING BAY		OM	18-Aug-88	31-Aug-88	52,000	2,929,880	0	52,000	1,284,150	1,645,730	2,929,880
9	FLUSHING BAY & CREEK	FLUSHING BAY		OM	01-Sep-88	30-Sep-88	199,600	3,129,480	0	199,600	1,284,150	1,845,330	3,129,480
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	EVE	01-Sep-88	30-Sep-88	406,394	3,535,874	0	406,394	1,284,150	2,251,724	3,535,874
14837	AMERADA HESS CORP	KILL VAN KULL		NW QU	03-Sep-88	10-Sep-88	13,016	3,548,890	13,016	0	1,297,166	2,251,724	3,548,890
63	NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE		OM	13-Sep-88	30-Sep-88	214,200	3,763,090	0	214,200	1,297,166	2,465,924	3,763,090
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		OM	19-Sep-88	30-Sep-88	56,600	3,819,690	56,600	0	1,353,766	2,465,924	3,819,690
63	NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE		OM	01-Oct-88	03-Oct-88	27,200	3,846,890	0	27,200	1,353,766	2,493,124	3,846,89[illegible]
9	FLUSHING BAY & CREEK	FLUSHING BAY		OM	01-Oct-88	07-Oct-88	51,000	3,897,890	0	51,000	1,353,766	2,544,124	3,897,890
64	NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	EVE	01-Oct-88	31-Oct-88	599,361	4,497,251	0	599,361	1,353,766	3,143,485	4,497,251
14190	US NAVY [illegible]TON, SAG)	NEW YORK HARBOR		OM	[illegible]-88	02-Oct-88	2,200	4,499,451	2,200	0	1,355,966	3,[illegible]485	4,499,451
14832	PA OF N[illegible](PT. NEWARK & ELIZ TERM)	NEWARK BAY		EVE	[illegible]88	25-Oct-88	20,400	4,519,851	20,400	0	1,376,366	[illegible]5	4,519,851

Table 2 continued (page 13 of 16)

	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	ROCK	BERGEN POINT	NY	30-Oct-88	31-Oct-88	8,670	4,528,521	0	8,670	1,376,366	3,152,155	4,528,521
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	ROCK	BERGEN POINT	NY	01-Nov-88	30-Nov-88	87,321	4,615,842	0	87,321	1,376,366	3,239,476	4,615,842
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*			KVK	01-Nov-88	30-Nov-88	226,066	4,841,908	0	226,066	1,376,366	3,465,542	4,841,908
13814	PORT LIBERTE PARTNERS	NEW YORK HARBOR			CLAREMONT CHAN	OM	02-Nov-88	30-Nov-88	119,044	4,960,952	119,044	0	1,495,410	3,465,542	4,960,952
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		HOPPER DREDGE	KVK	04-Nov-88	30-Nov-88	311,418	5,272,370	0	311,418	1,495,410	3,776,960	5,272,370
13814	PORT LIBERTE PARTNERS	NEW YORK HARBOR			CLAREMOT CHAN	OM	01-Dec-88	05-Dec-88	28,953	5,301,323	28,953	0	1,524,363	3,776,960	5,301,323
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		GREAT LAKES	KVK	01-Dec-88	24-Dec-88	123,400	5,424,723	0	123,400	1,524,363	3,900,360	5,424,723
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		HOPPER DREDGE	KVK	01-Dec-88	30-Dec-88	349,814	5,774,537	0	349,814	1,524,363	4,250,174	5,774,537
	63 NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE				OM	03-Dec-88	23-Dec-88	201,700	5,976,237	0	201,700	1,524,363	4,451,874	5,976,237
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		AMER. DREDGING	KVK	08-Dec-88	31-Dec-88	174,650	6,150,887	0	174,650	1,524,363	4,626,524	6,150,887
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				KVK	10-Dec-88	11-Dec-88	6,400	6,157,287	6,400	0	1,530,763	4,626,524	6,157,287
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY				KVK	14-Dec-88	17-Dec-88	12,000	6,169,287	12,000	0	1,542,763	4,626,524	6,169,287
14783	CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL			TREMLEY POINT	OM	24-Dec-88	24-Dec-88	1,500	6,170,787	1,500	0	1,544,263	4,626,524	6,170,787
	63 NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE				OM	27-Dec-88	31-Dec-88	51,200	6,221,987	0	51,200	1,544,263	4,677,724	6,221,987
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		GREAT LAKES	KVK	28-Dec-88	31-Dec-88	55,600	6,277,587	0	55,600	1,544,263	4,733,324	6,277,587

Table 2 continued (page 14 of 16)

	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		HOPPER DREDGE	KVK	01-Jan-89	13-Jan-89		150,952	150,952	0	150,952	0	150,952	150,952
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		GREAT LAKES	KVK	01-Jan-89	31-Jan-89		410,000	560,952	0	410,000	0	560,952	560,952
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY			AMERICAN DRED.	KVK	01-Jan-89	31-Jan-89		180,200	741,152	0	180,200	0	741,152	741,152
	63 NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE			GREAT LAKES	OM	01-Jan-89	31-Jan-89		462,800	1,203,952	0	462,800	0	1,203,952	1,203,952
14783	CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL				OM	05-Jan-89	05-Jan-89		1,500	1,205,452	1,500	0	1,500	1,203,952	1,205,452
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		NEWARK BAY	KVK	05-Jan-89	06-Jan-89		12,000	1,217,452	0	12,000	1,500	1,215,952	1,217,452
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KOLL	*	ROCK	BERGEN POINT	NY	07-Jan-89	30-Jan-89		42,000	1,259,452	0	42,000	1,500	1,257,952	1,259,452
15016	A.J. BOSS LOGISTICS	RARITAN R				OM	23-Jan-89	31-Jan-89		25,101	1,284,553	25,101	0	26,601	1,257,952	1,284,553
15016	A.J. BOSS LOGISTICS	RARITAN R				OM	01-Feb-89	04-Feb-89		17,215	1,301,768	17,215	0	43,816	1,257,952	1,301,768
	63 NEW YORK & NEW JERSEY CHANNELS	PERTH AMBOY ANCHORAGE			GREAT LAKES	OM	01-Feb-89	08-Feb-89		131,600	1,433,368	0	131,600	43,816	1,389,552	1,433,368
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		GREAT LAKES	KVK	01-Feb-89	28-Feb-89		382,200	1,815,568	0	382,200	43,816	1,771,752	1,815,568
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		AMERICAN DRED.	KVK	01-Feb-89	28-Feb-89		151,100	1,966,668	0	151,100	43,816	1,922,852	1,966,668
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KOLL	*	ROCK	BERGEN POINT	NY	01-Feb-89	28-Feb-89		39,000	2,005,668	0	39,000	43,816	1,961,852	2,005,668
15029	TEXACO, INC	PASSAIC R				KVK	06-Feb-89	11-Feb-89		30,400	2,036,068	30,400	0	74,216	1,961,852	2,036,068
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		DON-JON MARINE	KVK	06-Feb-89	28-Feb-89		26,450	2,062,518	0	26,450	74,216	1,988,302	2,062,518
14395	McCORMACK AGGREGATES	RARITAN R				OM	08-Feb-89	09-Feb-89		6,000	2,068,518	6,000	0	80,216	1,988,302	2,068,518
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		HOPPER DREDGE	KVK	12-Feb-89	28-Feb-89		214,104	2,282,622	0	214,104	80,216	2,202,406	2,282,622
14344	US NAVY (EARLE)	SANDY HOOK BAY			WEEKS DREDGING	OM	23-Feb-89	28-Feb-89	CAPPED	52,500	2,335,122	52,500	0	132,716	2,202,406	2,335,122
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		AMERICAN DRED.	KVK	01-Mar-89	31-Mar-89		246,700	2,581,822	0	246,700	132,716	2,449,106	2,581,822
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY, UPPER	*		HOPPER DREDGE	KVK	01-Mar-89	31-Mar-89		150,535	2,732,357	0	150,535	132,716	2,599,641	2,732,357
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		DON-JON MARINE	KVK	01-Mar-89	31-Mar-89		40,335	2,772,692	0	40,335	132,716	2,639,976	2,772,692
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		GREAT LAKES	KVK	01-Mar-89	31-Mar-89		481,000	3,253,692	0	481,000	132,716	3,120,976	3,253,692
14344	US NAVY (EARLE)	SANDY HOOK BAY			WEEKS DREDGING	OM	01-Mar-89	31-Mar-89	CAPPED	506,468	3,760,160	506,468	0	639,184	3,120,976	3,760,160
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	ROCK	BERGEN POINT	NY	02-Mar-89	29-Mar-89		48,000	3,808,160	0	48,000	639,184	3,168,976	3,808,160
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY			GREAT LAKES	KVK	25-Mar-89	25-Mar-89		3,200	3,811,360	3,200	0	642,384	3,168,976	3,811,360
14782	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R			GREAT LAKES	OM	25-Mar-89	31-Mar-89		112,000	3,923,360	112,000	0	754,384	3,168,976	3,923,360
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		BEAN DREDGING	KVK	26-Mar-89	31-Mar-89		25,265	3,948,625	0	25,265	754,384	3,194,241	3,948,625
14782	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R			GREAT LAKES	OM	01-Apr-89	12-Apr-89		208,000	4,156,625	208,000	0	962,384	3,194,241	4,156,625
14344	US NAVY (EARLE)	SANDY HOOK BAY			WEEKS DREDGING	OM	01-Apr-89	30-Apr-89	CAPPED	339,661	4,496,286	339,661	0	1,302,045	3,194,241	4,496,286
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		GREAT LAKES	KVK	01-Apr-89	30-Apr-89		323,600	4,819,886	0	323,600	1,302,045	3,517,841	4,819,886
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		AMERICAN DRED.	KVK	01-Apr-89	30-Apr-89		204,350	5,024,236	0	204,350	1,302,045	3,722,191	5,024,236
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		HOPPER DREDGE	KVK	01-Apr-89	30-Apr-89		306,427	5,330,663	0	306,427	1,302,045	4,028,618	5,330,663
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		DON-JON MARINE	KVK	01-Apr-89	30-Apr-89		50,647	5,381,310	0	50,647	1,302,045	4,079,265	5,381,310
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	ROCK	BERGEN POINT	NY	02-Apr-89	30-Apr-89		21,400	5,402,710	0	21,400	1,302,045	4,100,665	5,402,710
14783	CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL			TREMLEY POINT	OM	13-Apr-89	14-Apr-89		9,600	5,412,310	9,600	0	1,311,645	4,100,665	5,412,310
	41 HUDSON RIVER CHANNEL	HUDSON RIVER CHAN			GREAT LAKES	OM	14-Apr-89	24-Apr-89		85,774	5,498,084	0	85,774	1,311,645	4,186,439	5,498,084
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY			GREAT LAKES	OM	15-Apr-89	16-Apr-89		16,000	5,514,084	16,000	0	1,327,645	4,186,439	5,514,084
14546	PA OF NY & NJ (AUTOPORT)	NEW YORK HARBOR			GREAT LAKES	OM	24-Apr-89	28-Apr-89		22,400	5,536,484	22,400	0	1,350,045	4,186,439	5,536,454
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		HOPPER DREDGE	KVK	01-May-89	17-May-89		184,202	5,720,686	0	184,202	1,350,045	4,370,641	5,720,686
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		AMERICAN DRED.	KVK	01-May-89	17-May-89		116,750	5,837,436	0	116,750	1,350,045	4,487,391	5,837,436
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		DON-JON MARINE	KVK	01-May-89	17-May-89		21,846	5,859,282	0	21,846	1,350,045	4,509,237	5,859,282
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		GREAT LAKES	KVK	01-May-89	17-May-89		137,600	5,996,882	0	137,600	1,350,045	4,646,837	5,996,882
14344	US NAVY (EARLE)	SANDY HOOK BAY			WEEKS/BEAN	OM	01-May-89	31-May-89	CAPPED	452,203	6,449,085	452,203	0	1,802,248	4,646,837	6,449,085
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	ROCK	BERGEN POINT	NY	02-May-89	02-May-89		1,500	6,450,585	0	1,500	1,802,248	4,648,337	6,450,585
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		HOPPER DREDGE	KVK	06-May-89	17-May-89		96,130	6,546,715	0	96,130	1,802,248	4,744,467	6,546,715
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		HOPPER DREDGE	KVK 1	18-May-89	31-May-89		111,352	6,658,067	0	111,352	1,802,248	4,855,819	6,658,067
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		GREAT LAKES	KVK 1	18-May-89	31-May-89		147,200	6,805,267	0	147,200	1,802,248	5,003,019	6,805,267
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		AMERICAN DRED.	KVK 1	18-May-89	31-May-89		149,100	6,954,367	0	149,100	1,802,248	5,152,119	6,954,367
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		DON-JON MARINE	KVK 1	18-May-89	31-May-89		23,949	6,978,316	0	23,949	1,802,248	5,176,068	6,978,316
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	*	ROCK	BERGEN POINT	NY	22-May-89	29-May-89		19,300	6,997,616	0	19,300	1,802,248	5,195,368	6,997,616
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		DON-JON MARINE	KVK 1	01-Jun-89	27-Jun-89		45,212	7,042,828	0	45,212	1,802,248	5,240,580	7,042,828
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		GREAT LAKES	KVK 1	01-Jun-89	29-Jun-89		259,200	7,302,028	0	259,200	1,802,248	5,499,780	7,302,028
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*		AMERICAN DRED.	KVK 1	01-Jun-89	30-Jun-89		224,000	7,526,028	0	224,000	1,802,248	5,723,780	7,526,028
	64 NEWARK P[illegible]KENSACK,&PASSAIC RIVERS	NEWARK BAY	*		HOPPER DREDGE	KVK 1	0[illegible]-89	30-Jun-89		337,581	7,863,609	0	337,581	1,802,248	6,061,361	7,863,609
14344	US NAVY [illegible]	SANDY HOOK BAY			WEEKS DREDGING	OM 1	[illegible]83	30-Jun-89		794,143	8,657,752	794,143	0	2,596,391	[illegible]	8,657,752

14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	EVE 1	05-Jun-89	24-Jun-89		158,600	8,816,352	158,600	0	2,754,991	6,061,361	8,816,352
	62 NEW YORK HARBOR	RED HOOK FLATS ANCHORAGE		MCFARLAND	OM 1	14-Jun-89	30-Jun-89		111,106	8,927,458	0	111,106	2,754,991	6,172,467	8,927,458
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	17-Jun-89	30-Jun-89		35,700	8,963,158	0	35,700	2,754,991	6,208,167	8,963,158
	62 NEW YORK HARBOR	RED HOOK FLATS ANCHORAGE		MCFARLAND	OM 1	01-Jul-89	20-Jul-89		111,106	9,074,264	0	111,106	2,754,991	6,319,273	9,074,264
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	AMERICAN DRED.	EVE 1	01-Jul-89	31-Jul-89		229,000	9,303,264	0	229,000	2,754,991	6,548,273	9,303,264
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Jul-89	31-Jul-89		95,700	9,398,964	0	95,700	2,754,991	6,643,973	9,398,964
14344	US NAVY (EARLE)	SANDY HOOK BAY		WEEKS/BEAN	OM 1	01-Jul-89	31-Jul-89		1,055,957	10,454,921	1,055,957	0	3,810,948	6,643,973	10,454,921
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	HOPPER DREDGE	EVE 1	01-Jul-89	31-Jul-89		292,283	10,747,204	0	292,283	3,810,948	6,936,256	10,747,204
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	DON-JON MARINE	EVE 1	01-Jul-89	31-Jul-89		63,918	10,811,122	0	63,918	3,810,948	7,000,174	10,811,122
14783	CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL		TREMLEY POINT	OM 1	03-Jul-89	05-Jul-89		7,200	10,818,322	7,200	0	3,818,148	7,000,174	10,818,322
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	EVE 1	21-Jul-89	31-Jul-89		76,800	10,895,122	0	76,800	3,818,148	7,076,974	10,895,122
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	EVE 1	01-Aug-89	14-Aug-89		118,400	11,013,522	0	118,400	3,818,148	7,195,374	11,013,522
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	DON-JON MARINE	EVE 1	01-Aug-89	14-Aug-89		24,252	11,037,774	0	24,252	3,818,148	7,219,626	11,037,774
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		WEEKS DREDGING	OM 1	01-Aug-89	31-Aug-89		54,000	11,091,774	54,000	0	3,872,148	7,219,626	11,091,774
	34 BAY RIDGE & RED HOOK CHANNELS	BAY RIDGE CHAN		HOPPER DREDGE	OM 1	01-Aug-89	31-Aug-89		397,534	11,489,308	0	397,534	3,872,148	7,617,160	11,489,308
14344	US NAVY (EARLE)	SANDY HOOK BAY		WEEKS/BEAN	OM 1	01-Aug-89	31-Aug-89		946,742	12,436,050	946,742	0	4,818,890	7,617,160	12,436,050
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	AMERICAN DRED.	EVE 1	02-Aug-89	07-Aug-89		31,500	12,467,550	0	31,500	4,818,890	7,648,660	12,467,550
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	02-Aug-89	31-Aug-89		42,000	12,509,550	0	42,000	4,818,890	7,690,660	12,509,550
15411	NORVAL INCORPORATED (PIER K)	EAST R		GREAT LAKES	OM 1	15-Aug-89	26-Aug-89		156,400	12,665,950	156,400	0	4,975,290	7,690,660	12,665,950
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	HOPPER DREDGE	EVE 1	19-Aug-89	26-Aug-89		121,969	12,787,919	0	121,969	4,975,290	7,812,629	12,787,919
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		WEEKS DREDGING	OM 1	01-Sep-89	02-Sep-89		2,800	12,790,719	2,800	0	4,978,090	7,812,629	12,790,719
14344	US NAVY (EARLE)	SANDY HOOK BAY		WEEKS/BEAN DR.	OM 1	01-Sep-89	24-Sep-89		320,967	13,111,686	320,967	0	5,299,057	7,812,629	13,111,686
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Sep-89	29-Sep-89		48,000	13,159,686	0	48,000	5,299,057	7,860,629	13,153,686
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT NEWARK CHAN	*	AMERICAN DRED.	[illegible]	[illegible]	[illegible]		21,000	13,180,686	0	21,000	5,299,057	7,881,629	13,180,686
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	[illegible]	[illegible]	[illegible]	30-Sep-89		155,927	13,336,613	0	155,927	5,299,057	8,037,556	13,336,613
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		WEEKS DREDGING	OM 1	18-Sep-89	30-Sep-89		135,200	13,471,813	135,200	0	5,434,257	8,037,556	13,471,813
14174	NORTHVILLE LINDEN TERM CORP	ARTHUR KILL		GREAT LAKES	OM 1	20-Sep-89	20-Sep-89		3,200	13,475,013	3,200	0	5,437,457	8,037,556	13,475,013
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	PORT ELIZABETH CHAN	*	AMERICAN DRED.	EVE 1	23-Sep-89	30-Sep-89		30,000	13,505,013	0	30,000	5,437,457	8,067,556	13,505,013
15441	REFINED SUGARS INC	HUDSON R		WEEKS DREDGING	OM 1	23-Sep-89	30-Sep-89		73,544	13,578,557	73,544	0	5,511,001	8,067,556	13,578,557
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	EVE 1	30-Sep-89	30-Sep-89		6,400	13,584,957	6,400	0	5,517,401	8,067,556	13,584,957
15441	REFINED SUGARS INC	HUDSON R		WEEKS DREDGING	OM 1	01-Oct-89	02-Oct-89		4,138	13,589,095	4,138	0	5,521,539	8,067,556	13,589,095
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		WEEKS DREDGING	OM 1	01-Oct-89	12-Oct-89		59,200	13,648,295	59,200	0	5,580,739	8,067,556	13,648,295
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	EVE 1	01-Oct-89	21-Oct-89		89,600	13,737,895	89,600	0	5,670,339	8,067,556	13,737,895
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	HOPPER DREDGE	EVE 1	01-Oct-89	31-Oct-89		302,642	14,040,537	0	302,642	5,670,339	8,370,198	14,040,537
14344	US NAVY (EARLE)	SANDY HOOK BAY		WEEKS DREDGING	OM 1	03-Oct-89	31-Oct-89		244,340	14,284,877	244,340	0	5,914,679	8,370,198	14,284,877
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	EVE 1	17-Oct-89	31-Oct-89		57,600	14,342,477	0	57,600	5,914,679	8,427,798	14,342,477
14344	US NAVY (EARLE)	SANDY HOOK BAY		WEEKS	OM 1	01-Nov-89	02-Nov-89		11,900	14,354,377	11,900	0	5,926,579	8,427,798	14,354,377
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	EVE 1	01-Nov-89	18-Nov-89		110,235	14,464,612	0	110,235	5,926,579	8,538,033	14,464,612
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	EVE 1	01-Nov-89	30-Nov-89		102,800	14,567,412	0	102,800	5,926,579	8,640,833	14,567,412
15442	MARINERS HARBOR MARINE CORP	KILL VAN KULL		WEEKS DREDGING	EVE 1	02-Nov-89	10-Nov-89	CAPPED	57,900	14,625,312	57,900	0	5,984,479	8,640,833	14,625,312
14190	US NAVY (STAPLETON, SAG)	NEW YORK HARBOR		WEEKS DREDGING	OM 1	07-Nov-89	07-Nov-89		2,000	14,627,312	2,000	0	5,986,479	8,640,833	14,627,312
15497	IMTT-BAYONNE (BAYONNE INDUSTRIES)	KILL VAN KULL		WEEKS DREDGING	EVE 1	28-Nov-89	29-Nov-89		15,100	14,642,412	15,100	0	6,001,579	8,640,833	14,642,412
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	29-Nov-89	30-Nov-89		4,500	14,646,912	0	4,500	6,001,579	8,645,333	14,646,912
15497	IMTT-BAYONNE (BAYONNE INDUSTRIES)	KILL VAN KULL		WEEKS DREDGING	EVE 1	01-Dec-89	20-Dec-89		29,719	14,676,631	29,719	0	6,031,298	8,645,333	14,676,631
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Dec-89	31-Dec-89		51,000	14,727,631	0	51,000	6,031,298	8,696,333	14,727,631
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	EVE 1	01-Dec-89	31-Dec-89		138,500	14,866,131	0	138,500	6,031,298	8,834,833	14,866,131
14344	US NAVY (EARLE)	SANDY HOOK BAY		WEEKS DREDGING	OM 1	05-Dec-89	12-Dec-89		19,265	14,885,396	19,265	0	6,050,563	8,834,833	14,885,396
14783	CITIES SERVICE OIL CO (CITGO)	ARTHUR KILL		TREMLEY POINT	OM 1	11-Dec-89	12-Dec-89		9,600	14,894,996	9,600	0	6,060,163	8,834,833	14,894,996
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	WEEKS DREDGING	EVE 1	14-Dec-89	28-Dec-89		25,900	14,920,896	0	25,900	6,060,163	8,860,733	14,920,896
14836	PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)			OM 1	29-Dec-89	31-Dec-89		32,000	14,952,896	32,000	0	6,092,163	8,860,733	14,952,896

Table 2 continued (page 16 of 16)

14836	PA OF NY & NJ (BKLN PIERS 1-12)	NEW YORK HARBOR (EAST R)		EAST RIVER	OM 1	01-Jan-90	08-Jan-90		101,700	101,700	101,700	0	101,700	0	101,700
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Jan-90	25-Jan-90		21,000	122,700	0	21,000	101,700	21,000	122,700
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	KVK 1	01-Jan-90	31-Jan-90		230,900	353,600	0	230,900	101,700	251,900	353,600
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	WEEKS DREDGING	KVK 1	05-Jan-90	05-Jan-90		10,000	363,600	0	10,000	101,700	261,900	363,600
15545	BELCHER CORP	KILL VAN KULL		WEEKS DREDGING	OM 1	08-Jan-90	09-Jan-90		10,700	374,300	10,700	0	112,400	261,900	374,300
	36 BUTTERMILK CHANNEL	BUTTERMILK CHAN		GREAT LAKES	OM 1	09-Jan-90	23-Jan-90		176,000	550,300	0	176,000	112,400	437,900	550,300
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	KVK 1	25-Jan-90	31-Jan-90		68,000	618,300	68,000	0	180,400	437,900	618,300
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	KVK 1	01-Feb-90	04-Feb-90		38,400	656,700	38,400	0	218,800	437,900	656,700
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	KVK 1	01-Feb-90	28-Feb-90		57,200	713,900	0	57,200	218,800	495,100	713,900
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	05-Feb-90	28-Feb-90		69,700	783,600	0	69,700	218,800	564,800	783,600
	70 RARITAN RIVER	RARITAN R		SOUTH CHAN	OM 1	22-Feb-90	28-Feb-90		70,000	853,600	0	70,000	218,800	634,800	853,600
	64 NEWARK BAY,HACKENSACK,&PASSAIC RIVERS	NEWARK BAY	*	GREAT LAKES	KVK 1	01-Mar-90	04-Mar-90		10,200	863,800	0	10,200	218,800	645,000	863,800
	70 RARITAN RIVER	RARITAN R		SOUTH CHAN	OM 1	01-Mar-90	31-Mar-90		397,000	1,260,800	0	397,000	218,800	1,042,000	1,260,800
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Mar-90	31-Mar-90		70,300	1,331,100	0	70,300	218,800	1,112,300	1,331,100
15545	BELCHER CORP	KILL VAN KULL		WEEKS DREDGING	OM 1	18-Mar-90	31-Mar-90		25,185	1,356,285	25,185	0	243,985	1,112,300	1,356,285
14782	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R		GREAT LAKES	OM 1	27-Mar-90	31-Mar-90		67,500	1,423,785	67,500	0	311,485	1,112,300	1,423,785
14782	PA OF NY & NJ (PASSENGER SHIP TERM)	HUDSON R		GREAT LAKES	OM 1	01-Apr-90	20-Apr-90		374,400	1,798,185	374,400	0	685,885	1,112,300	1,798,185
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Apr-90	26-Apr-90		462,200	2,260,385	0	462,200	685,885	1,574,500	2,260,385
15545	BELCHER CORP	KILL VAN KULL		WEEKS DREDGING	OM 1	02-Apr-90	13-Apr-90		16,084	2,276,469	16,084	0	701,969	1,574,500	2,276,469
15531	AMERADA HESS CORP	RARITAN R		WEEKS DREDGING	OM 1	16-Apr-90	23-Apr-90		17,479	2,293,948	17,479	0	719,448	1,574,500	2,293,948
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	KVK 1	20-Apr-90	30-Apr-90		118,400	2,412,348	118,400	0	837,848	1,574,500	2,412,348
15545	BELCHER CORP	KILL VAN KULL		WEEKS DREDGING	OM 1	23-Apr-90	30-Apr-90		10,801	2,423,149	10,801	0	848,649	1,574,500	2,423,149
	1 PORT CHESTER HARBOR	PORT CHESTER HARBOR		AMERICAN DREDGE	OM 1	23-Apr-90	30-Apr-90		22,800	2,445,949	0	22,800	848,649	1,597,300	2,445,949
14832	PA OF NY & NJ (PT. NEWARK & ELIZ TERM)	NEWARK BAY		GREAT LAKES	KVK 1	01-May-90	03-May-90		25,600	2,448,749	25,600	0	874,249	1,574,500	2,448,749
	1 PORT CHESTER HARBOR	PORT CHESTER HARBOR		AMERICAN DREDGE	OM 1	02-May-90	18-May-90		30,000	2,478,749	0	30,000	874,249	1,604,500	2,478,749
14395	McCORMACK AGGREGATES	RARITAN BAY		GREAT LAKES	OM 1	04-May-90	04-May-90		3,200	2,481,949	3,200	0	877,449	1,604,500	2,481,949
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	04-May-90	12-May-90		48,000	2,529,949	0	48,000	877,449	1,652,500	2,529,949
	77 SHOAL HARBOR & COMPTON CREEK	SANDY HOOK BAY		WEEKS DREDGING	OM 1	05-May-90	31-May-90		31,530	2,561,479	0	31,530	877,449	1,684,030	2,561,479
15632	CONSOLIDATED EDISON CO	EAST R		GREAT LAKES	OM 1	12-May-90	13-May-90		9,600	2,571,079	9,600	0	887,049	1,684,030	2,571,079
	77 SHOAL HARBOR & COMPTON CREEK	SANDY HOOK BAY		WEEKS DREDGING	OM 1	01-Jun-90	18-Jun-90		86,295	2,657,374	0	86,295	887,049	1,770,325	2,657,374
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	22-Jun-90	30-Jun-90		42,500	2,699,874	0	42,500	887,049	1,812,825	2,699,874
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Jul-90	31-Jul-90		119,500	2,819,374	0	119,500	887,049	1,932,325	2,819,374
	80 SHREWSBURY RIVER	SHREWSBURY R		WEEKS DREDGING	KVK 1	11-Jul-90	31-Jul-90		88,943	2,908,317	0	88,943	887,049	2,021,268	2,908,317
15497	IMTT-BAYONNE (BAYONNE INDUSTRIES)	KILL VAN KULL		WEEKS DREDGING	KVK 1	18-Jul-90	23-Jul-90	CAPPED	7,133	2,915,450	7,133	0	894,182	2,021,268	2,915,450
15442	MARINERS HARBOR MARINE CORP	KILL VAN KULL		WEEKS DREDGING	KVK 1	24-Jul-90	25-Jul-90	CAPPED	3,752	2,919,202	3,752	0	897,934	2,021,268	2,919,202
	63 NEW YORK & NEW JERSEY CHANNELS	KILL VAN KULL	* ROCK	BERGEN POINT	NY	01-Aug-90	26-Aug-90		36,000	2,955,202	0	36,000	897,934	2,057,268	2,955,202
	80 SHREWSBURY RIVER	SHREWSBURY R		WEEKS DREDGING	KVK 1	01-Aug-90	31-Aug-90		128,379	3,083,581	0	128,379	897,934	2,185,647	3,083,581
15819	NATIONAL PARK SERVICE	NEW YORK HARBOR		LIBERTY ISLAND	KVK 1	13-Aug-90	31-Aug-90	CAPPED	80,320	3,163,901	80,320	0	978,254	2,185,647	3,163,901

TABLE 3. Summary of Screening Analysis of Proposed Dredge Material Disposal Alternatives. Taken from Mitre, 1979; p 76.

AREA OF CONSIDERAITON / PROPOSED ALTERNATIVE	ENGINEERING (e.g., Construction Feasibility, Transport Feasibility, Treatment Availability)	ECONOMIC (e.g., Total Cost Compared to Attendant Benefits)	ENVIRONMENTAL (e.g., Toxicity to Marine or Terrestrial Ecosystems, Habitat Alteration)	PUBLIC HEALTH AND WELFARE (e.g., Air Quality, Water Quality, Food Resource Contamination)	SOCIAL ACCEPTABILITY (e.g., Acceptability to the Public and tp State Governments)	LEGAL/REGULATORY (e.g., FWPCA, MPRSA, ACRA, State and Local Laws and Regulations)	RESULTS OF SCREENING
No Dredging	○	●	○	○	◐	○	Not Currently Reasonable
Deep Ocean Disposal	○	●	◐	◐	○	◐	Not Currently Reasonable
Offshore Island Containment (e.g., Energy Island)	○	●	◐	○	○	◐	Not Currently Reasonable
Ocean Disposal with other Waste Materials	○	○	◐	◐	○	◐	Not Currently Reasonable
Ocean Spreading	○	○	◐	◐	○	◐	Not Currently Reasonable
Containerized Ocean Disposal	○	●	○	○	○	○	Not Currently Reasonable
Filling Mines	○	●	◐	◐	◐	◐	Not Currently Reasonable
Production of Construction Materials	●	●	○	○	○	○	Not Currently Reasonable
Incineration	◐	●	○	○	○	○	Not Currently Reasonable
Selective Dredging	○	◐	○	○	◐	○	Possible in Special Cases
Long Island Sound	○	○	◐	◐	◐	◐	Possible in Special Cases
River/Harbor Disposal (Open)	○	○	◐	◐	◐	○	Possible in Special Cases
Protected Water Containment	○	◐	◐	◐	◐	○	Possible in Special Cases
Beach Nourishment	○	○	○	○	○	○	Possible in Special Cases
Enhancement of the Environment	○	◐	○	○	○	◐	Possible in Special Cases
Wetlands Disposal (Filling Wetlands)	○	○	◐	○	◐	●	Possible in Special Cases
Sanitary Landfill Cover	○	◐	○	○	○	◐	Possible in Special Cases
Abandoned Piers	○	◐	◐	○	○	○	Possible in Special Cases
Shallow Ocean Disposal	○	○	◐	◐	○	○	Possible in Special Cases and Feasible For Large Volumes of Material
Subaqueous Borrow Pits	○	○	◐	◐	◐	○	Possible in Special Cases and Feasible For Large Volumes of Material
Confined Upland Disposal	○	◐	◐	◐	◐	◐	Possible in Special Cases and Feasible For Large Volumes of Material

○ - Considerations in this area are not likley to limit the use of the alternative.
◐ - Considerations in this area may limit the use of the alternative in certain cases as explained in the descriptions of alternatives.
● - Considerations in this area are likely to limit the use of the alternative for reasons explained in the descriptions of alternatives.

TABLE 4. Summary of FEIS Analysis of Feasible Disposal Alternatives. Taken from NYD, 1983' p2.0 - 2.2.

	EVALUATION FACTORS						
Feasible Alternatives	Avail-ability (Years)	Capacity	Environ-mental	Social Accept-ability	Public Health & Welfare	Legal	Engin-eering
Mud Dump	± 15 yrs. long-term	± 100 million yd^3	*	*	0	0	0
Subaqueous Borrow Pits	± 7 yrs. long-term	± 70 million yd^3	*	X	* (may reduce capacity)	*	*
Protected Water Containment	± 10 yrs. long-term	4-80 million yd^3 (depending on project)	*	*	0	*	0
Contained Upland	± 10 yrs.	± 50 million yds^3	X	X	*	*	0
Wetlands Disposal	± 5 yr short-term	N/A	X	*	*	X	0
Sanitary Landfill	N/A	X	*	X	*	0	0
Uncontained Upland	long-term	0	X	X	*	*	0
Sanitary Landfill Cover	long-term	± 10 million yd^3 per year	*	*	*	*	*
Creation of Wetlands	long-term	*	*	0	0	*	0
Beach Nourishment	indefinite long-term	± 27 million per yr.	0	0	0	0	0
Artificial Reefs	short-term	*	*	0	0	0	X

*Critical feasibility factor X-Critical Limiting factor

0-Not a factor NA-Not applicable

TABLE 5. Estimated Capacity and Cost for Disposal Alternatives

Alternative	Est. Cost/cu.yd.	Est. Capacity (in millions cu yd)
Ocean Disposal		
Mud Dump	$ 5.00	Large Volumes
New Site (20 mi)	$10.00 - $15.00	Large Volumes
Upland Disposal	$5.60 - $13.20 (N-61) (N-37)	2.6 - 8.5
Sanitary Landfill Cover*	$28.00 - $37.00 (N-61) (N-37)	0.1 - 0.34 (yearly)
Containment Islands** (500 acres)	$10.90 - $36.10 (sheet pile) (sand dike)	6.6 - 29.2 (sand) (concrete with arc cells)
Subaqueous Borrow Pits (existing***)	$ 5.00	Large Volumes (depending on pit)
Beach Nourishment****	$ 8.50	2.0 (yearly)
Containment Areas	$5.60 - $13.44 (Bowery B) (Flushing)	1.18 - 5.92 (Flushing)(Raritan)
Wetland Creation*****	$6.16 - $11.80 (Flushing) (Raritan)	1.70 - 6.0 (Flushing) (Raritan)

*includes $13.50 transportation cost to nearest landfill
**includesliner and treatment costs
***cost may be slightly less than for mud dump (less travel)
****added transport cost to beach paid by cost-sharing with state (usually)
*****Assumes 6 - 10,000 planting cost per acre.

note: Costs updated from DSEIS to reflect 1989 levels (NYD, 1990)

TABLE 6. Non-Biological Ranking* of Existing Borrow Pits Feasible for Use as Disposal Sites (See Figure 1 for pit locations)

PIT	CAPACITY	EROSION POTENTIAL	WATER QUALITY IMPACTS	DEPTH	CONFLICTING USES	TOTAL POINTS	RANKING*
3	3	2	4	4	1.5	14.5	4
4	4	3	2	2	1.5	12.5	2
6	1	1	3	1	4	10.0	1
7	2	4	1	3	3	13.0	3

*Relative ranking among pits, from most preferable (1) to least (4). See text (section 2.3.1.4) for details.

Table 7. Benthic Fauna Collected from East Bank Stations. Taken from Brinkhuis (1980), pages 56-57. See Figure 47 for Locations

Dredged	Stations									
	5 (59)	6 (56)	7 (53)	24 (45)	25 (37)	26 (70)	32 (48)	36 (55)	37 (65)	39 (50)
Nematoda		15	5	10			20			15
Eteone sp.		5	5		5					
Goniadia sp.										
Nephtys sp.		20		10		5				
Nereis sp.							5			
Cyathura polita										
Amphipoda			5							
Crangon septemspinosa						15				
Ovalipes ocellatus		5		5		10		5		
Rhithropanopeus harrissi				5						
Mytilus edulis										
Nassarius obsoletus					5		20			
Asterias forbesi						5				
Ammodytes americanus (sand lance)						15				
Total # species	1	4	3	4	2	5	3	1	0	1
Total $\#\cdot m^{-2}$	5	40	15	30	10	50	45	5	0	15

Not dredged	Stations								
	22 (26)	23 (35)	27 (25)	31 (26)	33 (18)	34 (75)	35 (12)	38 (25)	40 (18)
Nematoda						40			
Eteone									
Goniadia sp.									
Nephtys sp.		15		5				10	
Nereis sp.		25					5		
Cyathura polita							10		
Amphipoda									
Crangon septemspinosa									
Ovalipes ocellatus								5	
Rhithropanopeus harrissi		5							
Mytilus edulis									
Nassarius obsoletus				10	25				
Asterias forbesi									
Ammodytes americanus (sand lance)			25						
Total # species	0	3	1	2	1	1	2	2	0
Total $\#\cdot m^{-2}$	0	45	25	15	25	40	15	15	0

( ) = station depth. Data reported as $\#/m^2$ (6 pooled shipek grabs).

Table 8. Benthic Fauna Collected Along the West Bank. Taken from Brinkhuis (1980), pp 58-59. See Figure 47 for Locations.

	Stations															
Dredged	2 (26)	3 (22)	4 (22)	8 (33)	9 (37)	11 (30)	12 (33)	15 (40)	16 (40)	17 (28)	18 (35)	20 (40)	21 (60)	28 (25)	29 (25)	30 (40)
Nematoda																
Eteone sp.																
Goniada sp.																
Nephtys sp.					10		10				10	5		15		10
Nereis sp.		5											10			
Cyathura polita					5											
Amphipoda																
Crangon septemspinosa																
Rhithropanopeus harrissi																
Nassarius obsoletus														10		20
Mytilus edulis																
Asterias forbesi																
Ammodytes americanus (Sand lance)																
Total # species	0	1	0	0	2	0	1	0	0	0	1	1	1	2	0	2
Total $\# \cdot m^{-2}$	0	5	0	0	15	0	10	0	0	0	10	5	10	25	0	30

	Stations				
Not dredged	1 (16)	10 (11)	13 (12)	14 (16)	19 (16)
Nematoda					
Eteone sp.					
Goniadia sp.				10	
Nephtys sp.		15		10	
Nereis sp.				10	
Cyathura polita					
Amphipoda		15			
Crangon septemspinosa					
Rhithropanopeus harrissi					
Nassarius obsoletus					
Mytilus edulis			5		
Asterias forbesi					
Ammodytes americanus (sand lance)					
Total # species	0	2	1	3	0
Total $\# \cdot m^{-2}$	0	30	5	30	0

( ) = station depth Data reported as $\#/m^2$ (6 pooled shipek grabs)

Table 9. Seasonal Abundances and S cies Richness of Benthic Community of Lower Bay Co lex. From Cerrato et al, 1988

Station	Abundances (organisms/m^2)				Species Richness (avg spec/grab)			
	SPRING	SUMMER	FALL	WINTER	SPRING	SUMMER	FALL	WINTER
1	8315	2095	9435	95	26.5	14.5	20	5.5
2	31605	12210	26805	4310	18.5	16.5	21.5	24.5
3	130	12680	2260	385	4.5	39.5	25	8.5
4	18230	14655	13490	50545	24.5	26.5	20.5	31.5
5	410	700	440	425	13.5	11.5	9	10.5
6	245	220	245	200	10.5	8.5	9.5	9
7	2325	1355	400	1135	19	20.5	10	18
8	530	480	165	225	11	10.5	4.5	6.5
9	7755	15345	12980	5870	8.5	21	23	22
10	5	95	140	100	0.5	4.5	5	4.5
11	240	1610	690	360	6.5	7.5	10	6.5
12	240	385	6745	165	7.5	10.5	23.5	7.5
13	1910	660	160	440	20	9.5	7	5
14	5815	3275	7965	2655	6.5	15.5	17	16.5
15	6630	1335	3975	2020	18	10	11	10.5
16	7065	11220	9315	4025	16	21	18	17.5
17	3185	1745	2055	1015	4	11	11	14
18	21700	2115	1815	1870	20	11.5	13.5	14
19	390	245	225	170	8	7	11	8.5
21	510	305	405	265	12.5	8.5	11.5	11
24	5105	2685	2235	6270	12	15	13	16.5
25	4830	1135	3390	1035	8.5	8	6.5	8.5
26	24315	19070	28615	7315	26	25	27	26.5
27	9890	1290	24630	2525	10	8	30.5	17
28	16080	17520	1265	7385	23.5	24.5	12.5	17
29	1565	435	1170	930	14.5	13	22	17
30	8025	1750	5405	18920	11.5	9	9	26
31	150	4130	14125	17530	4.5	18.5	24.5	22
32	170	1165	2915	40	4	16.5	19	2.5
34	40	1090	940	510	2	16	5.5	3.5
36	10040	8075	2740	4280	14	22.5	13.5	27
37	3185	25	15	35	10.5	2	1.5	3
38	14330	15155	1455	2630	26	27	15	17
40	2420	1125	6945	535	31	26	30	15.5
41	2190	2665	1880	8490	26.5	25.5	27.5	29
42	1860	26370	3230	1525	26.5	22	24.5	12
43	16380	65995	29075	49275	15	25.5	25	23.5
46	1130	9260	27220	7250	15	18	24	16
47	90	1120	2495	640	5.5	14.5	17	11.5
48	10290	7000	1990	29340	14	15	8.5	12.5
49	735	19435	14275	17280	10	21	21.5	20.5
50	4375	6230	8215	3765	8.5	12.5	12.5	17.5
51	355	1400	3320	1000	9	16.5	19	13
52	655	10280	2445	940	13	22	19	7
53	1160	6725	13530	1725	15.5	19	16.5	13
54	1930	11975	395	15085	13.5	31	9.5	21
55	1045	4130	5860	1675	20.5	10	10	11.5
56	4970	7305	10920	4175	11	14	16.5	12.5
57	285	3160	6355	895	7	21.5	20.5	15.5
58	285	2070	4600	770	5.5	11	14	6.5
59	130	155	2415	3110	6.5	6.5	12	10.5
60	315	1490	1500	1825	9.5	7.5	10.5	13.5
62	35	60	2180	75	2	3	6.5	2
68	8185	12135	8715	210	30.5	19.5	13.5	7
69	9395	700	1695	3245	28	14.5	15.5	26.5
70	61730	4225	6650	2810	37	12.5	23.5	26.5
71	3255	320	285	760	17	8.5	6	13
73	10865	2565	4550	12100	21	14	20.5	19
80	145	5550	7590	6415	7	23.5	28	13.5
81	1070	6515	790	4490	6.5	23	13	27
82	245	545	7330	1005	5	8	24	8.5
83	1095	675	5175	15405	19.5	17	36	24.5
84	625	745	825	410	16.5	17	22.5	10.5
85	300	6305	3425	5	7	17	13	0.5
86	18910	5885	3465	1050	19.5	21	16.5	11.5
87	2055	8635	11175	1635	11	20	15.5	6
88	295	9135	2160	25505	6.5	29	26.5	23
89	195	1110	305	400	5	15.5	8.5	11
90	115	220	235	125	1.5	4.5	6	2
91	90	385	290	155	4	10	6	8
92	85	500	260	150	5	10.5	10.5	8
93	50	680	235	55	3.5	11.5	4	3.5
94	5845	300	310	130	9	5.5	5	5.5
95	125	765	655	345	8.5	9.5	8	11
96	155	590	185	60	5.5	6.5	9	4.5
97	185	70	195	160	7	2.5	9	6
98	55905	23755	15800	1405	17.5	18	17	9.5
99	71605	13160	16595	2135	17	16.5	14.5	12
100	685	435	375	480	14	9.5	8.5	11
101	155	130	190	355	5.5	5	6	8.5
102	35	95	40	85	1	2.5	4.5	5
103	8195	2365	495	1810	34.5	36	22	25
104	1930	1435	1865	1090	34.5	27.5	27	24
105	1000	570	2090	895	9	11.5	15.5	11

See Figure 11 for sta locations, Table 10 for Areas A-C.

Table 10. Seasonal Abundances and Species Richness of Benthos in Three Shoal Areas of the Lower Bay Complex. Taken from Cerrato et al, 1988

Station	Abundances (organisms/m^2)				Species Richness (avg spec/grab)			
	SPRING	SUMMER	FALL	WINTER	SPRING	SUMMER	FALL	WINTER
A1	1215	2380	34120	13855	22.5	26.5	20	19.5
A2	770	5350	1515	1980	13.5	28.5	21.5	12
A3	495	745	6640	2675	13	14	23	19.5
A4	4665	5235	5680	1690	10.5	12.5	10.5	8.5
A5	13040	9530	8365	9495	15.5	21	15	18.5
A6	12505	5275	23300	4745	23.5	17	17	14.5
A7	1470	3030	5110	6740	8.5	13.5	11.5	13
A8	4145	6005	9365	3310	15	15	13	10
A9	5715	3805	18390	9075	31	30	30	23.5
A10	8630	3895	2600	1035	14	10.5	10.5	7.5
B1	225	465	550	430	6.5	11	12.5	10.5
B2	350	405	640	350	8	8	16.5	9
B3	290	220	535	510	9.5	8.5	12	10.5
B4	32100	4010	17830	13680	21.5	17	21.5	15.5
B5	23385	18935	5810	1840	18.5	31	15	15.5
B6	12820	2200	2970	4390	17	13.5	10	14
B7	10145	3355	2985	1155	11.5	12.5	9.5	11.5
B8	34115	8255	9725	4005	19	19	14	17
B9	18755	13650	17765	14045	11	22	17.5	25.5
B10	675	300	890	665	14	9	14.5	14
C1	53170	30860	16875	90	20	19	21.5	3.5
C2	16725	550	2810	255	18	8.5	12.5	8.5
C3	18530	1040	875	605	22.5	12.5	11.5	10
C4	785	705	645	1185	13.5	16	17.5	17.5
C5	2140	695	125	1405	10.5	10	4.5	16
C6	8765	13550	6995	3890	28.5	29.5	29.5	25
C7	2505	2865	1750	2140	19	24	17.5	25.5
C8	2570	3880	3105	2120	24.5	32.5	28.5	22.5
C9	4615	20600	8980	2605	27	30.5	27	22.5
C10	2745	755	340	1340	25	16	10	20.5

See Figure 11 for sta locations, Table 9 for 9 for areas outside A-C.

TABLE 11. Biological Ranking* of Existing Borrow Pits Feasible for Use as Disposal Sites (Figure 1)

PIT NUMBER	BENTHIC IMPACTS	FISH IMPACTS	TOTAL POINTS	RANKING*
3	2	2	4	1
4	1	4	5	2.5
6	4	1	5	2.5
7	3	3	6	4

*Relative ranking among pits from most preferable (1) to least (4). See text (2.3.1.5) for details

Table 12. Total Species, Numbers (n), and Weight (Kg) of fish caught in two West Bank Pits (002,003) and along an adjacent shoal (001). (aee map in Figure 56 for locations). Taken from Pacheco, 1983.

Station	FA81		Wi 81-82		SP82		SU82		FA82	
	n	kg	n	kg	n	kg	n	kg	n	kg
001 Fish	167	4.80	22	1.45	216	8.88	47	2.80	66	0.71
Inverts.	168	20.45	15	0.95	62	2.50	14	0.40	16	0.78
Total	335	25.25	37	2.40	278	10.38	61	3.20	82	1.49
002 Fish	132	3.60	171	2.23	322	11.53	179	4.35	262	5.82
Inverts.	18	0.40	302	14.60	378	35.55	217	28.57	46	1.57
Total	150	4.00	473	16.83	700	47.08	346	32.92	308	7.39
003 Fish	731	24.25	216	8.88	470	21.55	301	14.52	205	11.00
Inverts.	103	2.06	62	1.50	375	9.50	289	16.02	99	2.45
Total	834	26.31	278	10.38	845	31.05	590	30.54	304	13.45

Numbers of Species

	FA81	WI 81-82	SP82	SU82	FA82
001 Fish	11	8	10	6	10
Inverts.	5	2	3	3	2
002 Fish	9	12	15	13	17
Inverts.	3	1	5	5	4
003 Fish	19	18	18	12	18
Inverts.	5	5	5	4	5

Table 13. Total Catch at Eight Lower Bay Trawl stations, including Two West Bank Pits (2 3) and a channel (5). From NYD, 1984; p 86 (see map in Figure 58 for locations)

	1	2	3	4	5	6	7	8	TOTAL
Fish									
Smooth dogfish		16			1		7	1	25
Clearnose skate					1				1
Atlantic sturgeon		1			9		9		19
Atlantic herring	1		1		1		7		10
Alewife	32	349	83	54	94		31	3	646
Blueback herring	19	12	1	7	4	2	41	4	90
American shad	97	14	6	18	4	27	4	2	172
Atlantic menhaden					2		1		3
Hickory shad			1		3				4
Gizzard shad			1		6				7
Bay anchovy	58	342	90	313	3040	18	143	1	4005
Striped anchovy		1		8			2		11
Silver hake	4	131	325	17	355		9	20	861
Pollock							1		1
Atlantic tomcod	1	5			2		66		74
White hake		1	9		24				34
Red hake	31	78	2259	68	978		65		3479
Spotted hake		13	62	4	11			1	91
Fourbeard rockling			1						1
Summer flounder	9	7	8	84	26	1	14	4	153
Fourspot flounder	4	7	23	2	7	63	11	5	122
Winter flounder	222	359	782	756	1203	322	1532	150	5326
Windowpane	48	198	151	85	149	45	58	64	798
Atlantic silverside	1	1				2	8	1	13
Lined seahorse				2					2
Northern pipefish		1		2	1	1			5
Smallmouth flounder	2		1	1		33	2		39
Hogchoker			2						2
Atlantic mackerel	1								1
Butterfish	16	804	73	48	191	3	182	22	1339
Atlantic moonfish		6							6
Crevalle jack					1				1
Bluefish	1	8		7	8		2	3	29
Striped bass	1						2		3
Black sea bass			1		5			3	9
White perch							1		1
Scup	28	6	41	28	2	41	211	81	438
Weakfish	5	50	296	11	442	3	3	5	815
Spot					14		2	1	17
Longhorn sculpin	2	1	9	3	16	3		2	36
Sea raven	1		2	1	2		4		10
Grubby	5	13	10	11	164	15	37	14	269
Northern searobin			3				2	2	7
Striped searobin	2	1	5	10	12		2	2	34
Cunner	7	5	3	5	3	2	5	28	58
Tautog	18	2	15	22	5	14	6	43	125
Rock gunnel						2			2
Striped cusk eel		1	1	1					3
Fawn cusk eel			1						1
Northern puffer			1						1
American eel		2	2	4	9				17
Conger eel				4					4
Ocean pout			1					1	2
Oyster toadfish	1			3					4
Total # Individuals	617	2435	4270	1579	6795	597	2470	463	19226
Total # Species	27	30	34	29	35	18	32	25	54
Invertebrates									
American lobster	2	83	102	16	102	5	716	1	1027
Rock crab	59	349	845	1220	234	627	382	175	3891
Blue crab	7	11	15	45	5	7	15	3	108
Jonah crab					2				2
Spider crab	1		18	7	1	4	2	1	34
Horseshoe crab	8	9	38	22	14	6	26	3	126
Lady crab	521	1072	623	158	53	553	1181	318	4479
Total # Individuals	598	1524	1641	1468	411	1202	2322	501	9667
Total # Species	6	5	6	6	7	6	6	6	7

TABLE 14. Order of Preference of Existing Borrow Pits Feasible for Use as Disposal Sites (see Figure 1 for site locations).

Pit Number	Non-Biol Ranking*	Biological Ranking**	Combined Rank	Preferred Order Of Use***
3	4	1	5	3
4	2	2.5	4.5	2
6	1	2.5	3.5	1
7	3	4	7	4

*See Table 6

**See Table 11

***Order of preference from greatest (1) to least (4)
(see text section 2.3.1.6 for summary)

Table 15. Changes in Wave Energy along the Shoreline of Lower NY Bay For Five Hypothetical Dredging Scenarios. Taken from Kinsman et al, 1979; p23.

	Impact Strips***										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
No Refraction	*318.2	9.5	109.5	83.1	650.9	293.2	187.7	0.0	0.0	0.0	311.5
** No Dredging	345.2	5.2	7.3	199.4	270.0	317.6	91.2	19.6	196.9	19.6	373.8
** Selected Areas Dredged to 45 ft.	345.2	8.1	7.3	177.2	318.2	317.6	80.5	0.0	199.8	0.0	373.8
** Selected Areas Dredged to 90 ft.	356.7	6.5	7.3	177.2	376.1	298.1	66.2	0.0	182.4	14.7	405.0
** Entire Mining Area Dredged to 90 ft.	345.2	7.5	7.3	193.9	221.8	254.1	92.1	39.1	205.6	29.5	373.8

*Reported in arbitrary energy units per meter of shoreline X 10^{-4}.

** See Figure 61 for location of hypothetical dredging areas on East Bank.

*** See Figure 23 for location of shoreline impact strips.

TABLE 16. Low catch, Biomass, Species, and Diversity Stations from 1984-85 SUNY Survey of Lower Bay Complex. Taken from Woodhead and McAfferty (1986): p56

Parameter	Inner Raritan Sta. Code, IR	East Raritan Sta. Code, RB	West Bank Sta. Code, LW	East Bank Sta. Code, LE
		SUBAREAS		
Total Catch	01, 02, 05	02, 03, 04, 09, 11	06	04, 06
Total Biomass	01, 02, 03	02, 04, 05, 08, 11	04, 06, 11	03, 04, 06
Number Species	01, 02, 03, 04	02, 04, 10	05, 06, 07	04, 06, 07
Diversity Indices				
Shannon Weaver, H'	03, 05	05, 10	04, 07, 10	04, 07, 08
Simpson, D	03, 05, 08	05, 10	04, 07	04, 07, 08
Margalef, d	01, 03, 04	10	04, 05, 06, 07	04, 06, 07
Hurlburt, PIE	03, 08	05, 07, 10	04, 07	04, 07, 08

Underlined stations have lowest value

(see Figure 51 for station locations)

Table 17. Cultural Resource Management Recommendations for Proposed Borrow Pit Areas. Taken from NYD, 1986.

BORROW AREA	POTENTIAL CULTURAL RESOURCES	RECOMMENDATIONS FOR IDENTIFYING CULTURAL RESOURCES
Lower Bay (Raritan Reach)	Post-glacial land surfaces with prehistoric sites	Subbottom Profiling Side Scan Sonar Sedimentary Cores
	Shipwrecks	Side Scan Sonar Magnetometer
Ambrose Channnel	Shipwrecks	Side Scan Sonar Magnetometer
East Bank	Post-glacial land surfaces with prehistoric sites	Subbottom Profiling Side Scan Sonar and Sedimentary Cores
	Shipwrecks	Side Scan Sonar Magnetometer
Sandy Hook Channel	Shipwrecks	Side Scan Sonar Magnetometer

Table 18. Identification and Characteristics of Surficial Sand Deposits in the Lower Bay (see Figure 39 for map). Taken from Brinkhuis, 1980.

Deposit	Type	Grain-size range (mm)	Av. median dia. (mm)	Area (km^2)	Thick-ness (m)	Volume ($x10^6$. m^3)	Bore-hole data available?
I	medium sand	0.250-0.392	0.314	10.9	11.0	119.3	yes
II	fine sand	0.043-0.268	0.185	12.0	11.0	131.8	no
III	fine sand	0.157-0.245	0.201	5.1	12.2	61.7	yes
IV	coarse-very coarse sand	0.441-0.906	0.875	-	*	-	yes
Va	medium sand	0.281-0.412	0.362	4.86	9.1	44.2	no
Vb	medium sand	0.261-0.466	0.372	*	*	*	no
VIa	fine sand	0.143-0.304	0.178	*	*	*	no
VIb	very fine-medium sand	0.158-0.669	0.273	*	*	*	no
VII	very fine sand	0.102-0.116	0.112	*	*	*	no
VIII	fine sand	0.128-0.337	0.173	*	*	*	no
IX	fine sand and mud	0.053-0.426	0.227	5.8	13.4	77.0	no
X	fine-medium sand	0.156-0.376	0.257	5.8	9.1	52.5	no
XI	fine sand	0.154-0.235	0.189	2.3	9.1	21.0	no
XII	very fine sand-mud	0.008-0.236	0.068	*	*	*	no
XIII	mud	0.005-0.039	0.029	*	*	*	no
XIV	medium sand	0.310-0.460	0.389	*	*	*	no
XV	fine-very fine sand	0.110-0.182	0.133	4.0	24.1	97.5	no
XVI	very fine sand-mud	0.005-0.162	0.055	*	*	*	no
XVII	medium sand	0.218-0.316	0.298	10.2	18.3	185.9	yes
XVIII	mud-shell	*	*	4.2	19.5	80.9	no
XIX	medium sand	0.270-0.521	0.340	7.0	15.9	110.7	yes
XXa	mud, shell, medium sand	*	*	*	*	*	yes
XXb	mud, shell, fine sand	*	*	6.9	48.8	335.7	no
XXI	medium-very coarse sand	0.361-1.000	0.738	12.0	2.4	28.9	yes
XXII	medium sand	0.274-0.438	0.354	140.2	42.7	598.4	yes
XXIII	fine sand	0.102-0.230	0.176	2.1	42.7	88.1	yes
XXIV	medium sand	0.171-0.669	0.428	*	*	*	no
XXV	coarse sand	0.525-1.117	0.730	*	*	*	no
Lower Bay Sands	fine-medium sand	*	*	52.1	7.9	413.1	yes
Keansbury Sands	fine sands	*	*	35.7	6.1	217.5	yes
Ward Pt. Sands	fine-medium sand	*	*	5.38	4.0	23.1	yes

*Insufficient data to calculate th parameter.

Table 19. Grain Size of Sediments at Stations Sampled During 1986 - 87 SUNY Benthic Survey of Lower Bay Complex. Taken from Cerrato et al, 1988

SAMPLE	% GR/SH	% SAND	% SILT	% CLAY
1	28.1%	22.4%	31.4%	18.1%
2	6.1%	42.7%	31.0%	20.3%
3	0.4%	98.5%	-0.0%	1.1%
4	8.8%	72.4%	7.9%	10.9%
5	3.7%	95.7%	0.7%	0.0%
6	0.2%	98.4%	0.2%	1.2%
7	0.0%	43.4%	37.4%	19.2%
8	0.0%	98.7%	0.1%	1.1%
9	0.0%	98.1%	0.7%	1.2%
*10	0.0%	8.1%	43.0%	48.9%
11	0.2%	98.9%	0.1%	0.8%
12	6.2%	91.4%	0.7%	1.8%
13	4.3%	87.0%	1.2%	7.5%
14	0.0%	21.7%	37.4%	40.9%
15	0.0%	12.7%	45.7%	41.6%
16	2.4%	5.9%	49.7%	42.0%
17	0.0%	32.7%	33.0%	34.3%
18	1.3%	72.6%	11.2%	14.8%
19	2.7%	94.4%	0.8%	2.2%
✓ 21	3.0%	95.6%	0.2%	1.1%
24	11.7%	19.5%	39.5%	29.3%
25	0.0%	7.4%	46.0%	46.7%
26	5.2%	74.9%	10.3%	9.6%
27	0.0%	15.9%	44.0%	40.0%
28	12.9%	57.1%	14.3%	15.7%
29	0.6%	97.1%	2.2%	0.1%
30	0.5%	19.1%	60.8%	19.7%
31	2.5%	95.9%	0.4%	1.3%
32	11.6%	78.2%	4.6%	5.6%
34	0.5%	5.2%	48.4%	45.9%
36	0.2%	63.1%	21.8%	15.0%
**37	0.0%	17.0%	45.7%	37.2%
***38	0.0%	82.5%	11.1%	6.4%
40	2.0%	97.2%	0.6%	0.2%
41	4.9%	93.1%	0.7%	1.4%
42	19.0%	76.2%	2.6%	2.2%
43	1.1%	50.0%	32.8%	16.1%
46	1.6%	91.3%	3.3%	3.8%
47	0.0%	98.6%	0.2%	1.2%
48	0.0%	10.7%	46.4%	42.9%
49	0.0%	94.7%	2.0%	3.3%

SAMPLE	% GR/SH	% SAND	% SILT	% CLAY
50	6.0%	35.4%	30.5%	28.1%
51	3.0%	95.5%	-0.0%	1.5%
52	0.6%	95.0%	2.7%	1.7%
53	2.7%	35.7%	31.4%	30.2%
54	0.8%	97.5%	0.5%	1.3%
55	10.3%	26.2%	33.1%	30.5%
56	0.6%	7.5%	52.8%	39.1%
57	3.4%	93.4%	1.2%	2.0%
58	5.8%	13.6%	47.4%	33.2%
59	0.0%	15.6%	43.9%	40.5%
60	2.5%	33.5%	35.7%	28.3%
62	0.0%	1.9%	54.8%	43.3%
68	3.2%	80.4%	8.4%	8.0%
69	0.0%	93.3%	2.4%	4.4%
70	0.0%	38.4%	25.1%	36.5%
71	0.0%	95.2%	1.8%	3.0%
73	1.3%	41.3%	22.0%	35.3%
80	0.0%	2.6%	47.7%	49.7%
81	0.1%	98.9%	-0.0%	1.0%
82	0.0%	97.6%	0.5%	2.0%
83	12.6%	85.0%	0.6%	1.8%
84	14.0%	83.5%	1.1%	1.4%
85	0.0%	50.5%	23.0%	26.5%
86	0.0%	64.8%	13.8%	21.4%
87	0.0%	21.3%	36.8%	41.9%
88	3.6%	94.7%	0.1%	1.5%
89	0.0%	99.0%	0.1%	0.9%
90	0.0%	99.3%	0.1%	0.6%
91	0.8%	98.0%	1.3%	-0.0%
92	23.8%	75.0%	0.5%	0.7%
93	5.3%	93.5%	0.1%	1.1%
94	0.0%	98.1%	0.3%	1.6%
95	41.1%	57.9%	0.2%	0.7%
96	0.4%	99.3%	0.2%	-0.0%
97	0.0%	99.0%	0.1%	0.9%
98	52.2%	44.9%	1.1%	1.8%
99	21.8%	70.9%	3.8%	3.6%
100	0.0%	98.7%	0.1%	1.2%
101	0.0%	98.8%	0.3%	0.8%
102	0.0%	96.4%	2.0%	1.6%
103	7.9%	62.8%	16.4%	12.9%
104	2.1%	80.0%	10.7%	7.1%
105	0.0%	35.8%	39.9%	24.4%

See Figure 11 for station locations

See Table 20. C.

*station in pit 4 **station in pit 2 ***station in pit 3

pit 6 located in area C (C2-5, 8-10)

Table 20. Grain Size of Sediments at Special Shoal Areas Sampled During 1986 - 87 SUNY Benthic Survey of Lower Bay Complex. Taken from Cerrato et al, 1988

SAMPLE	% GR/SH	% SAND	% SILT	% CLAY
A-1	12.5%	53.1%	18.3%	16.0%
A-2	3.3%	88.8%	5.0%	2.9%
A-3	1.3%	96.6%	0.6%	1.5%
A-4	6.6%	3.7%	54.2%	35.5%
A-5	7.2%	10.5%	49.3%	33.0%
A-6	2.9%	15.4%	51.1%	30.6%
A-7	0.0%	18.9%	46.3%	34.8%
A-8	2.9%	8.5%	53.3%	35.3%
A-9	0.0%	71.2%	15.1%	13.7%
A-10	2.8%	10.1%	49.2%	38.0%
B-1	0.0%	98.1%	0.4%	1.5%
B-2	0.4%	97.6%	0.8%	1.2%
B-3	0.0%	96.7%	0.9%	2.5%
B-4	0.0%	89.0%	11.0%	0.0%
B-5	6.7%	31.7%	28.6%	33.0%
B-6	0.0%	34.8%	31.4%	33.8%
B-7	4.9%	45.8%	21.5%	27.9%
B-8	17.9%	41.9%	18.6%	21.6%
B-9	3.1%	80.6%	7.2%	9.1%
B-10	2.8%	90.0%	3.1%	4.1%
C-1	34.7%	49.3%	16.0%	-0.0%
*C-2	0.0%	88.3%	4.8%	6.8%
*C-3	0.0%	98.6%	1.1%	0.3%
*C-4	0.9%	97.5%	0.5%	1.1%
*C-5	0.0%	6.3%	49.5%	44.1%
C-6	0.0%	29.5%	31.9%	38.5%
C-7	11.8%	50.8%	37.5%	0.0%
*C-8	6.0%	40.6%	23.8%	29.6%
*C-9	5.8%	33.3%	28.7%	32.2%
*C-10	6.4%	89.7%	1.6%	2.2%

See Figure 11 for station locations.

*most likely stations within pit 6 (based on depth).

Table 21. Metals content in New York Harbor sediments. Taken from NYD, 1984; p 36.

Location	Ag	Cd	Cr	Cu	Co	Mn	Pb	Ti	Zn	Ni	Fe
	μg/gm										%
N. Borrow Pit[1]	6.9±0.5	5.2±0.2	207±17	203±2	26.2±0.4	680±17	319±3	355±20	359±8	52±2	3.15±0.004
Shooters Island[1]	12.2±0.6	12.2±0.2	480±10	550±9	28.4±0.8	415± 5	446±6	257±51	680±23	47±1	3.40±0.1
Mud Dump[2a,b]	NA	1.6[a]	106[b]	76[a], 141[b]	NA	261[a]	68[a], 144[b]	NA	NA	24[b]	1.99
NY Harbor & Hoppers[3]	NA	3.6	NA	180	NA	420	134	NA	NA	NA	3.5
Upper Bay[4]	NA	NA	NA	248	NA	530	202	NA	337	NA	3.3
Raritan Bay[5]	NA	12.8	227	812	NA	667	565	NA	617	44.3	NA
Newark Bay[6]	NA	10.6	247	318	NA	NA	315	NA	497	43.5	NA
Suspended Sediment in Lower Bay*	8.4	8.0	258	322	376	568	376	NA	NA	69	4.15
Inner Harbor[7]	NA	NA	NA	220	NA	NA	390	NA	315	NA	NA
Passaic River mud[8]	NA	22.3	913	NA	29	NA	1784	NA	991	216	0.23

NA - Not Available
* Material in near-surface sediment traps

1. D. Hirschberg, pers. comm. in letter to John Tavolaro of 24 March 1982

2a. Dayal et al., 1981

2b. Carmody et al., 1973

3. Williams et al., 1978 and Conner et al., 1979 as reported by Dayal et al., 1981

4. Williams et al., 1978; top 5 cm of one core.

5. Average of the three highest values of Grieg and McGrath, 1977, from a copy of the data set supplied by R. Reid, National Fisheries Service, 1984.

6. Suszkowski, 1978

7. Olsen et al., 1984, The "Inner Harbor is defined as the Hudson Estuary downstream of mile point 11"

8. Multer, 1978 as reported by Olsen et al., 1984

Table 22. Benthic Abundance along East Bank Station (A1) of Long Island Transect A survey by Steimle and Stone, 1973. Taken from Brinkhuis, 1980.

*Station A1	Month										
Species	F	M	A	M	J	J	A	S	O	N	J
Mytilus edulis	16		4,423	3,926	15,897	92,869	30,144	2,580		16	NO SAMPLE COLLECTED
Harmothoe extenuata					80	497					
Cancer irroratus						577					
Protohaustorius deichmannae	224										
Nereis succinea	16						160				
Trichophoxus epistomus	128										
Harmothoe imbricata						64	64				
Nereis pelagica						96					
Tellina agilis	64					16					
Neopanope texana							64	16			
Lepidodonatus squamata							64				
Phyllodoce mucosa						48					
Parahaustorius holmesi	32										
Spio setosa						32					
Unciola irrorata			16								
Metridium senile					16						
Scolelepsis squamata	16										
Autolytus cornutus			16								
Ischyrocerus anquipes					16						
Total	497	0	4,455	3,926	16,010	94,199	30,497	2,596	0	16	X

Average # of organisms/m² 15,200 Total # taxa 19

* See Figure 46 for station locations

Table 23. Benthic Abundance along the East Bank before Dredging (Sand Mining). Taken from Woodward-Clyde, 1975 (see Figure 48 for station locations).

	Number of organisms/m²							
Station No.	1	2	3	4	5	6	7	8
Taxa								
Rhynchocoela spp.			58.3	8.3			8.3	
Nematoda spp.		25.0		8.3	1,366.7			
Oligochaeta spp.	8.3		16.7	75.0	141.7	783.3	558.3	658.3
Eumida sanguinea	8.3					50.0	83.3	
Paranaitis speciosa							8.3	
Harmothoe extenuata							33.3	
Glycera capitata		8.3			8.3	25.0		
Goniadella gracilis		8.3		16.7	425.0	650.0	8.3	
Nephtys picta	50.0	8.3	8.3				33.3	
Nephtys sp.			16.7				8.3	
Autolytus cornutus							25.0	
Capitella capitata			8.3					
Polydora ligni							8.3	
Scololepis squamata	8.3				8.3			
Spio filicornis	166.6	8.3		16.7		50.0	600.0	50.0
Spiophanes bombyx	91.7	25.0	50.0		8.3		250.0	
Magelona sp.		25.0					8.3	
Tharyx acutus	8.3				8.3	125.0	333.3	
Pherusa affinis	16.6						16.7	
Asabellides oculata	8.3						50.0	
Ampharetidae							25.0	
Cirratulidae							1,016.7	8.3
Glyceridae	8.3					25.0		
Goniadidae		8.3	8.3		41.7			
Magelonidae			50.0					
Phyllodocidae	8.3						8.3	
Polynoidae	8.3						25.0	
Spionidae	66.7	25.0	16.7				216.7	25.0
Unidenti. Polychaete	25.0	41.7	16.7	75.0	16.7	25.0	50.0	8.3
Leptocuma minor					25.0			8.3
Leptochelia filum		33.3		58.3				8.3
Cyathura polita							16.7	
Unciola serrata							216.7	
Unciola irrorata	8.3						150.0	
Unciola sp.				8.3	25.0		8.3	
Elasmopus laevis					8.3		8.3	
Gammarus annulatus	16.7	16.7	8.3	16.7	33.3		58.3	16.7
Bathyporeia quoddyensis			8.3	8.3				8.3
Protohaustorius deichmannae		8.3	116.6	33.3				
Parahaustorius longimerus			33.3	8.3				16.7
Acanthohaustorius millsi		50.0	8.3					16.7
Listriella sp.						50.0		
Paraphoxus spinosus		8.3	8.3				783.3	
Trichophoxus epistomus		8.3						
Haustoridae	8.3			8.3				
Pagurus sp.							25.0	
Libinia emarginata			16.7	8.3				
Ovalipes ocellatus		8.3			41.7	666.7	183.3	
Lunatia heros						25.0		
Nucula proxima	50.0							
Mytilus edulis	25.0	41.7	8.3	316.7	5,550.0	110,708.3	58.3	25.0
Spisula solidissima	91.7	166.7	16.7		33.3	25.0	66.7	308.3
Tellina agilis	108.3	16.7		8.3		50.0	50.0	
# species/grab (1)	10	16	8	7	7	6	25	4
(2)	10	5	9	7	5	5	24	10
(3)	14	9	10	8	14	11	23	5
# organisms/m²/grab (1)	575	825	275	200	17,450	165,100	3,350	2.125
(2)	400	250	625	350	1,100	60,150	5,700	1,075
(3)	1,400	550	525	1,475	4,675	114,525	5,950	275
Av. #/m²	791.3	541.5	474.8	674.8	7,741.6	113,258.3	4,999.6	1,158.2
Total # species	20	20	19	16	16	14	33	13

Table 24. Species, Rank, Seasonal Distribution, and Percent Occurrence of the Fifteen Most Common Fish Caught in Otter Trawls of the Lower Bay. Taken from Berg & Levinton, 1985; p 62.

RANK	SPECIES	NUMBERS PER TRAWL												
		JAN	FEB	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL # /TRAWL	% OF TOTAL	% OC-CUR.*
1.	Bay anchovy	0.07	--	0.08	--	50	0.73	23	287	354	9.4	76	58	27
2.	Silver anchovy	--	--	--	--	--	--	0.13	--	92	--	11	8.4	8.7
3.	Blueback herring	16	3.4	12	3.9	45	--	--	--	0.05	1.8	9.7	7.4	30
4.	Winter flounder	1.4	.08	.62	3.2	4.0	4.9	1.2	3.1	13	17	5.4	4.1	53
5.	Alewife	8.6	28	2.5	1.5	--	0.20	--	--	0.84	13	5.0	3.8	32
6.	Red hake	0.64	0.15	0.15	28	0.96	0.20	--	--	0.05	0.63	3.1	2.3	20
7.	Atlantic menhaden	19	1.7	0.08	0.56	2.8	0.07	--	--	0.95	1.6	2.6	2.0	26
8.	American shad	20	1.0	--	1.6	--	--	--	--	0.05	3.3	2.4	1.8	24
9.	Weakfish	--	--	--	--	0.04	1.4	2.9	12	6.5	1.5	2.3	1.8	28
10.	Windowpane	0.21	0.15	0.38	3.6	1.0	0.33	0.13	0.23	5.5	5.7	2.0	1.5	35
11.	Butterfish	--	--	--	0.13	3.9	0.07	0.80	2.7	6.8	0.16	1.7	1.3	21
12.	Atlantic silverside	0.50	--	--	4.6	4.5	--	--	--	0.47	2.5	1.5	1.1	22
13.	Summer flounder	--	--	--	0.06	0.57	2.7	5.7	1.8	1.5	0.11	1.2	0.91	21
14.	Silver hake	1.1	0.15	0.38	3.4	--	--	--	--	--	5.2	1.1	0.84	21
15.	Bluefish	--	--	--	--	0.13	1.4	0.80	1.8	5.8	0.11	1.1	0.82	16

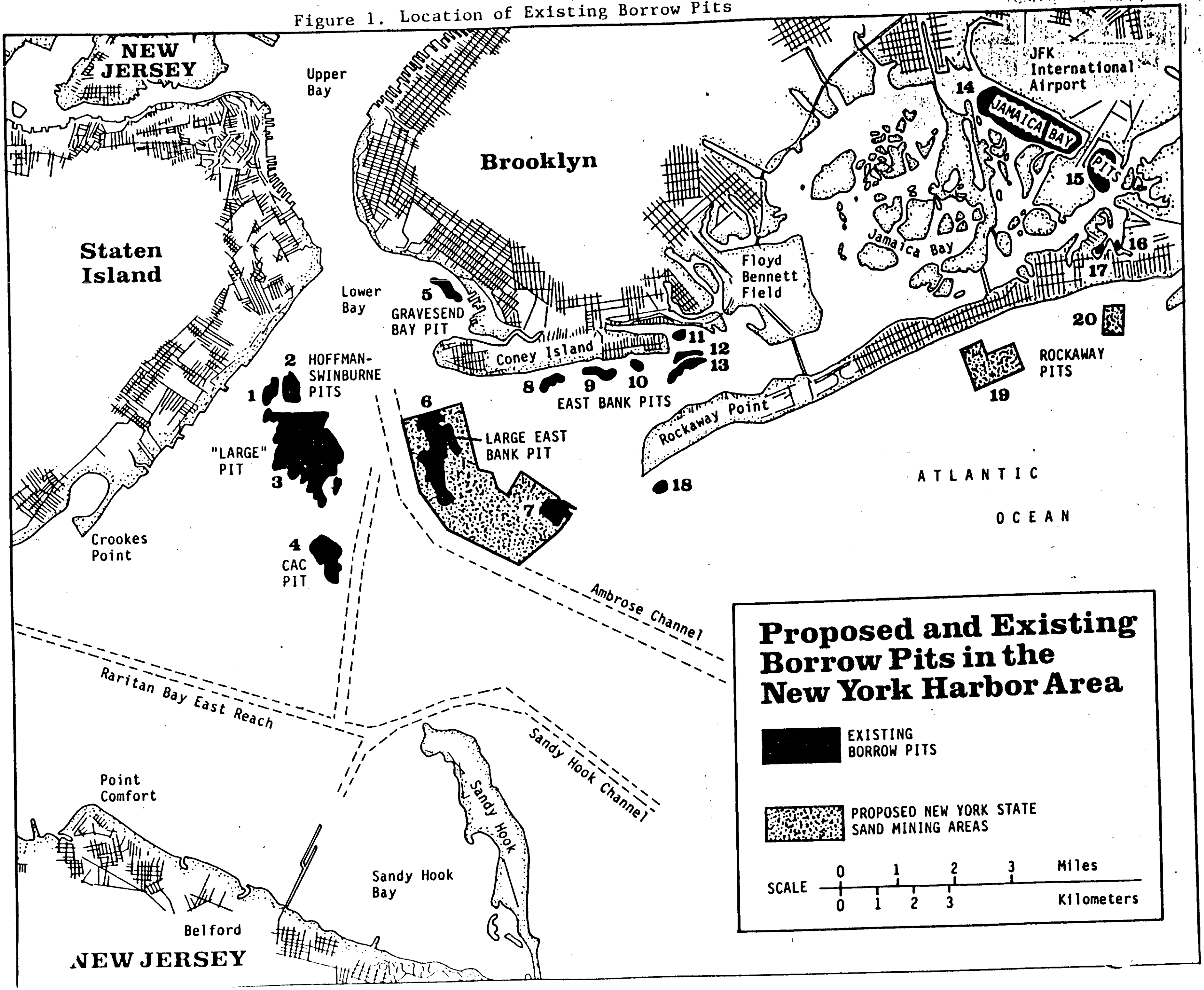
Table 25. **Seasonal Average Catch Abundance for the Lower Bay Complex. Taken from Woodhead and McAfferty (1986): p 23.**

Name Code	Winter,	±se	Spring,	±se	Summer,	±se	Fall,	±se
LAMPREY	-		-		-		0.04	0.04
SM DOGF	-		0.48	0.15	1.98	0.61	-	
SP DOGF	-		-		-		0.15	0.11
LI SKATE	0.36	0.36	0.39	0.25	-		-	
RS SKATE	0.06	0.06	-		-		-	
W SKATE	0.52	0.23	-		-		0.28	0.28
TH SKATE	0.40	0.40	-		-		0.25	0.16
AT STURG	-		0.18	0.10	0.24	0.19	0.06	0.06
AMER EEL	0.14	0.10	0.72	0.48	0.18	0.18	0.05	0.05
CON EEL	-		-		0.69	0.51	0.33	0.17
BB HERRG	42.98	9.85	4.46	1.47	-		296.40	120.92
ALEWIFE	170.20	68.74	2.55	1.36	0.10	0.07	160.15	84.80
AM SHAD	13.87	3.91	3.86	1.29	0.05	0.05	81.84	24.97
AT MENHD	5.53	4.43	0.26	0.12	0.06	0.06	2.46	1.64
AT HERRG	2.29	1.17	-		-		0.14	0.10
RND HERR	-		1.26	1.08	1.10	0.07	-	
BAY ANCH	0.75	0.38	459.00	136.27	3561.53	596.73	24.29	6.50
STR ANCH	-		0.56	0.27	1.48	0.56	-	
TOADFISH	0.05	0.05	-		0.05	0.05	0.05	0.05
GOOSEF	-		-		-		0.10	0.10
4 ROCKLG	0.04	0.04	-		-		-	
SL HAKE	1.56	1.16	9.94	2.72	0.16	0.11	10.53	3.57
TOMCOO	1.91	1.87	0.06	0.06	-		-	
POLLOCK	-		0.44	0.44	-		-	
SPT HAKE	4.91	1.69	19.13	12.18	0.58	0.41	5.82	2.04
W/R HAKE	10.90	8.97	11.58	5.21	0.51	0.40	17.11	12.67
JUV GAD	-		0.05	0.05	-		-	
CUSKEEL	0.08	0.08	0.19	0.14	-		-	
CORNETF	-		-		0.05	0.05	-	
A SILVER	2.85	1.73	-		-		7.05	1.95
3 STICKL	0.13	0.07	-		-		-	
SEAHORSE	0.20	0.09	0.13	0.09	0.24	0.12	0.58	0.20
PIPEFISH	0.22	0.09	1.26	0.51	0.69	0.22	1.58	0.61
SEA RAVN	0.09	0.06	0.08	0.08	-		-	
GRUBBY	4.27	1.74	3.74	1.38	0.15	0.11	0.36	0.22
LN SCULP	0.72	0.26	-		0.06	0.06	-	
SH SCULP	-		-		-		0.09	0.09
UN SCULP	0.04	0.04	-		-		-	
BL SEABS	-		0.10	0.07	3.00	1.39	0.15	0.09
GRY SNAP	-		-		-		0.05	0.05
MSC SERR	0.10	0.07	-		-		-	
STR BASS	0.15	0.11	0.08	0.06	0.11	0 11	1.06	0.55
LEPOMIS	-		-		-		0.05	0.05
BLUEFISH	-		1.38	0.50	6.20	4.45	0.06	0.06
CREV JCK	-		0.05	0.05	-		-	
LOOKDOWN	-		0.04	0.04	3.81	1.53	-	
RH SCAD	-		0.32	0.19	0.30	0.17	-	
SLPERCH	-		-		-		0.12	0.12
WEAKFISH	-		0.49	0.24	133.63	70.55	4.84	1.87
SPOT	-		-		0.10	0.10	0.15	0.11
SCUP	-		36.56	9.88	27.54	6.43	-	
SP BUTFL	-		-		0.06	0.06	-	
ST MULL	0.90	0.06	-		-		0.17	0.13
N BARRAC	-		-		0.21	0.21	-	
BLACKF	0.29	0.11	15.54	3.23	6.31	1.73	1.66	0.60
CUNNER	0.40	0.16	3.71	1.96	1.50	0.56	-	
RCK GUNN	0.72	0.22	0.49	0.31	0.21	0.10	1.55	0.71
AM SANDL	37.40	13.43	90.79	57.36	0.06	0.06	0.18	0.13
BUTTERF	-		42.80	11.00	147.83	62.60	5.62	2.98
AT MACKR	-		0.10	0.07	-		-	
N SEARBN	-		0.23	0.11	0.09	0.07	-	
ST SEARB	-		5.31	4.50	24.40	14.91	0.20	0.16
SMM FLND	0.49	0.29	0.05	0.05	0.52	0.21	1.59	0.49
FLUKE	0.10	0.07	19.93	3.11	17.95	3.39	0.30	0.14
4SP FLND	-		0.51	0.32	2.54	1.14	1.72	0.67
WINDOWPN	16.63	4.80	39.57	9.79	8.88	3.11	13.29	3.79
WN FLND	102.40	32.03	101.30	21.31	12.27	2.65	76.44	18.96
HOGCHOKR	-		-		0.06	0.06	-	
PL FILEF	-		-		0.25	0.15	-	
N PUFFER	-		-		0.06	0.06	-	

Table 26. A Comparison of Percent Composition and Ranking of Dominate Species in a West Bank Pit Sampled by Three Studies. From NYD, 1984; p88.

	West Bank pit						All Stations	
	Conover, et al. (1983)		Pacheco (1983)		NMFS (1984)		NMFS (1984)	
	%	Rank	%	Rank	%	Rank	%	Rank
Red Hake	10	5	24	2	53	1	18	3
Winter Flounder	11	3.5	45	1	18	2	28	1
Silver Hake	4	8	11	3	8	3	5	5
Weakfish	11	3.5	4	5	7	4	4	6
Windowpane Flounder	5	7	5	4	4	5	4	7
Bay Anchovy	34	1			2	6	21	2
Alewife	5	6	2	6	2	7	3	8
Butterfish	16	2	2	7	2	8	7	4
Grubby			2	8			1	10
Scup							2	9
American Shad							1	11
Summer Flounder							1	12
Cumulative Percent	96		95		96		95	
Number of Species	8		8		8		12	

Figure 1. Location of Existing Borrow Pits



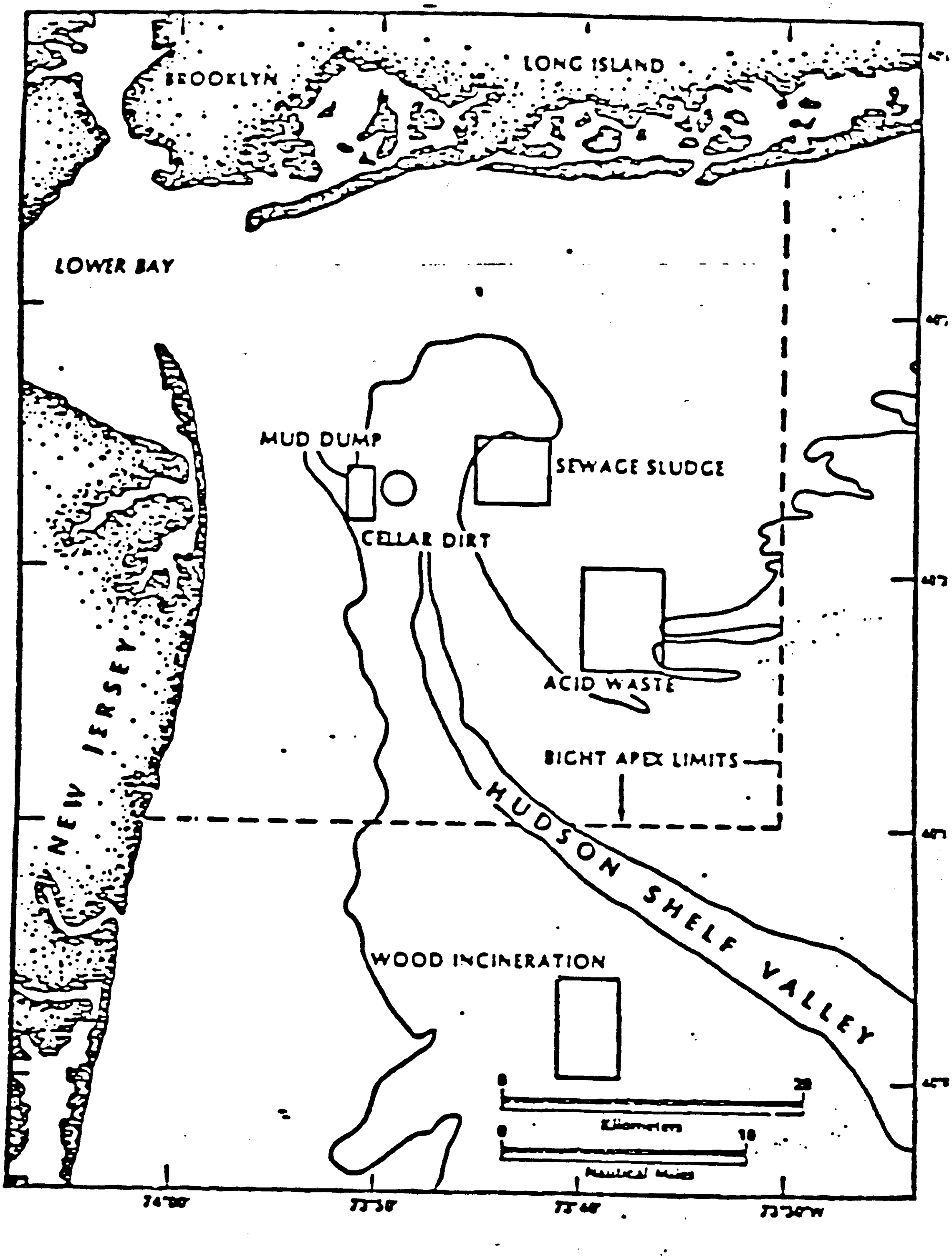


Figure 2. LOCATION OF THE MUD DUMP AND OTHER EXISTING DISPOSAL SITES IN THE NEW YORK BIGHT AREA

Source: EPA, 1982

Figure 3. Containment Area Sites

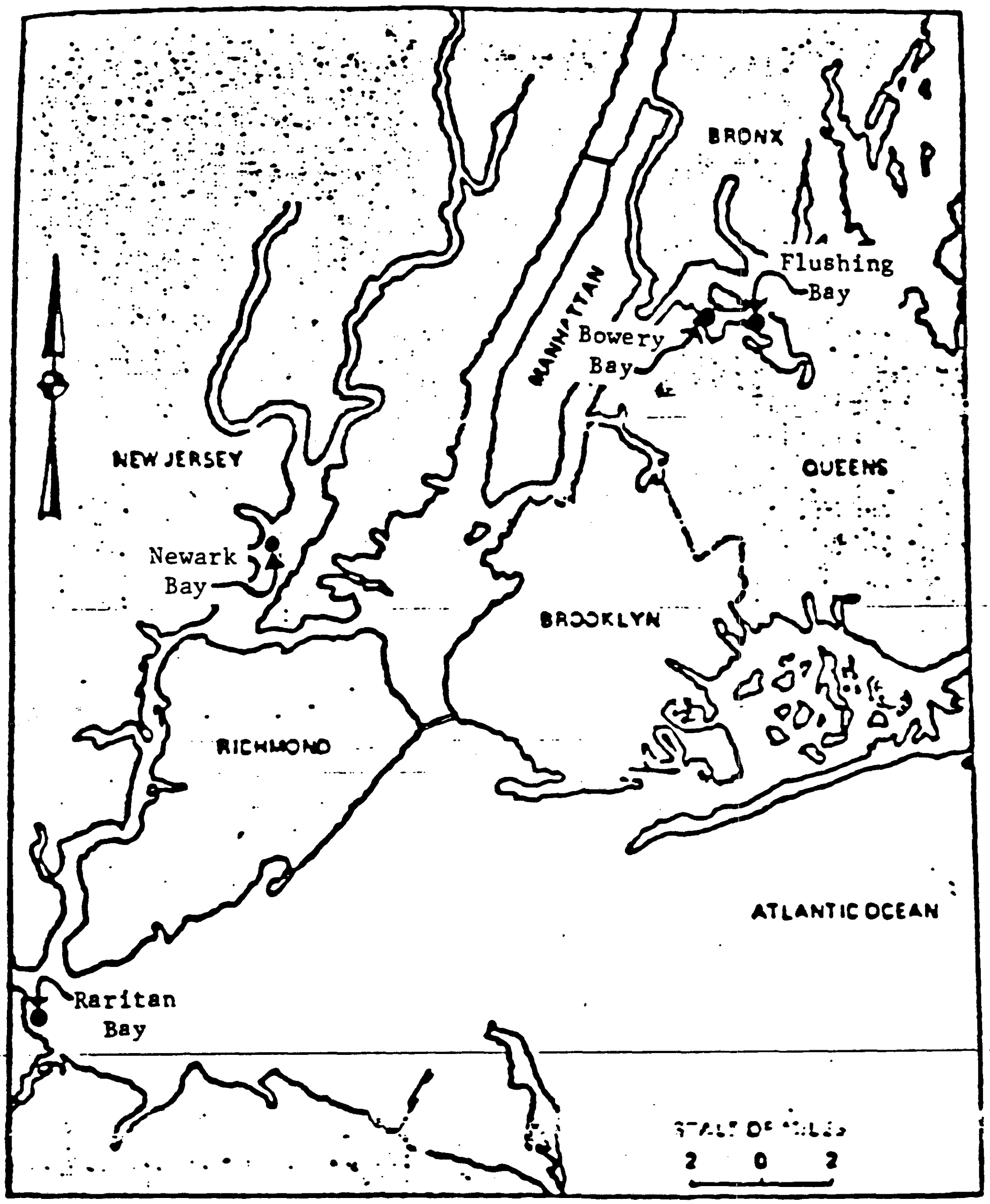


FIGURE 4. Potential Upland Disposal Sites. Modified from PICG, 1985; p 2.

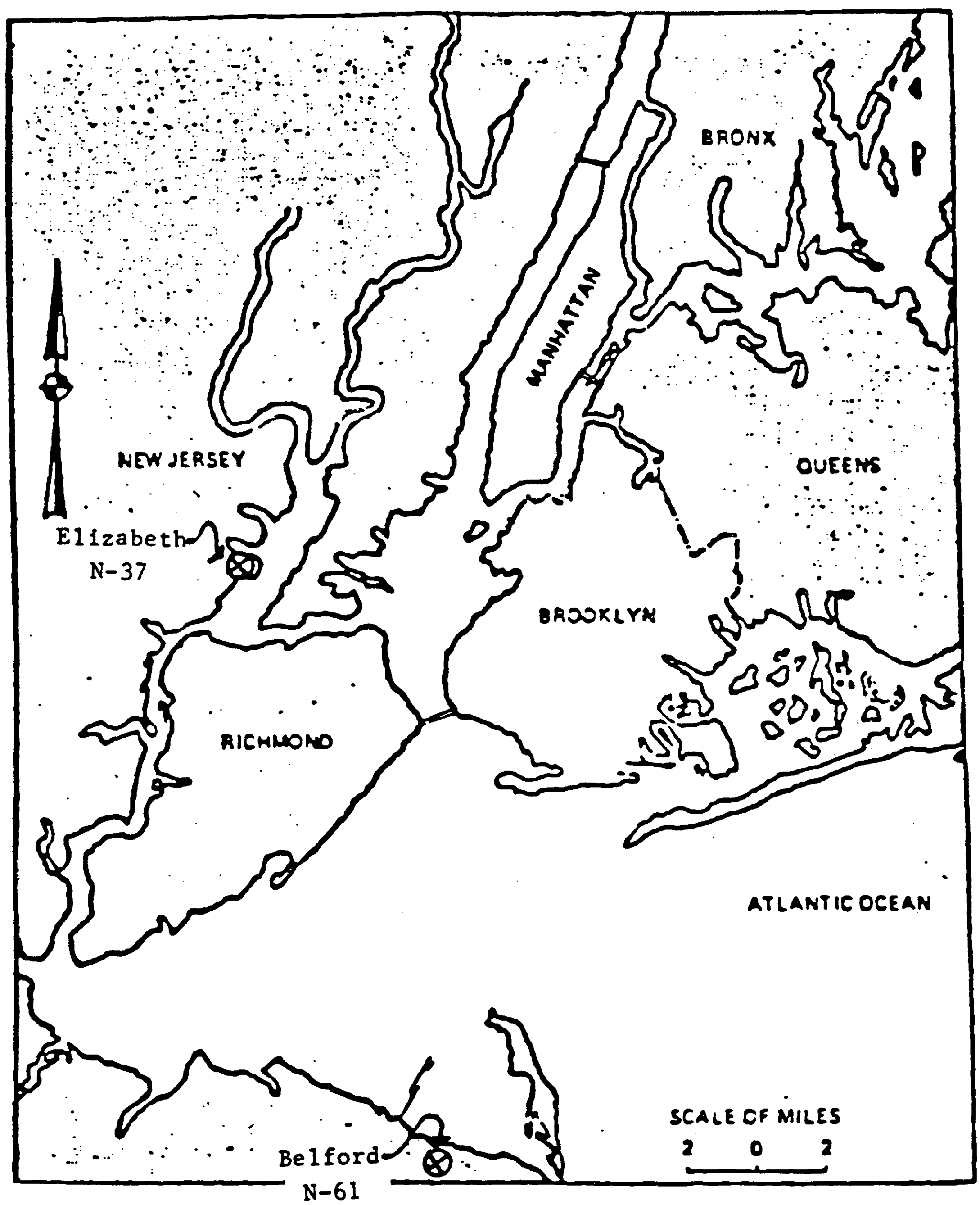


Figure 5. Schematic of Typical Dredge Material Disposal Discharge Plume. Taken from WES, 1986; p2.

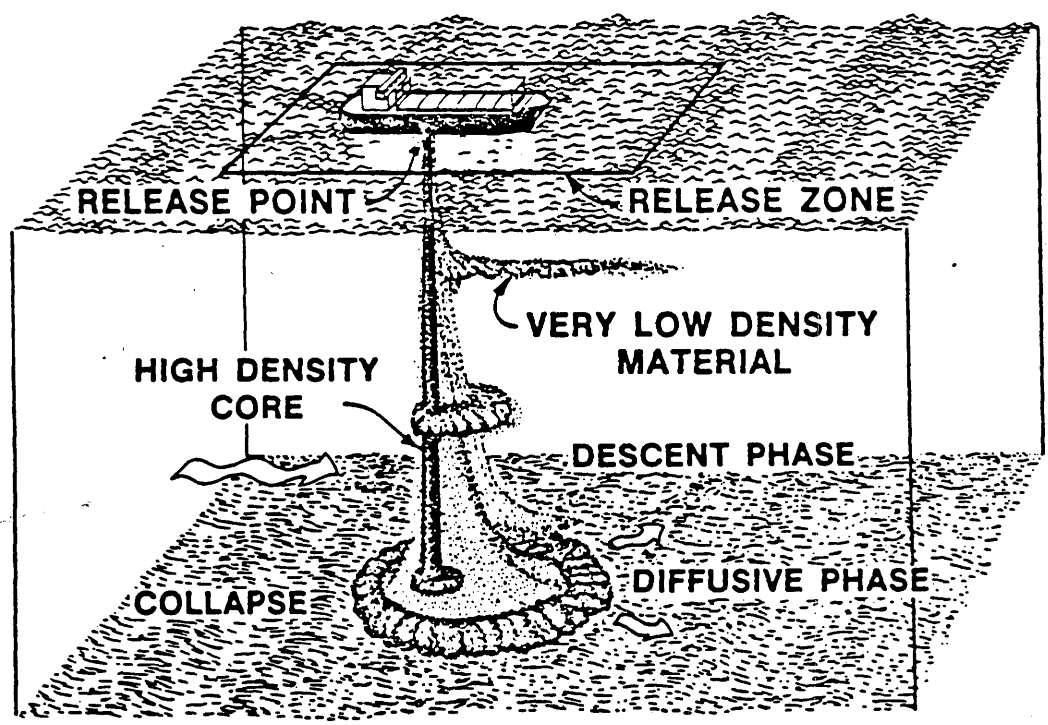


Figure 6. Potential Containment Island Sites, Based on areas of Overall Low Biological Use. Taken from Cerrato et al. (1988).

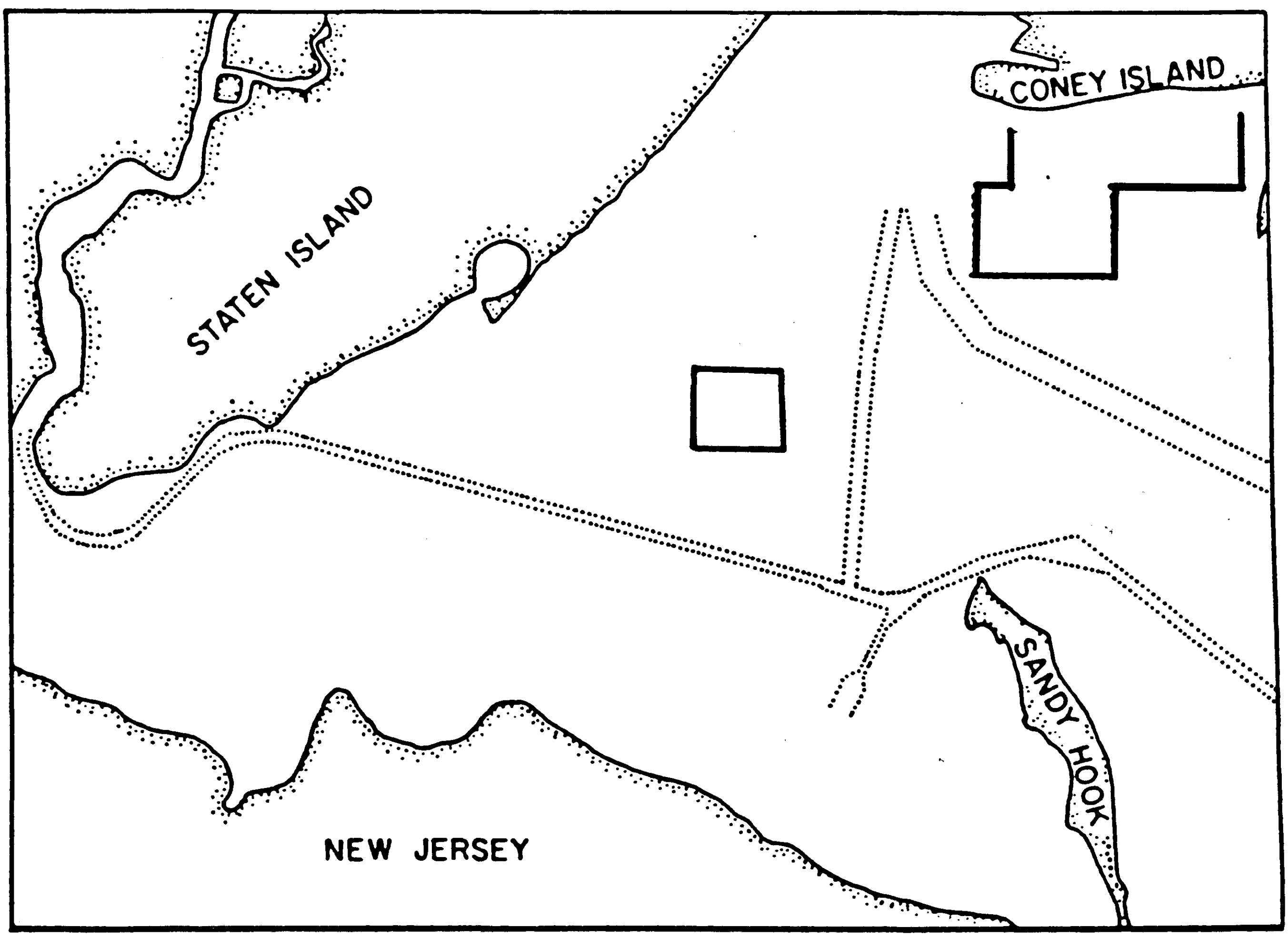


FIGURE 7. Taken from Brinkhuis, 1978; p 103

Projected excess suspended sediment concentrations (mg.1⁻¹) in plumes generated at Old Orchard Shoal and East Bank sites with a mass input of 13.23 kg.s⁻¹. Current vectors (from Doyle and Wilson, 1979) are shown for intermediate water depths.

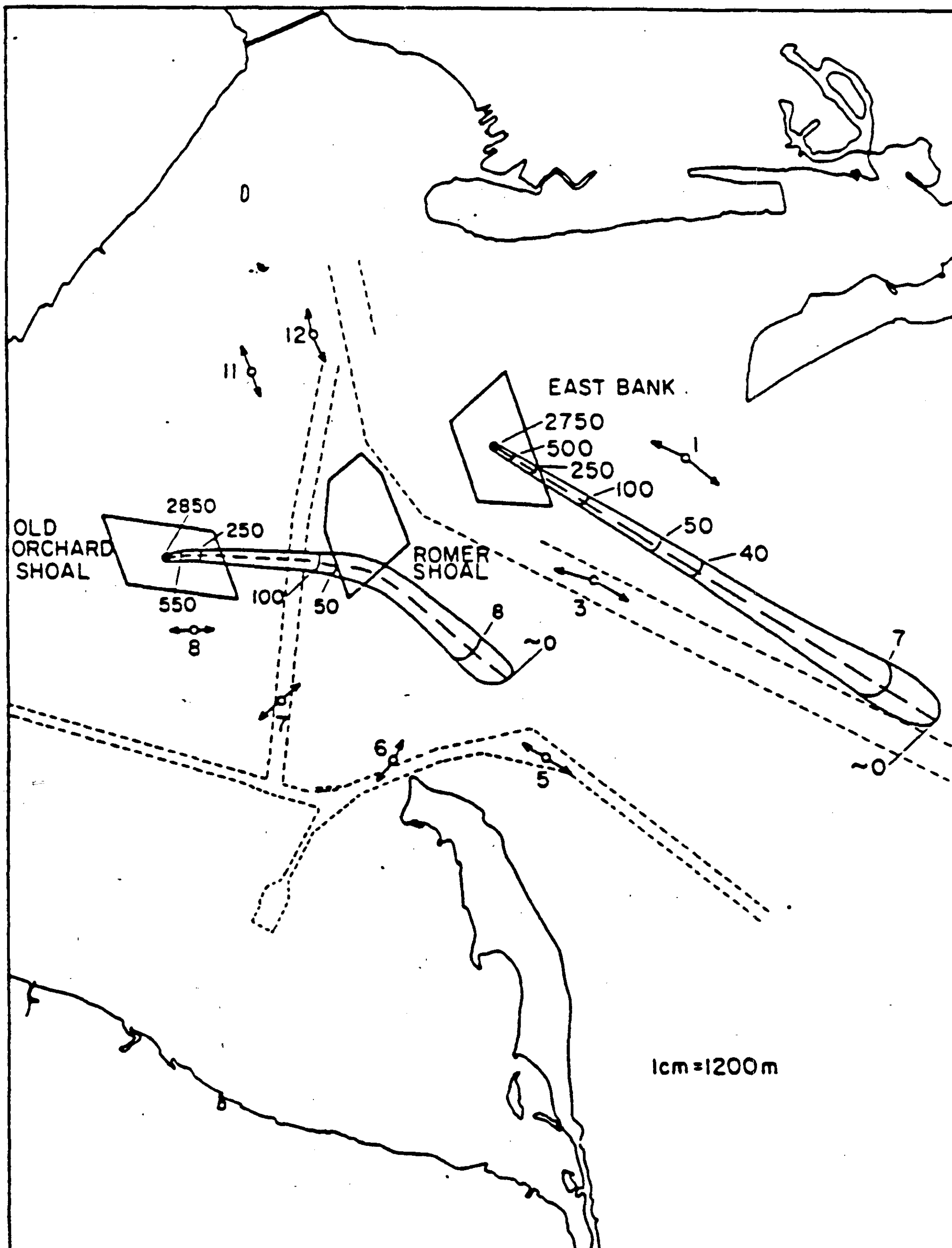
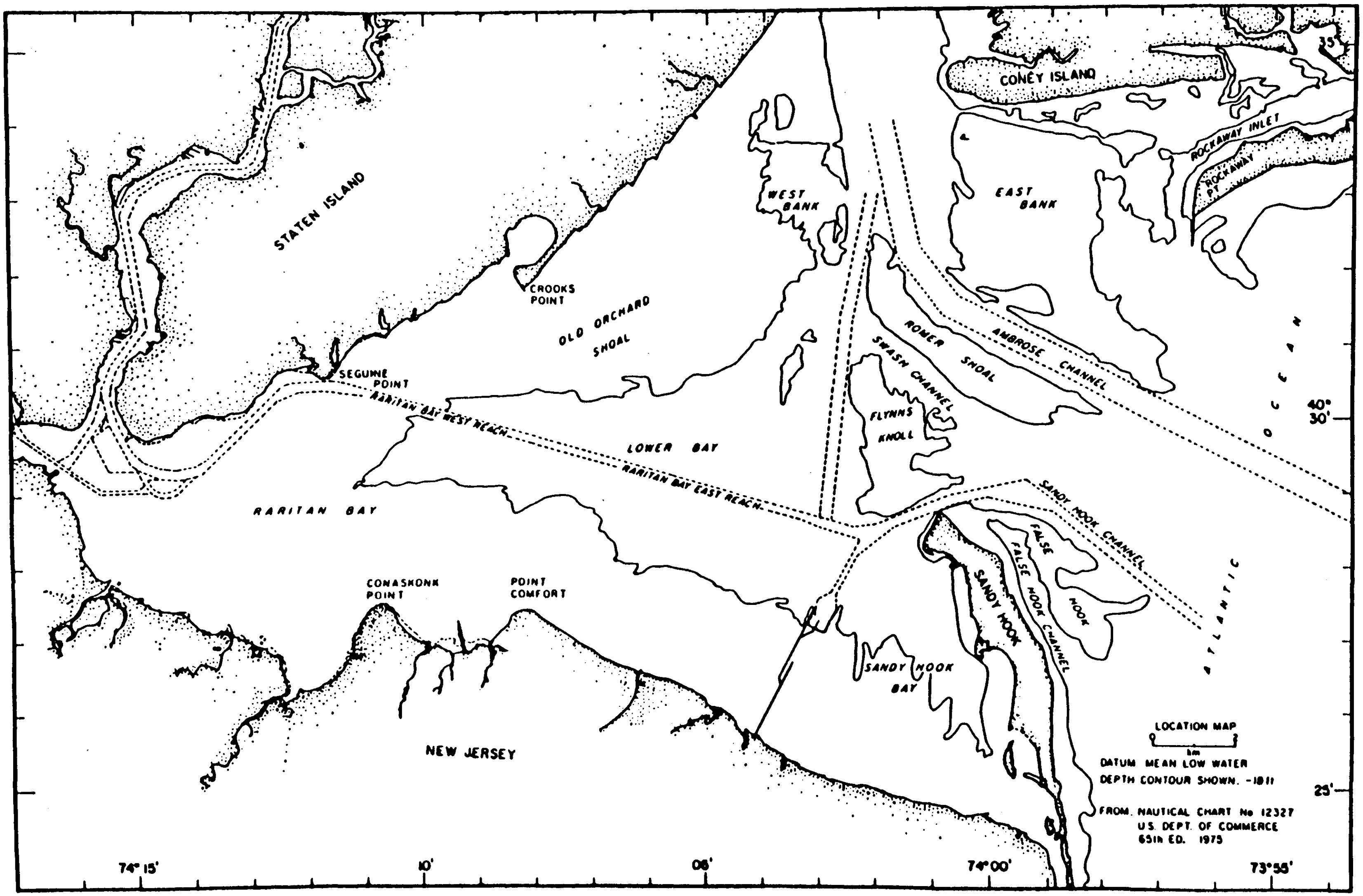


FIGURE 8. Lower Bay/Bight Apex Shoals, Channels, -18 ft depth Contour. Taken from Brinkhuis, 1980; p 2.



F-8

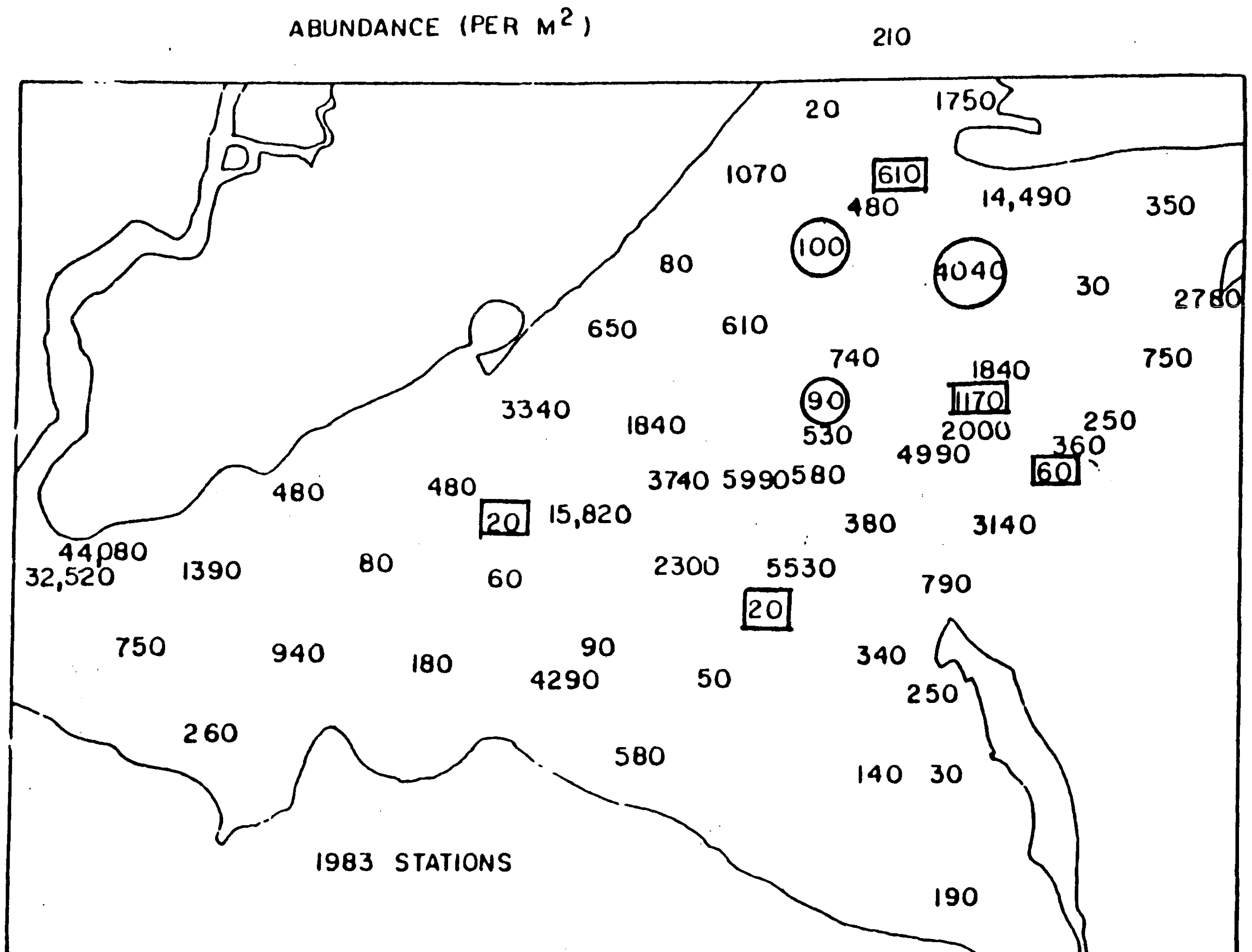


FIGURE 9. Total Abundance of Benthos Collected from Lower Bay Complex During 1983 SUNY, Stoybrook Sampling. Taken from Cerrato and Bokuniewicx, 1986, Figure 2.

□ = station in channel

○ = station in Borrow Pit

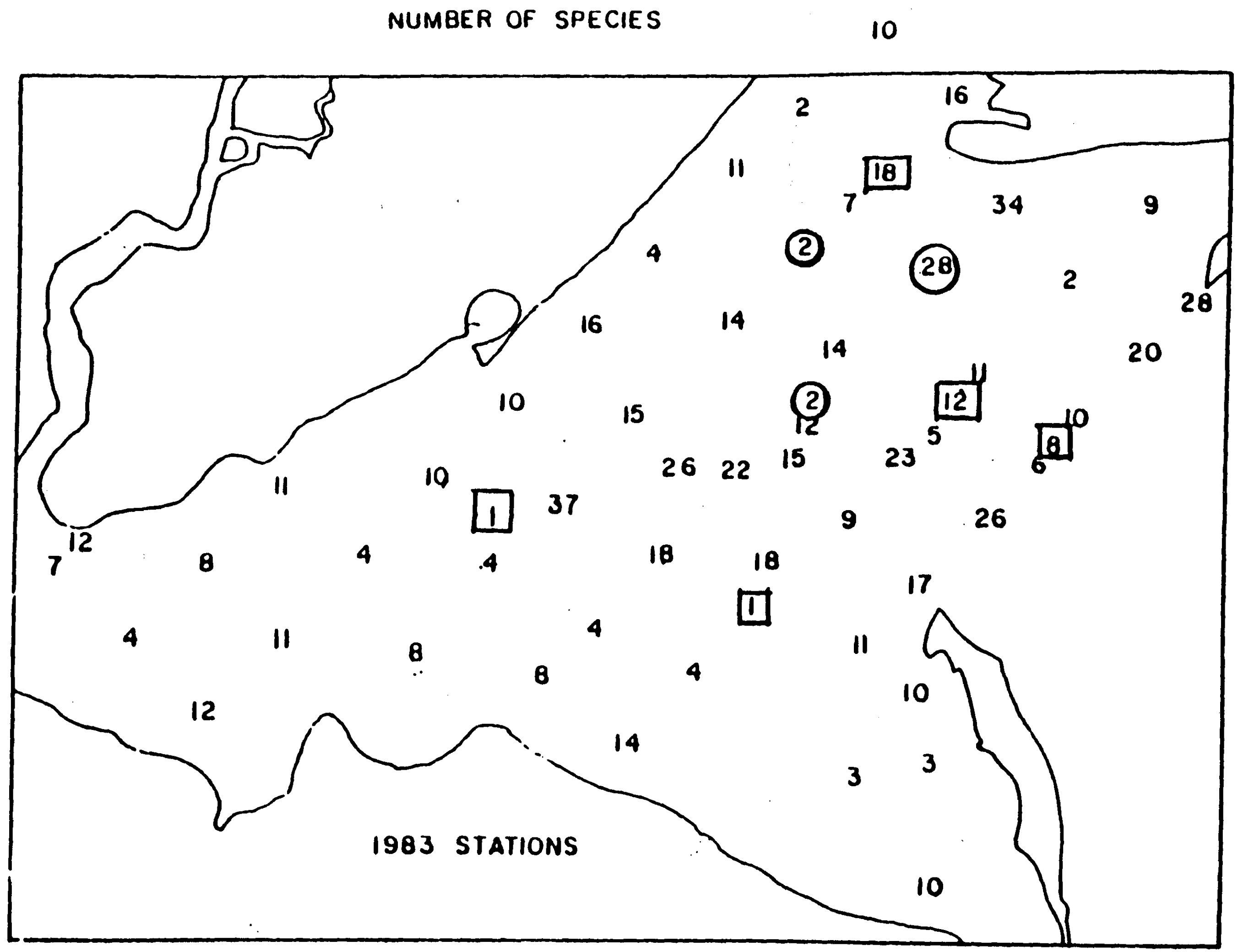
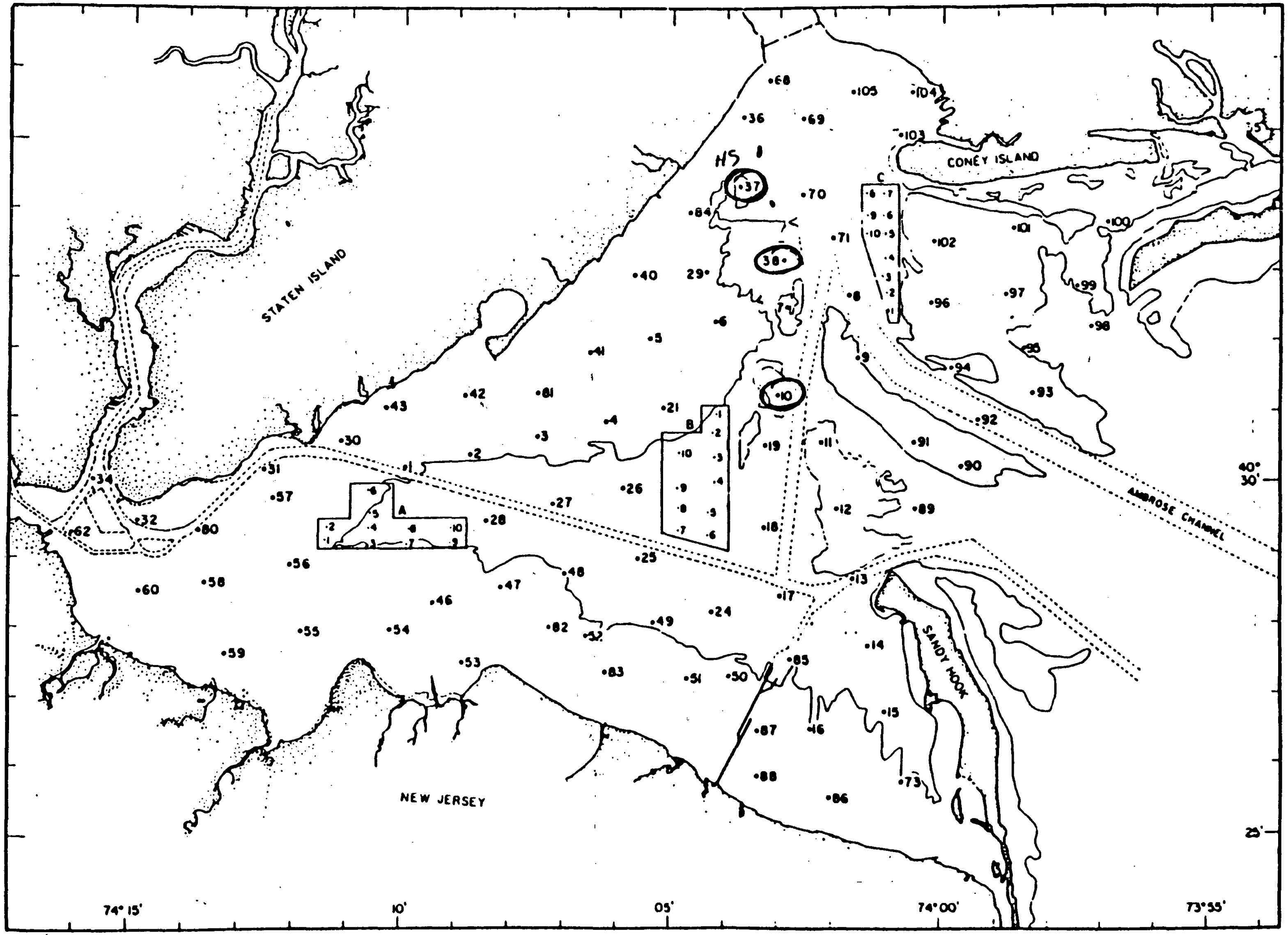


FIGURE 10. Benthic Diversity Found During 1983 Benthic Survey Of Lower Bay Complex.
Taken from Cerrato and Bokuniewicz, 1986, Figure 3.

◯ = station in borrow pit ☐ = station in channel

Figure 11. Station Locations used During 1986 - 87 Suny Benthic Sampling

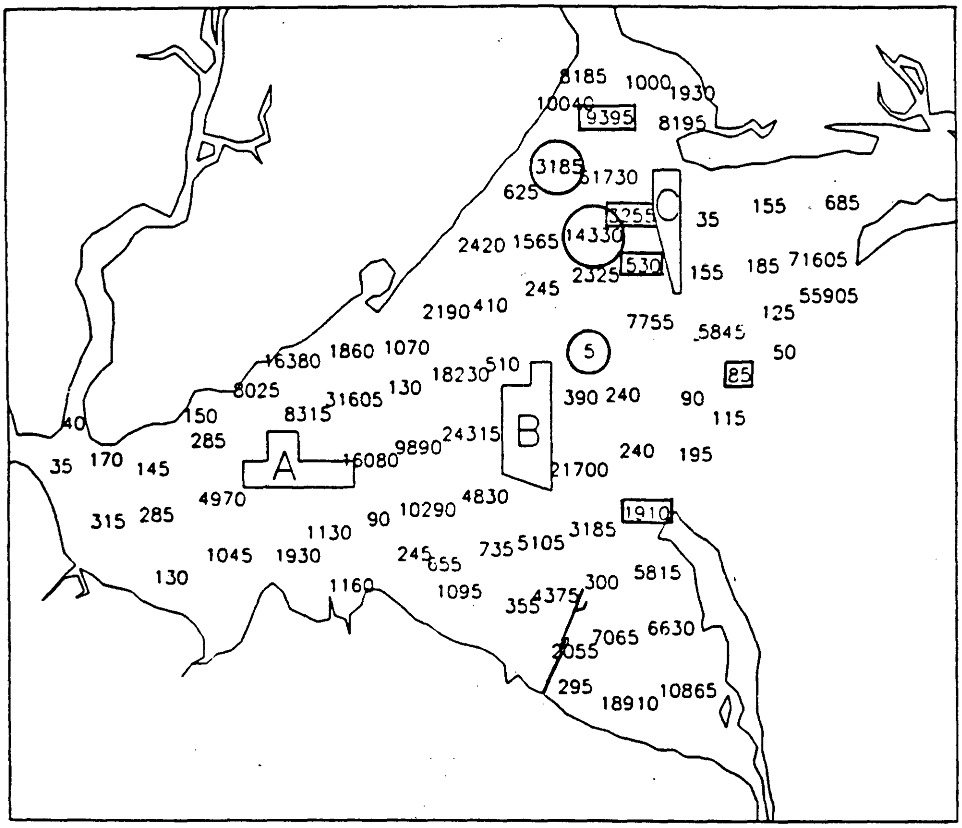


= Station in borrow pit

A, B, C, = Intensely sampled areas (preliminary containment island study sites).

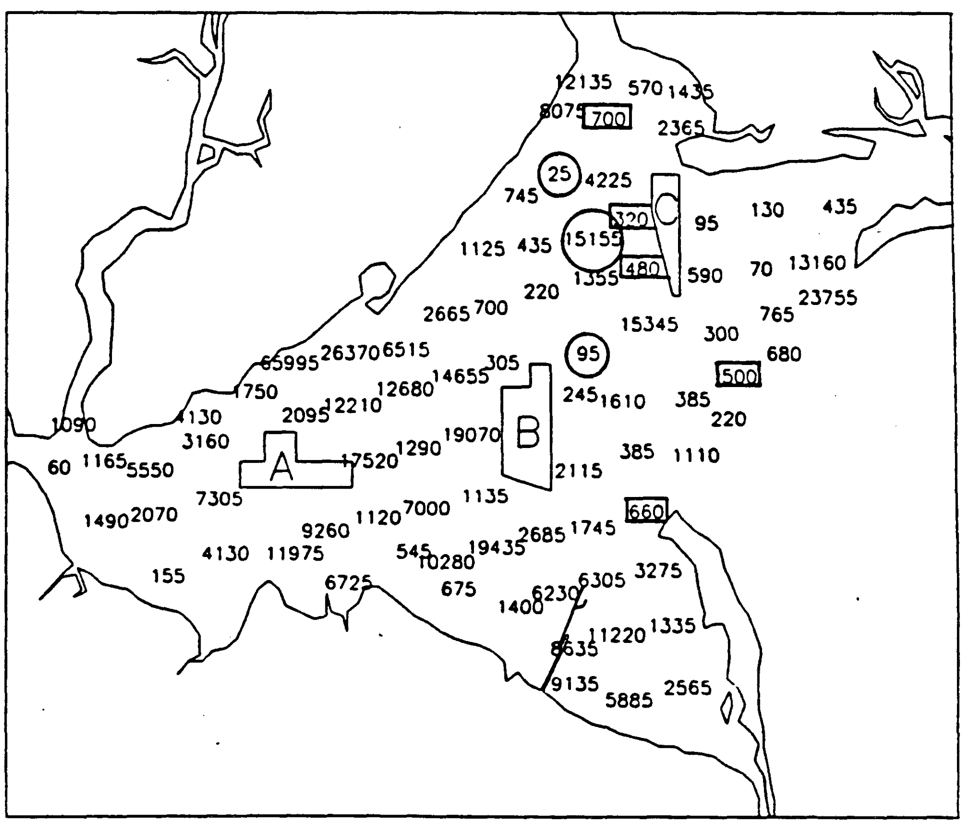
F-11

Figure 12. (part 1 of 2): Seasonal Benthic Abundances (m^2) from 1986 - 87 SUNY Sampling o Lower Bay Complex. Taken from Cerrato et al, 1988.



SPRING

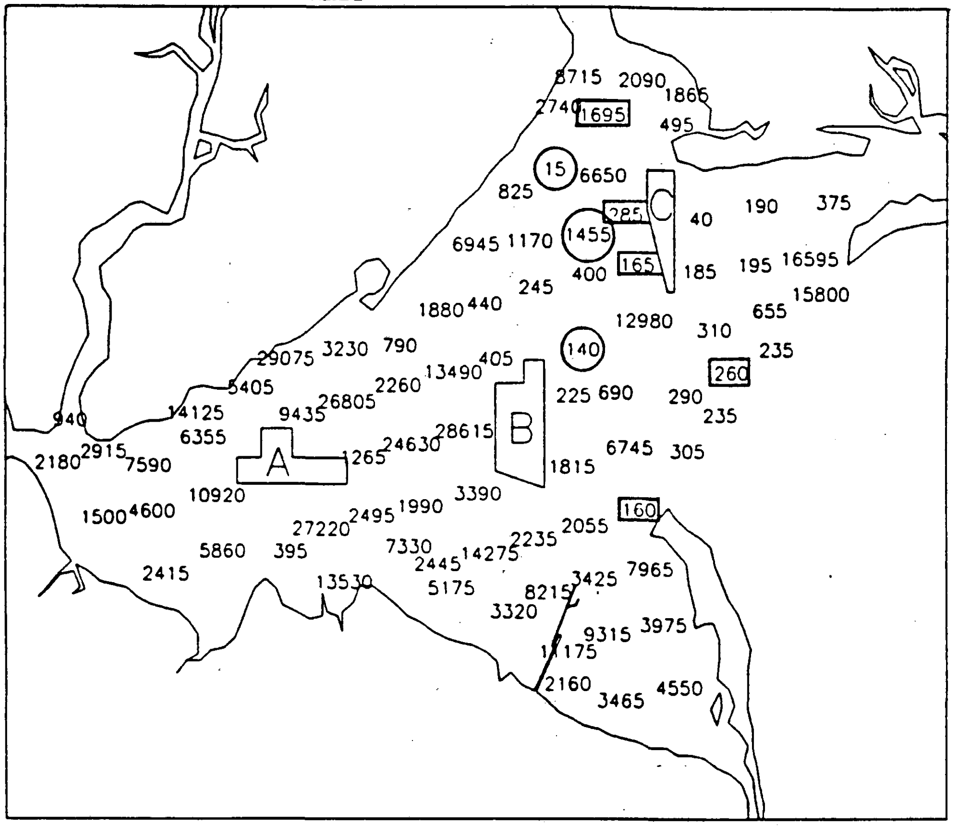
SUMMER



○ = Station in borrow pit   ▭ = Station in channel

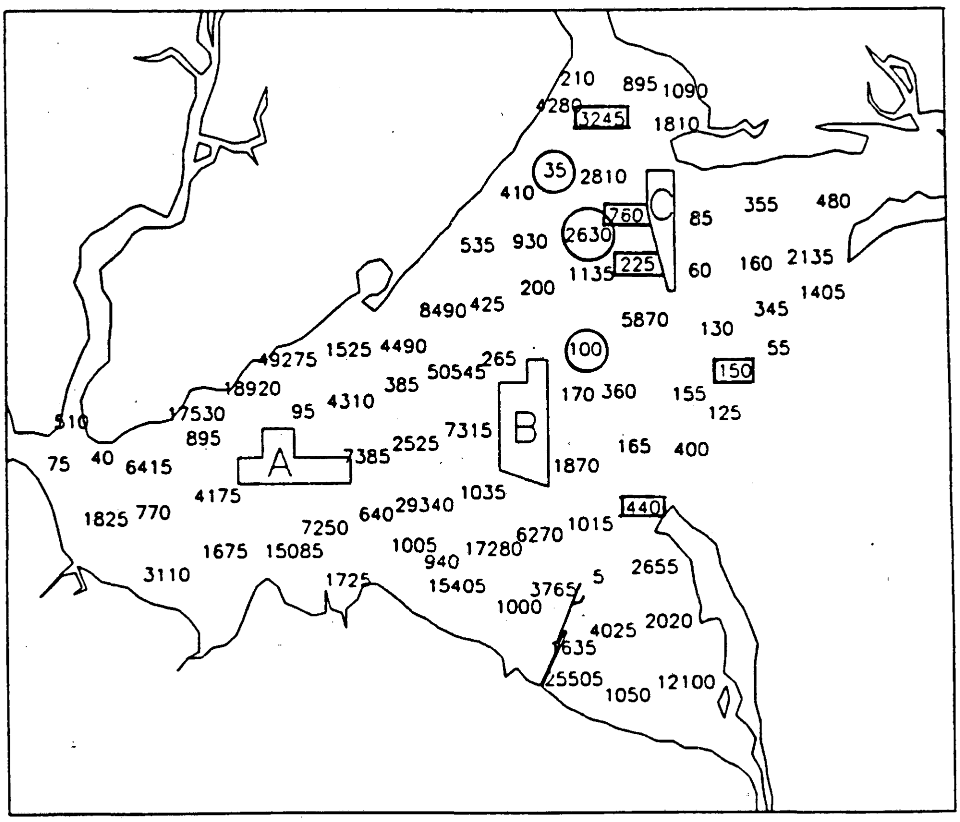
(see Figure 11 for sta locations; Figures 14 & 15 for area C abundances)

Figure 12. (part 2 of 2): Seasonal Benthic Abundances, continued.



FALL

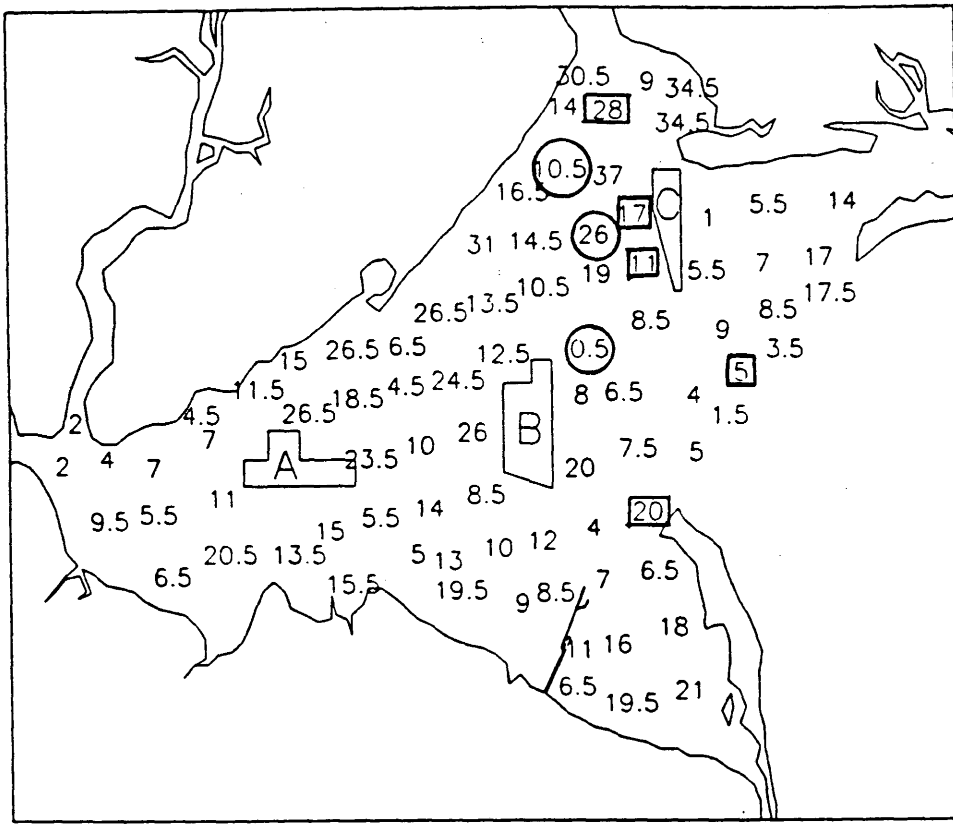
WINTER



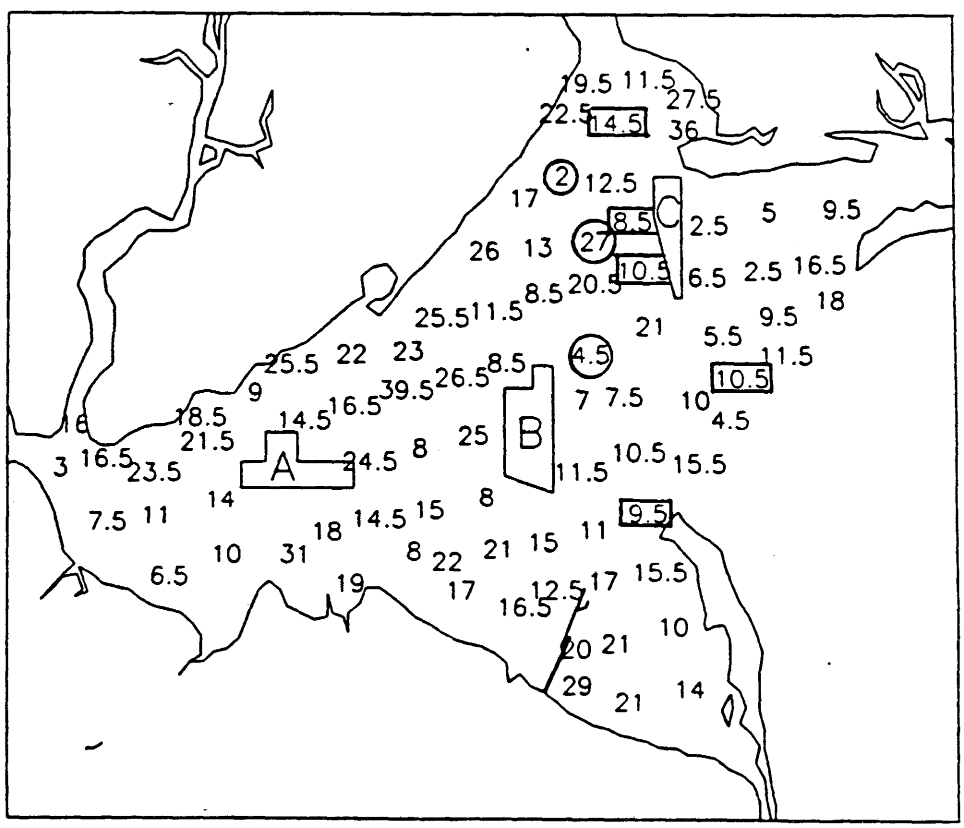
◯ = Station in borrow pit ▭ = Station in channel

(see Figure 11 for sta locations; Figures 14 & 15 for area C abundances)

Figure 13 (part 1 of 2). Seasonal Benthic Species Richness from 1986-1987 MSRC Sampling of Lower Bay Complex. Taken from Cerrato et al, 1988.



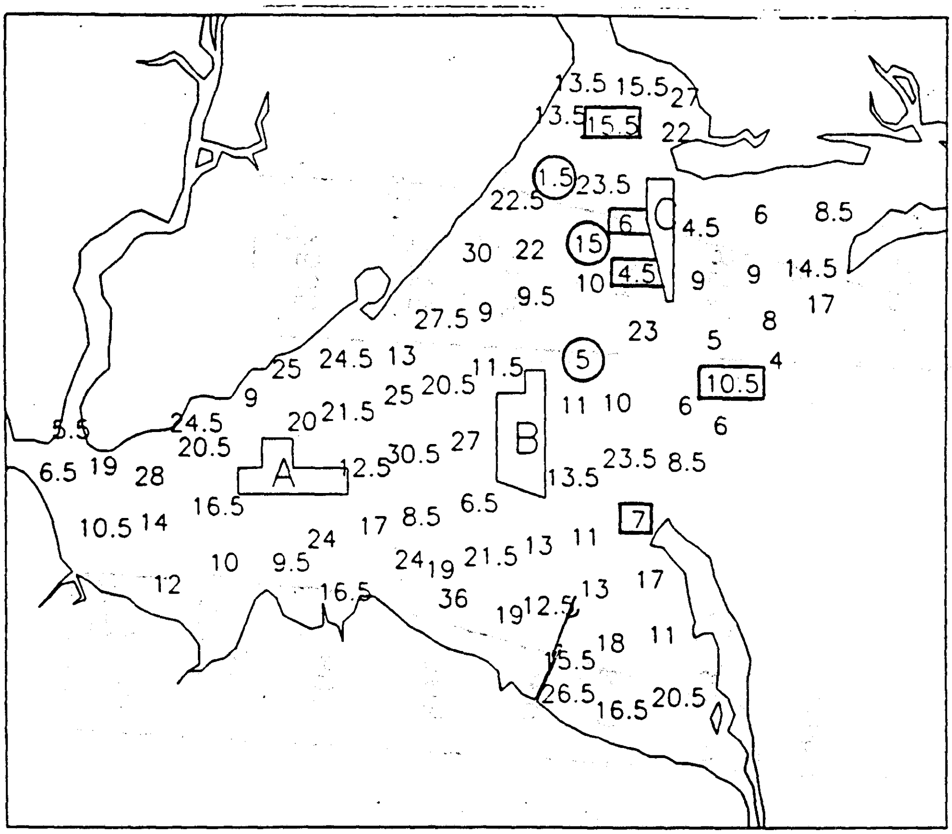
SPRING



SUMMER

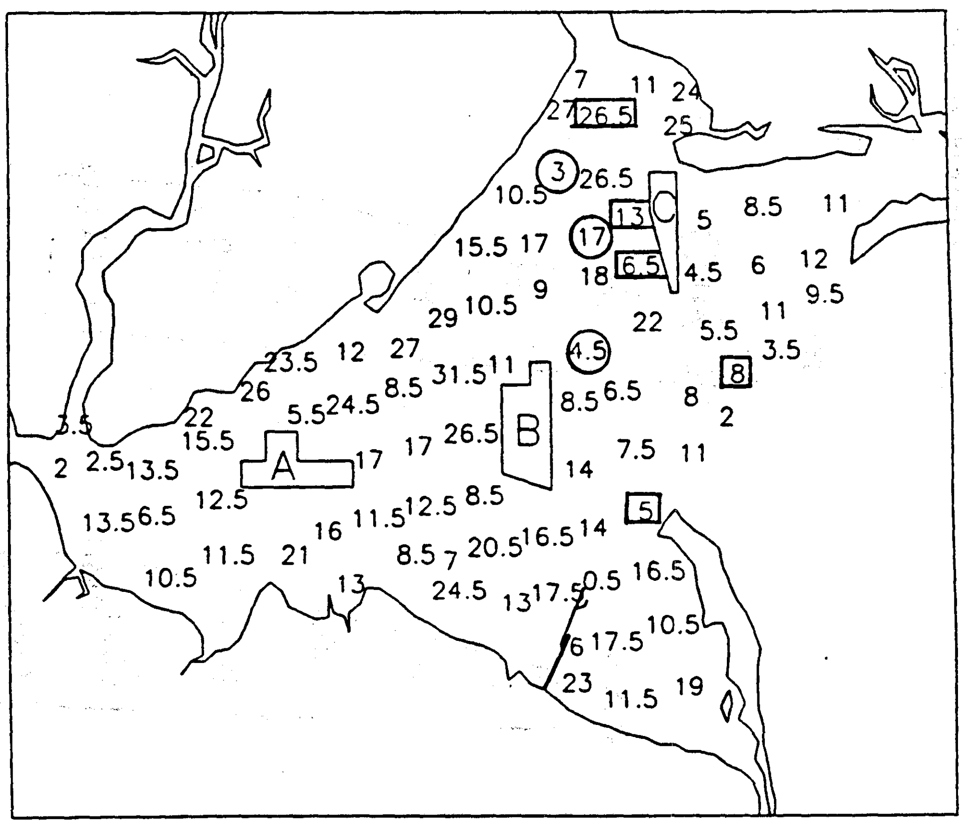
○ = Station in borrow pit ▭ = Station in channel
(see Figure 11 for sta locations; Figures 14 & 15 for area C richness)

Figure 13 (part 2 of 2). Seasonal Benthic Species Richness from 1986-1987 MSRC Sampling of Lower Bay Complex. Taken from Cerrato et al, 1988.



FALL

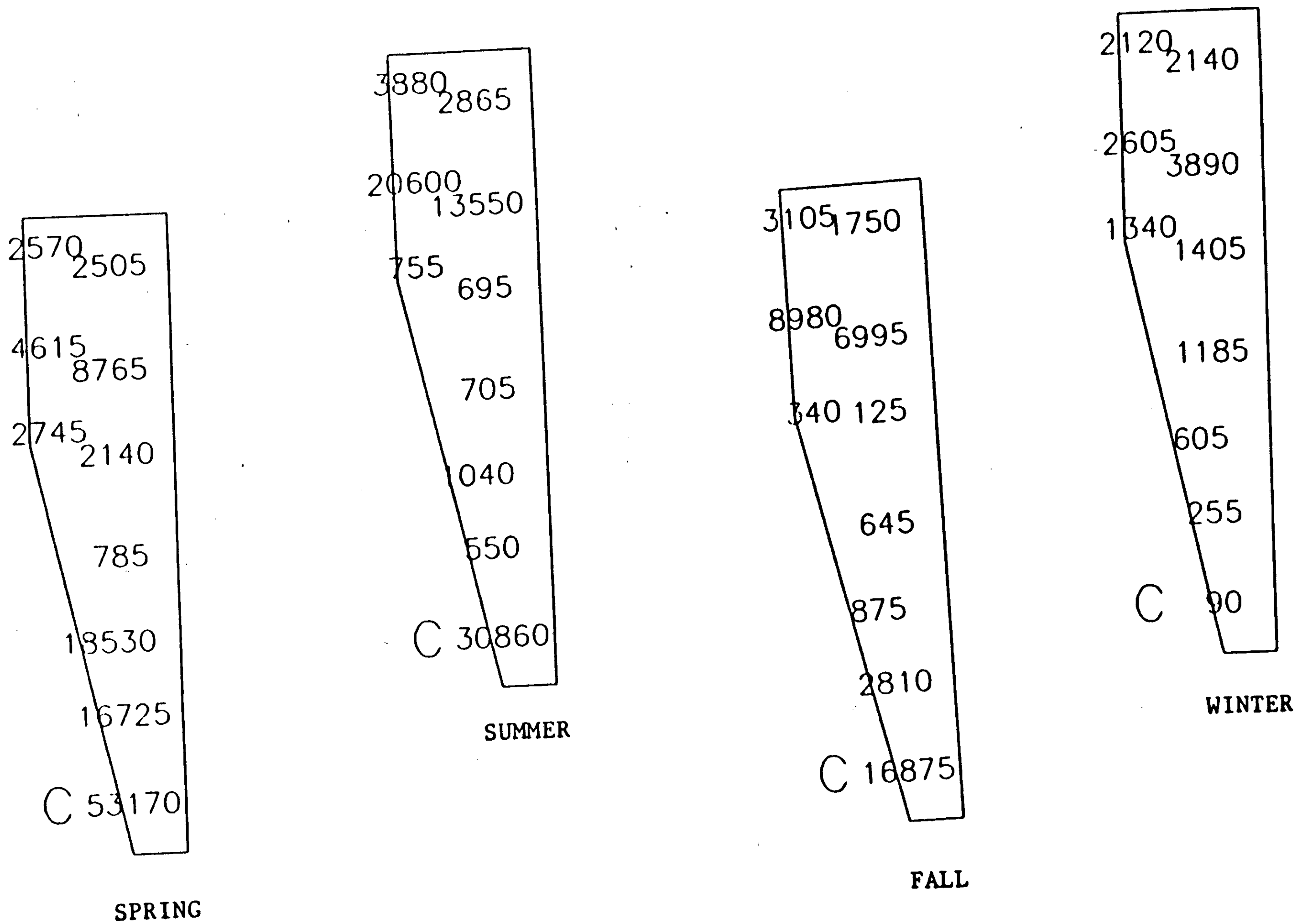
WINTER



○ = Station in borrow pit ☐ = Station in channel

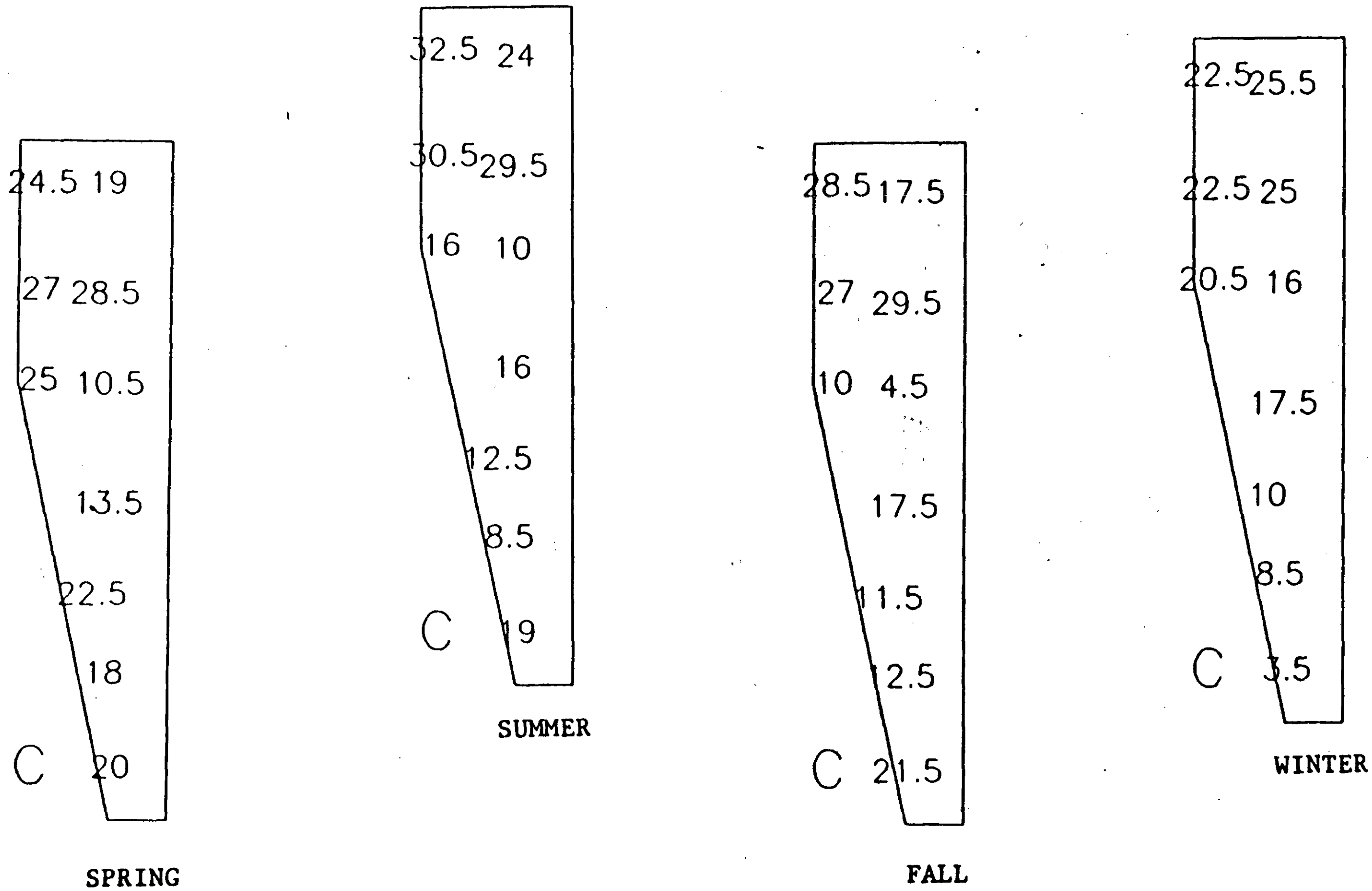
(see Figure 11 for sta locations; Figures 14 & 15 for area C richness)

Figure 14. Benthic Abundances (organisms/m^2) at East Bank Stations Sampled in 1986-1987 MSRC Benthic Survey. From Cerrato et al, 1988.



see Figure 11 for station locations

Figure 15. Benthic Species Richness (avg spec/grab) at East Bank Stations Sampled in 1986-1987 MSRC Benthic Survey. From Cerrato et al 1988.



see Figure 11 for station locations

Figure 16. Total Lobster Catch by Station from 1984-85 SUNY Sampling of Lower Bay Complex.

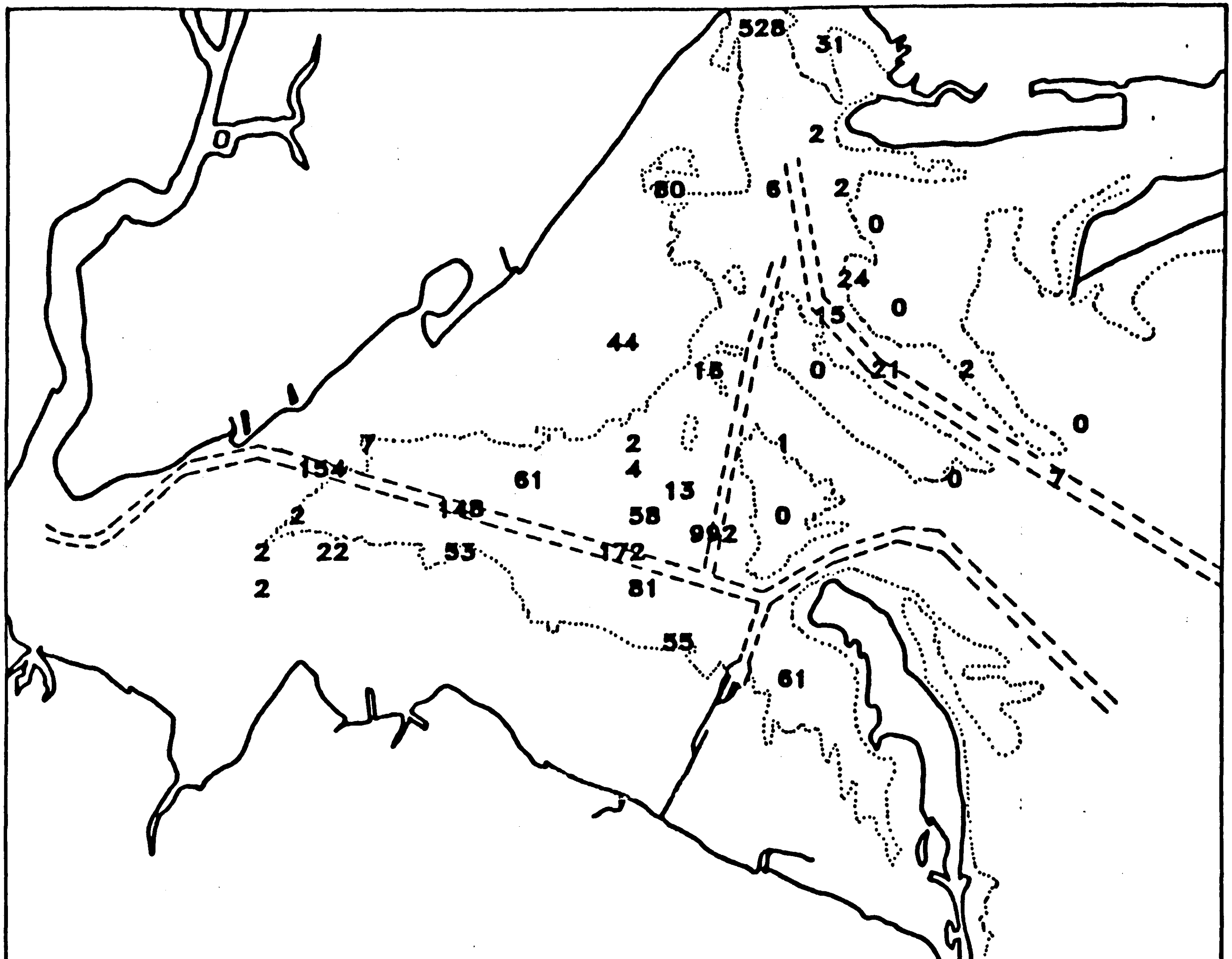


Figure 17. Total Blueclaw Crab Catch by Station from 1984-85 SUNY Sampling of Lower Bay Complex. Taken from Woodhead and McAfferty (1986): p 43.

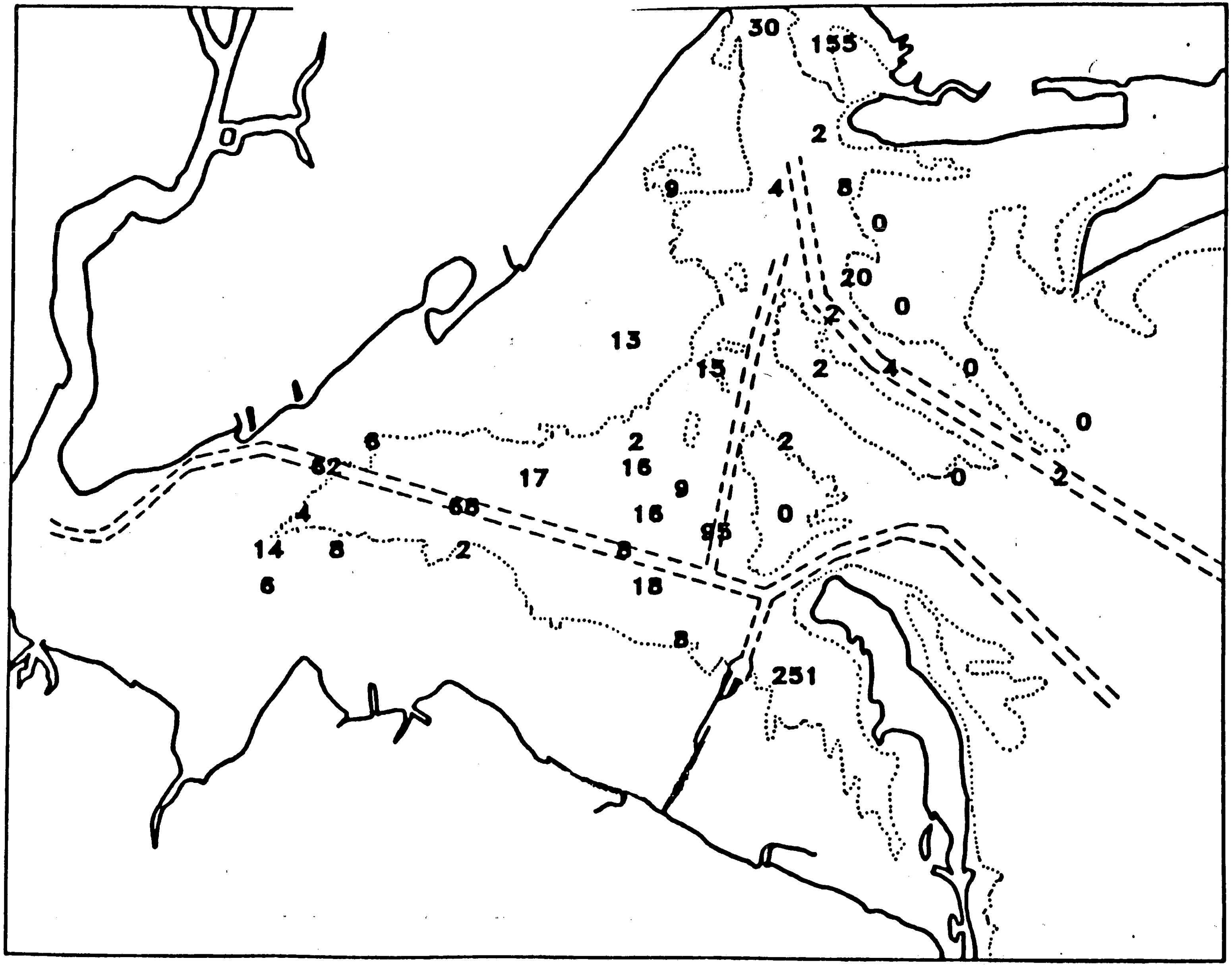
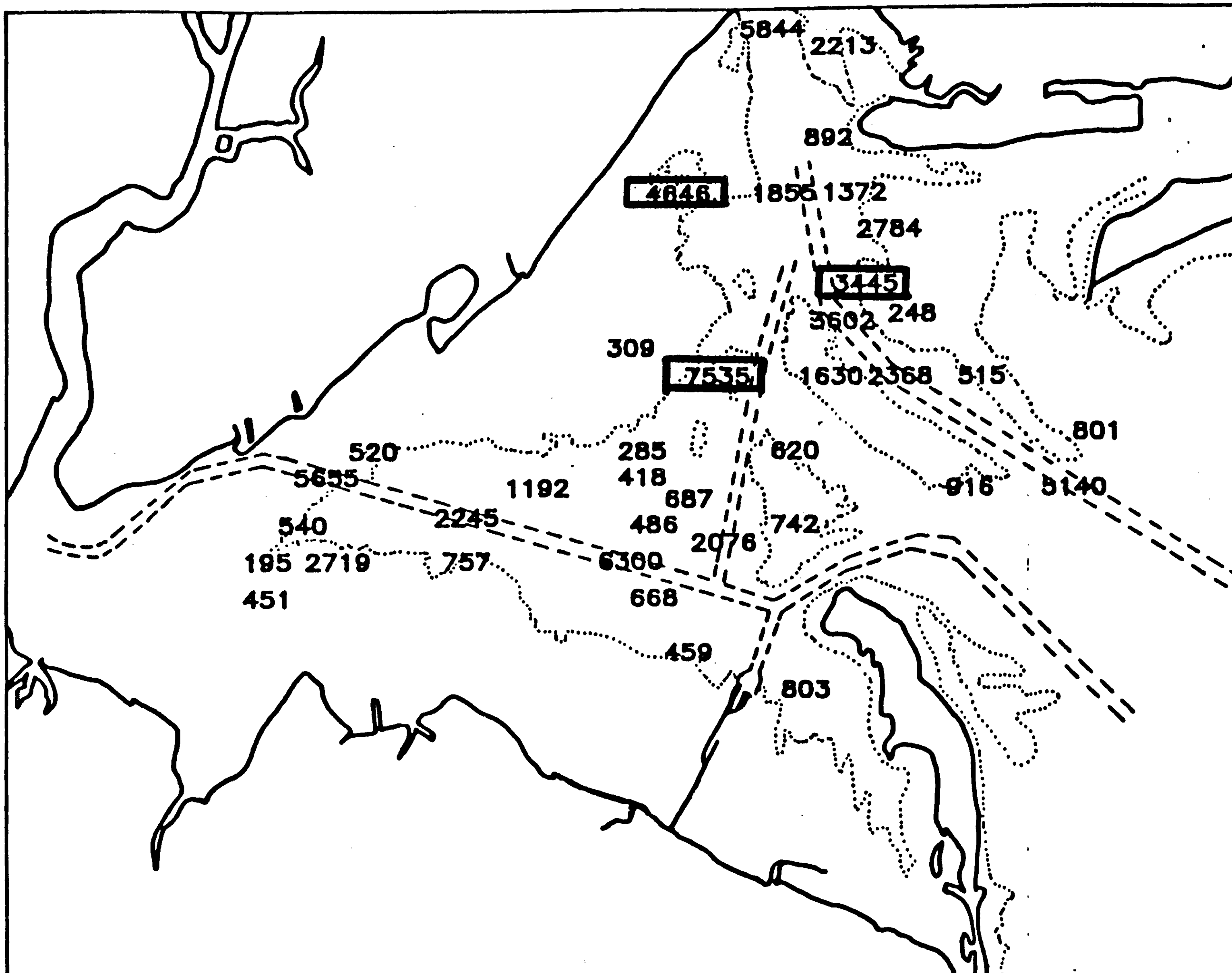
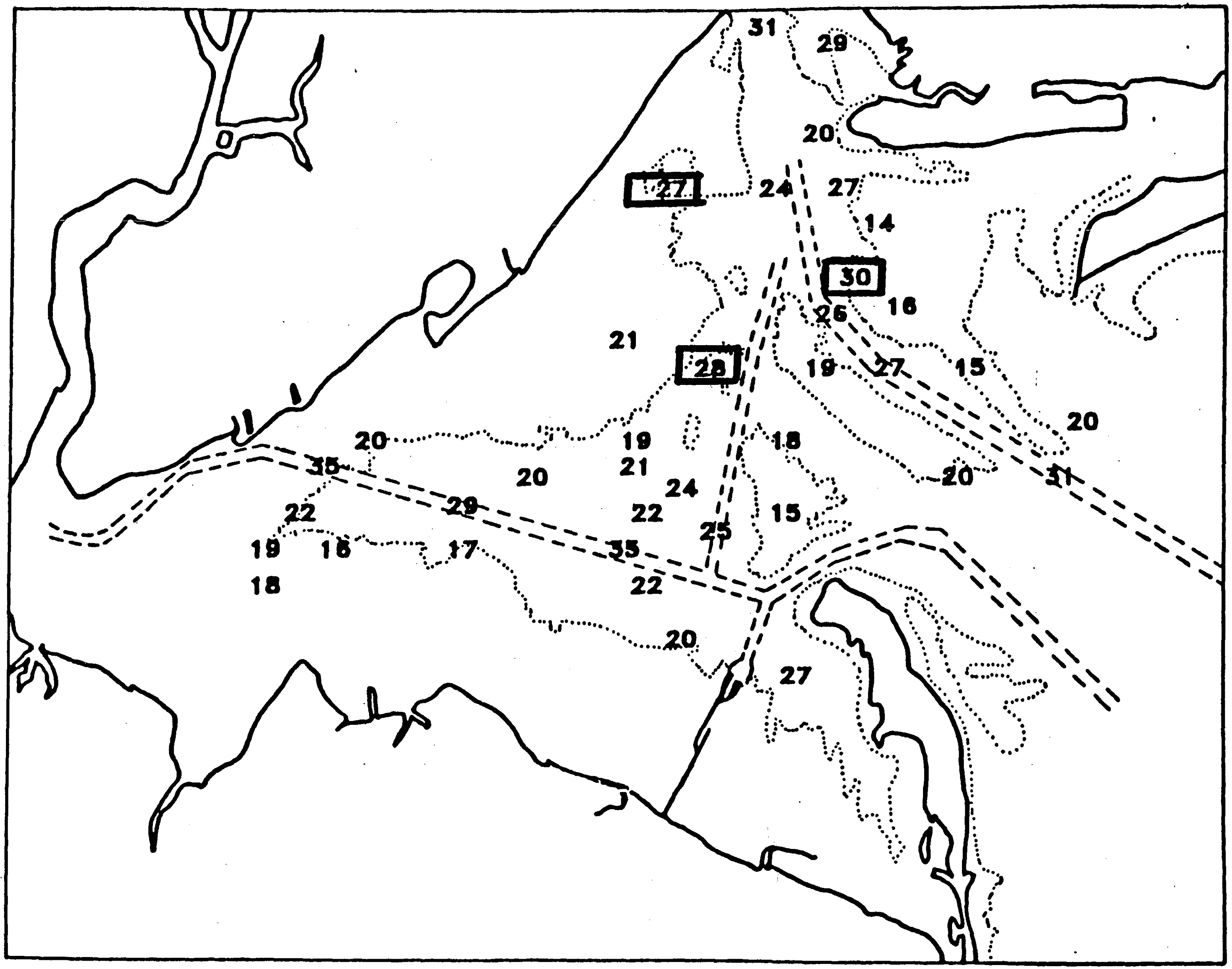


Figure 18. Total Fish Catch by Station for 1984-1985 MSRC Sampling of the Lower Bay Complex. From Woodhead and McCafferty, 1986



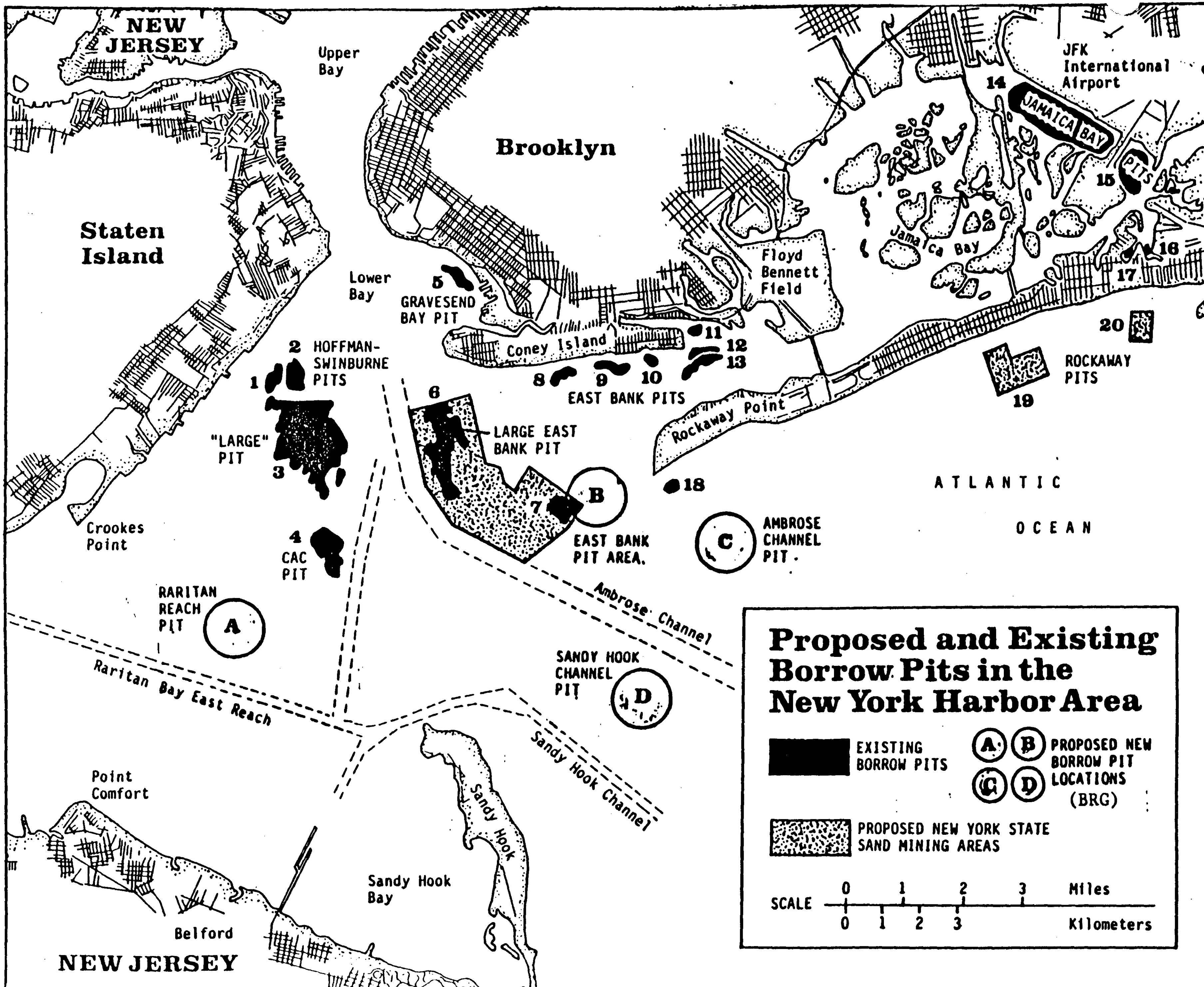
= Station in Borrow Pit

Figure 19. Total Number of Fish Species Caught per station during 1984-1985 MSRC Sampling of Lower Bay Complex. From Woodhead and McCafferty, 1986.



= Station in Borrow Pit

Figure 20. NY Bight Restoration Group (Bh 1984 Proposed New Borrow Pit Locations



F-22

Figure 21a. Potential Sand Mining Areas in Lower NY Bay, and Estimates of Thickness of deposit. Tajken from Kastens et al, 1978; p73

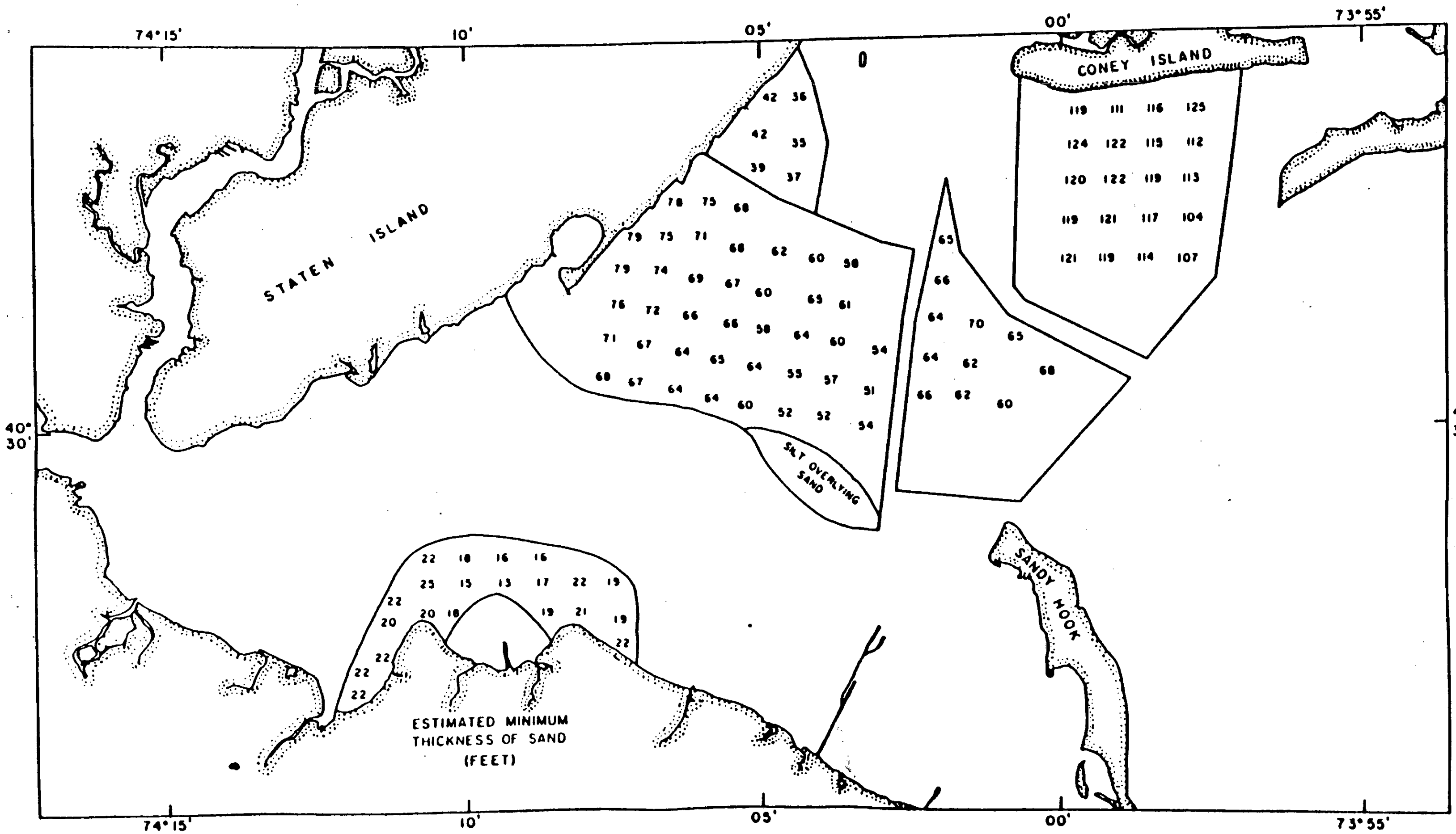
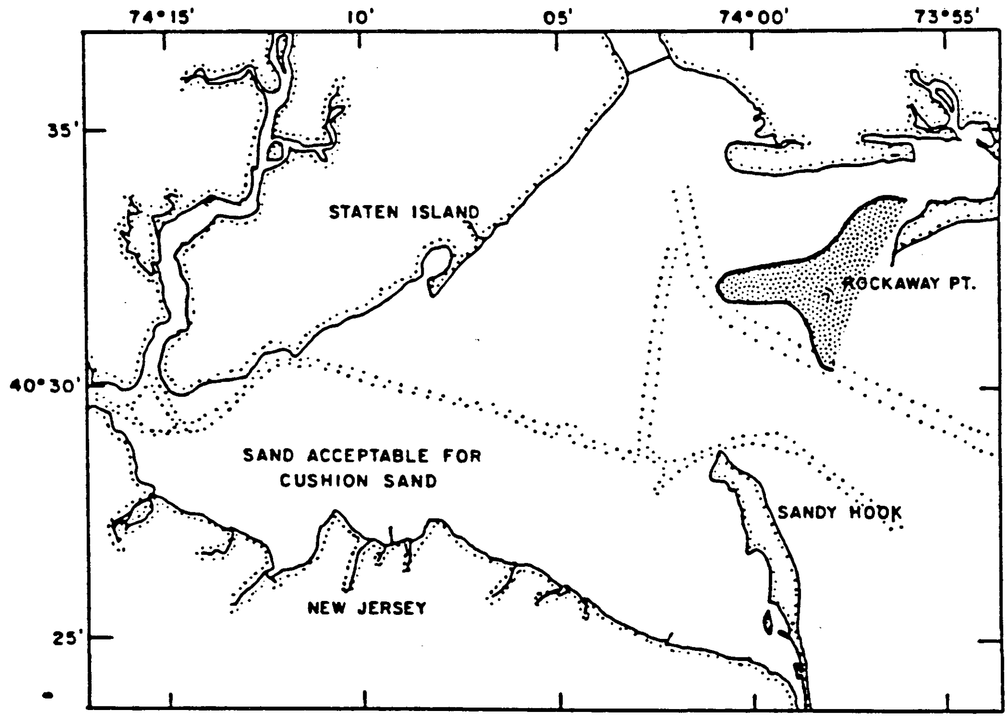


Figure 21b. Potential Sand Resources in Lower NY Bay Suitable for Specific Construction Uses. Taken from Kastens et al, 1978; pp75-80.



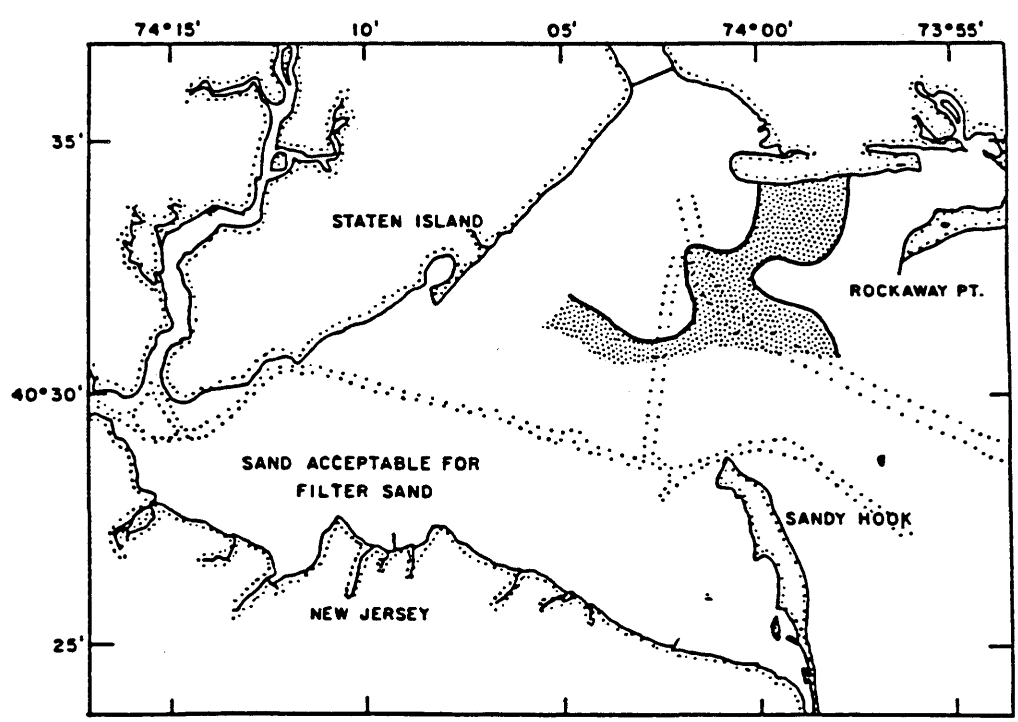


Figure 21c. Construction Sands in Lower NY Bay (con't)

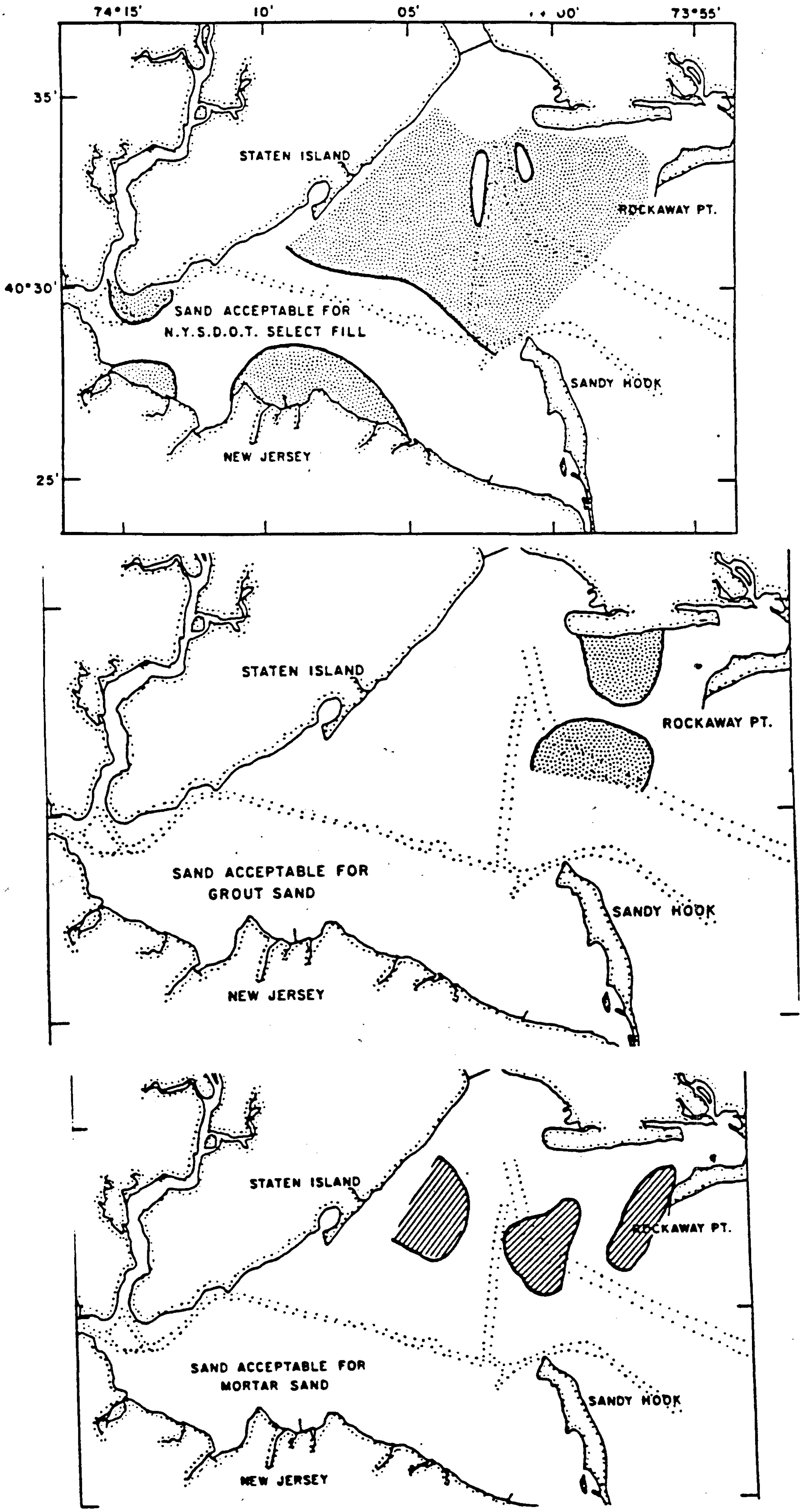


Figure 22. Hypothetical Borrow Pit Locations for Modeling Sand Mining Impacts on Tidal Circulation in Lower NY Bay. Taken from Wong and Wilson, 1979; p 6

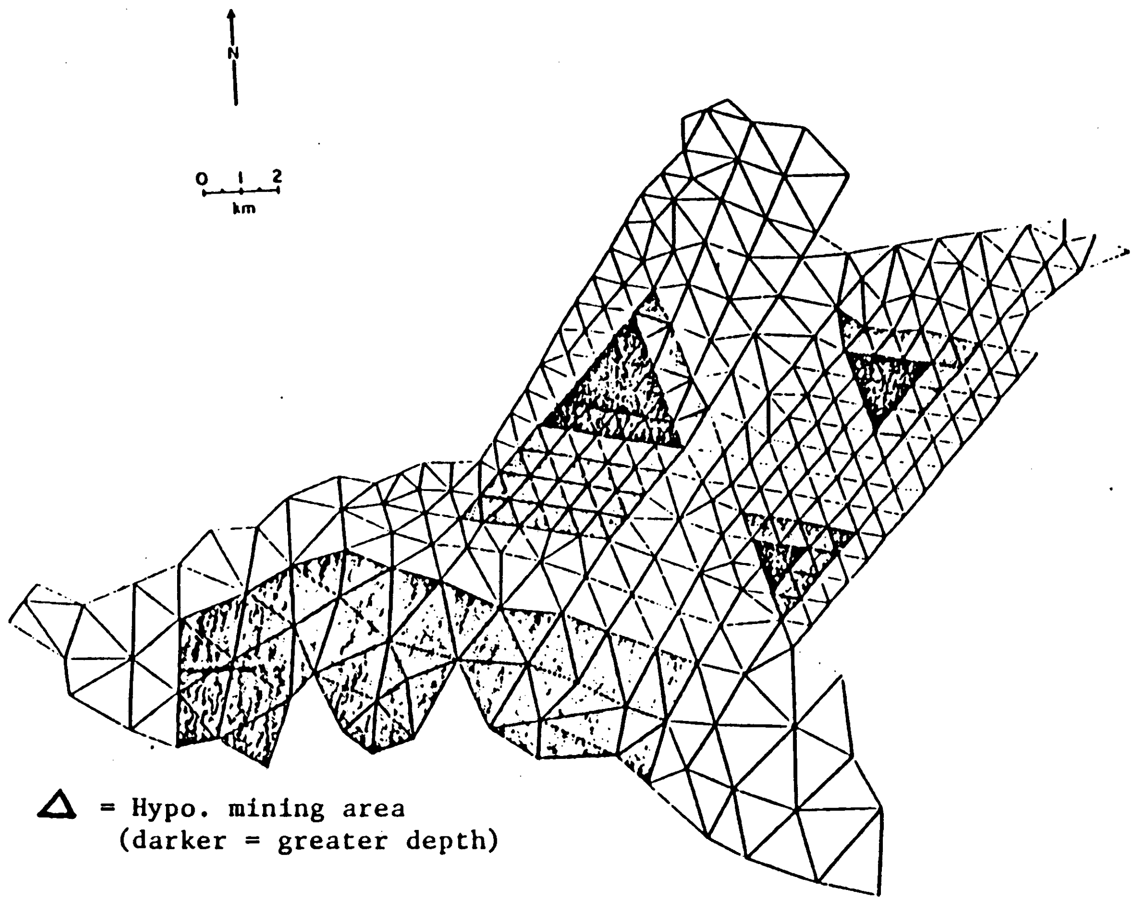


Figure 23. Location of Impact Zones in Lower NY Bay Used to Model Effects of Sand Mining along the East Bank on Wave Energy at the Shoreline. Taken from Kinsman et al, 1979; pp 8-10. Refer to Table 14 for model results (page 1 of 3).

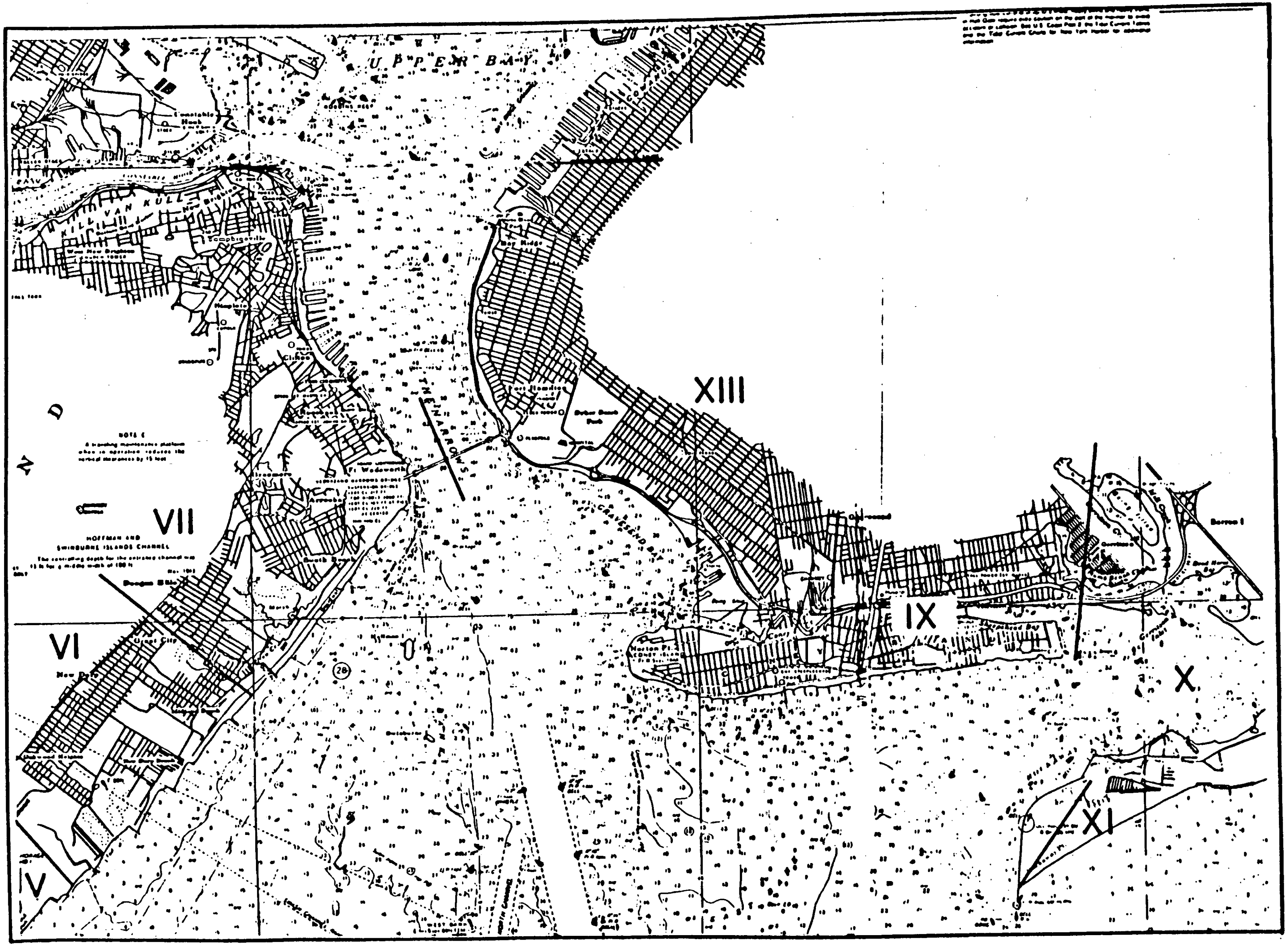


Figure 23. (continued, page 2 of 3).

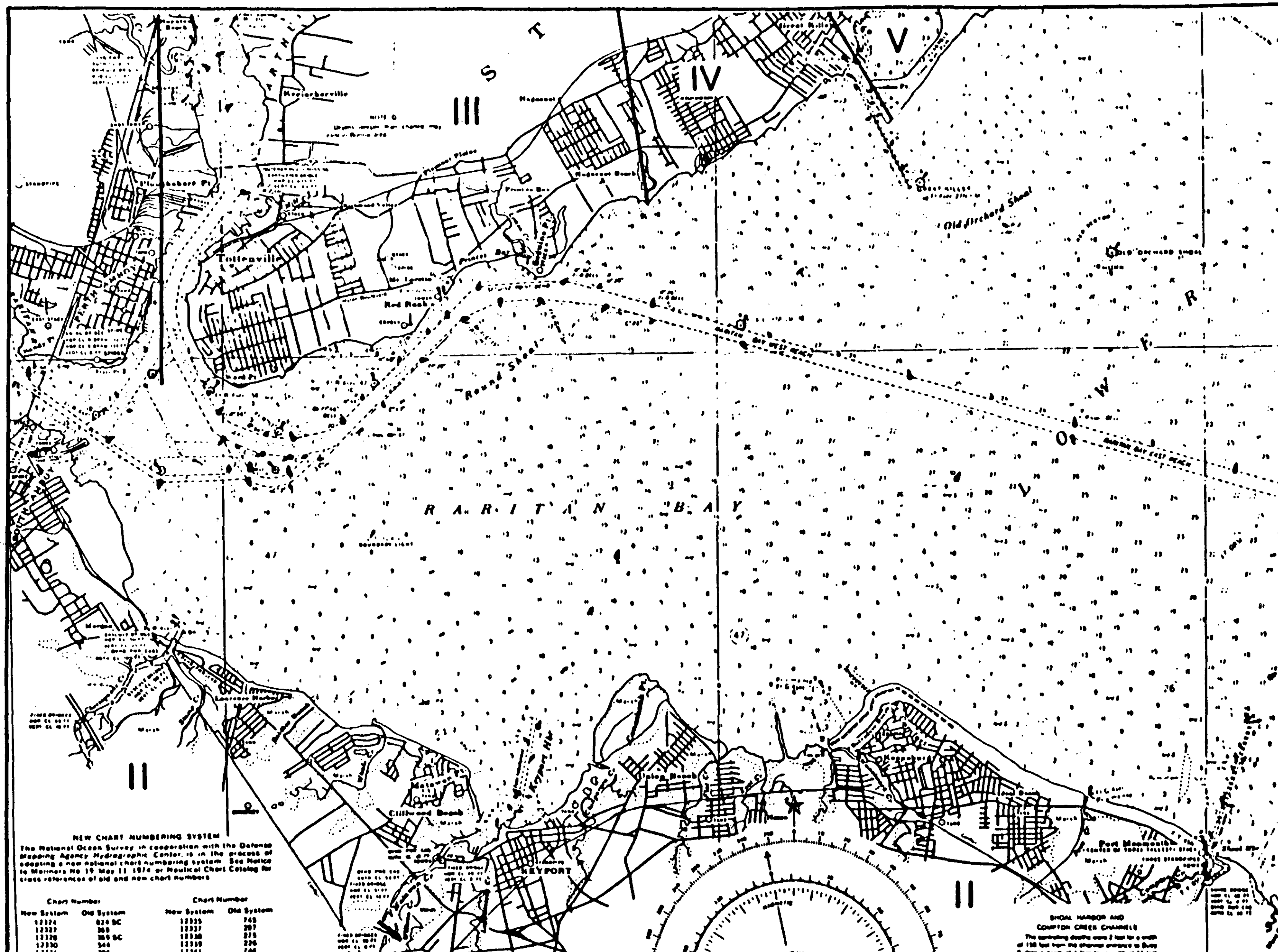


Figure 23. (continued, page 3 of 3).

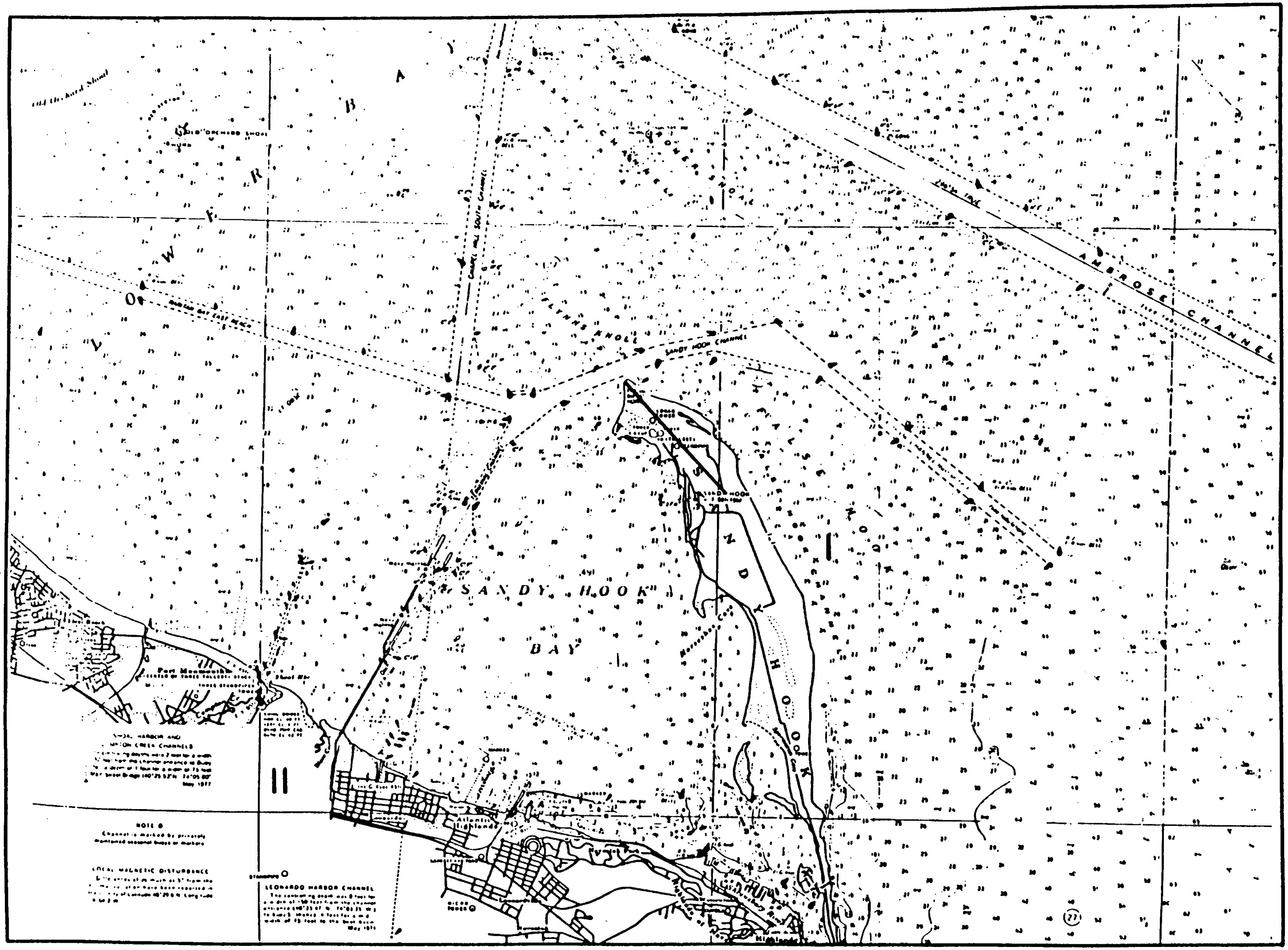
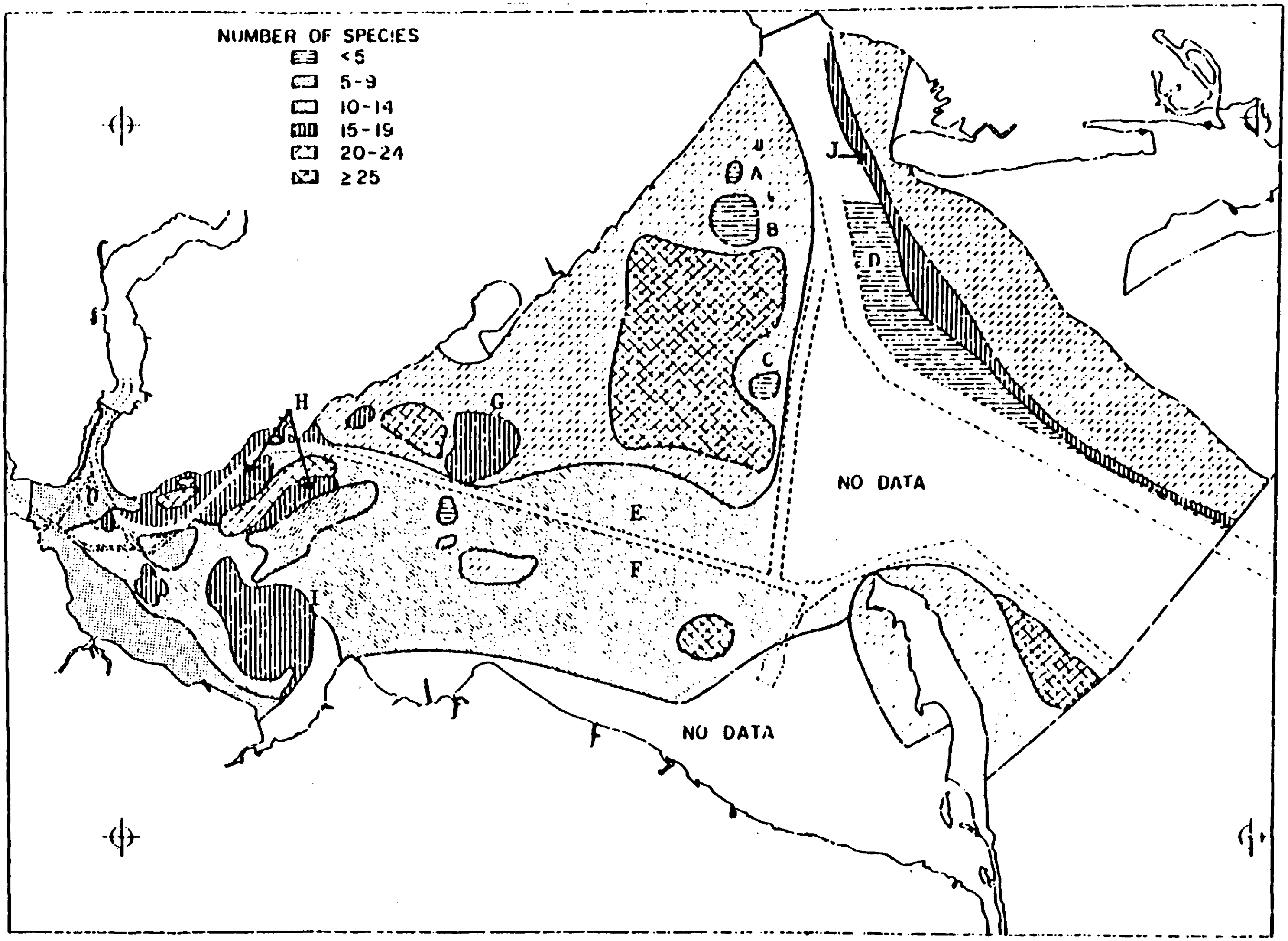


Figure 24. Benthic Species Richness Map of the Lower Bay Complex. Modified from Brinkhuis, 1980; p 46.



A - J Areas of lower richness

Figure 25. Benthic Species Diversity in the Lower Bay Complex. Taken from Brinkhuis, 1980; p49.

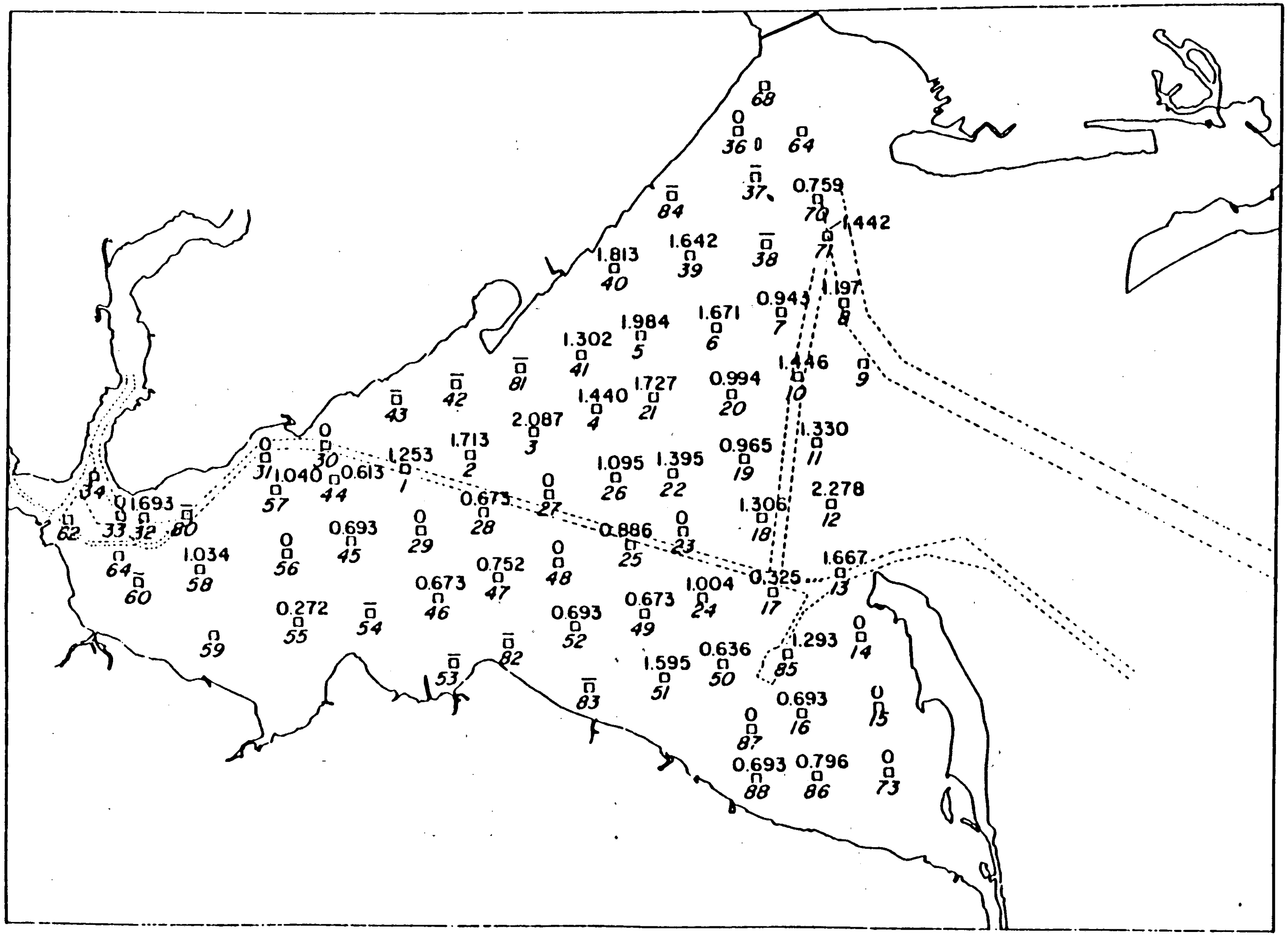
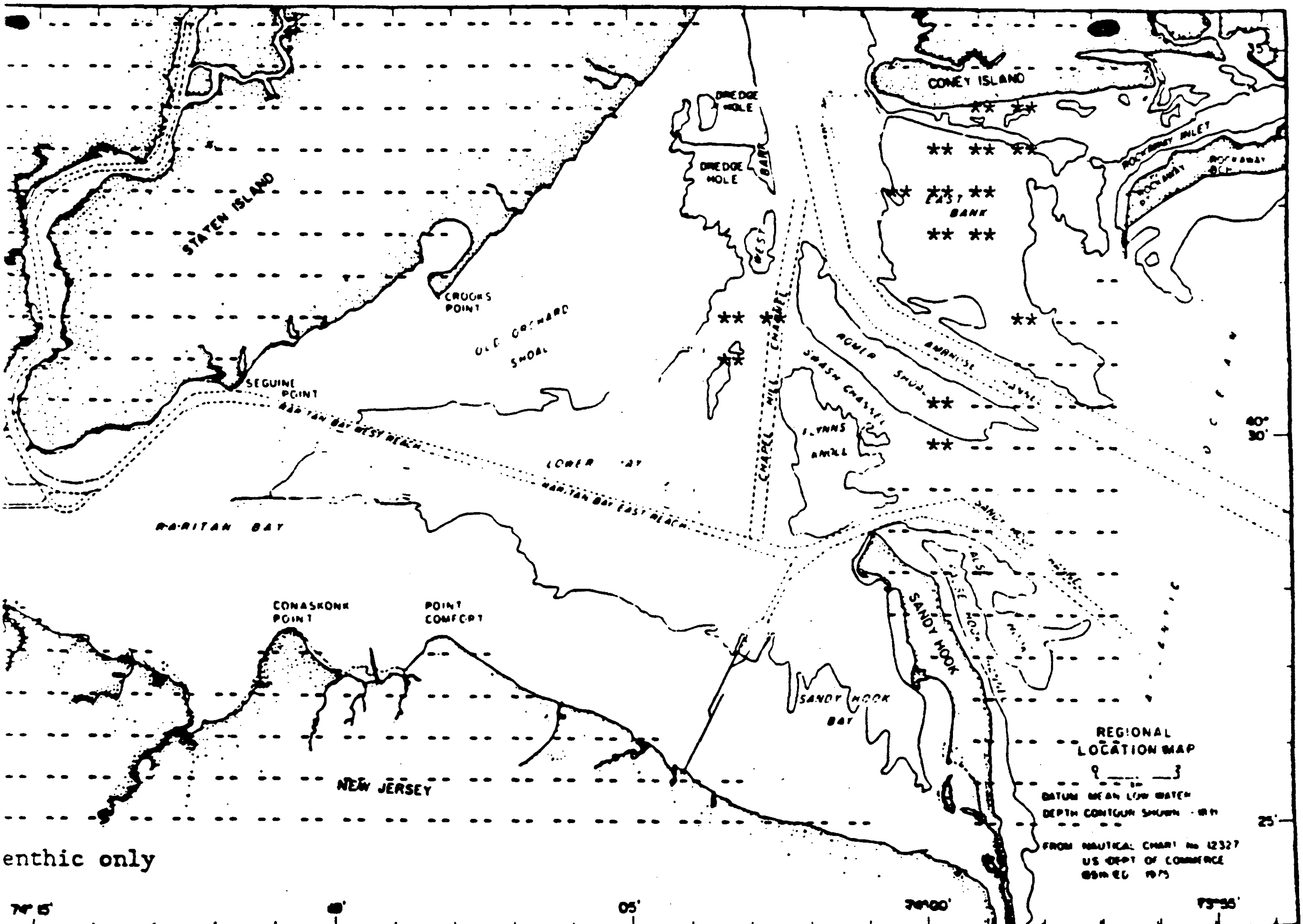


Figure 26. Areas of Least Benthic Use. From Cerrato et al, 1988

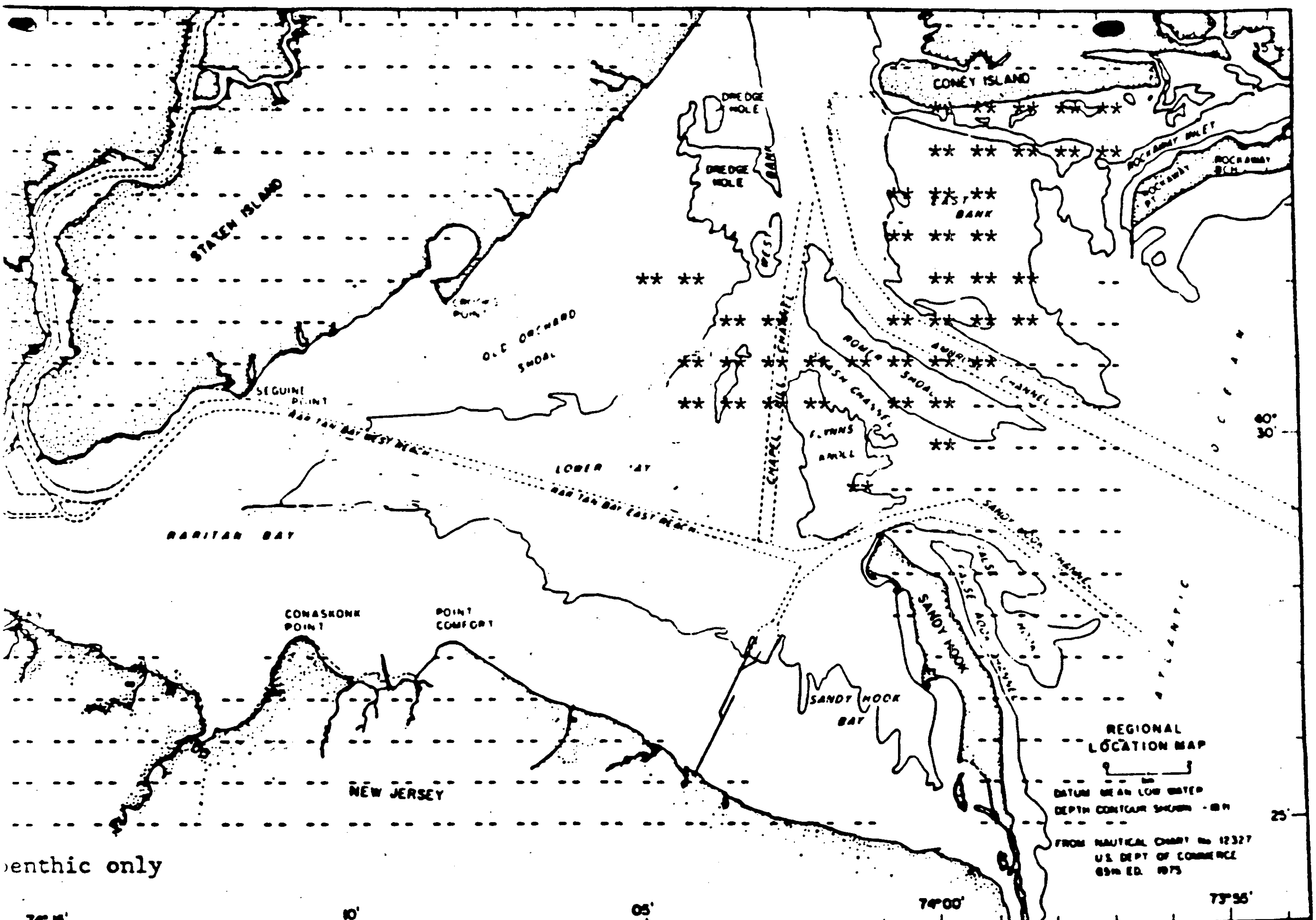


ields	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8

utoff Score >= 65 Tie Breaker Value >= 0

** Screening quadrant with lowest score for test level (low use).

Figure 27. Areas of Low Benthic Use (lowest 15% of screened stations). From Cerrato et al, 1988



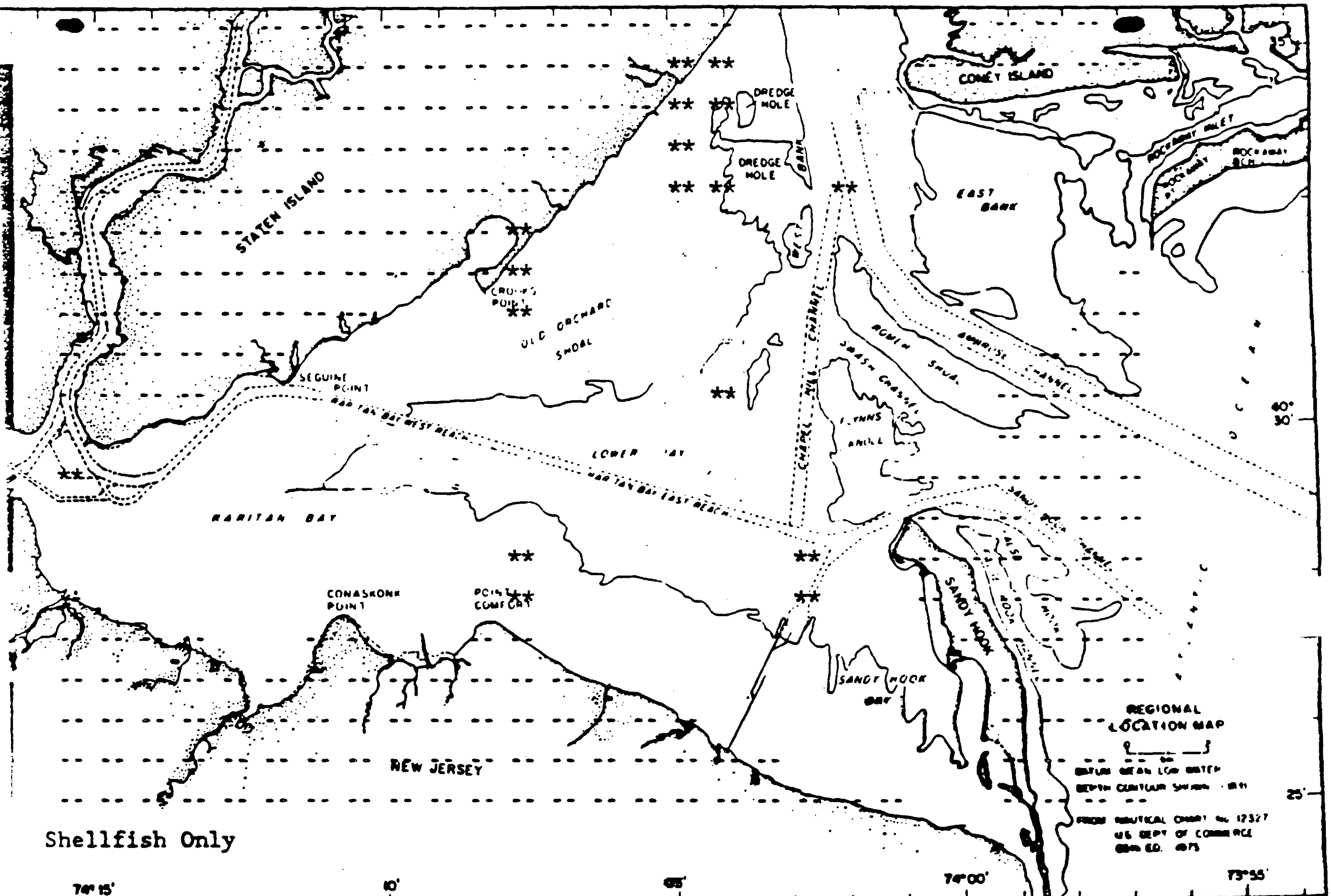
ɩelds 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

ɩt 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8

ɩutoff Score >= 59 Tie Breaker Value >= 0

** Screening quadrant with lowest score for test level (low use).

Figure 28. Areas of Least Shellfish Use. From Cerrato et al, 1988



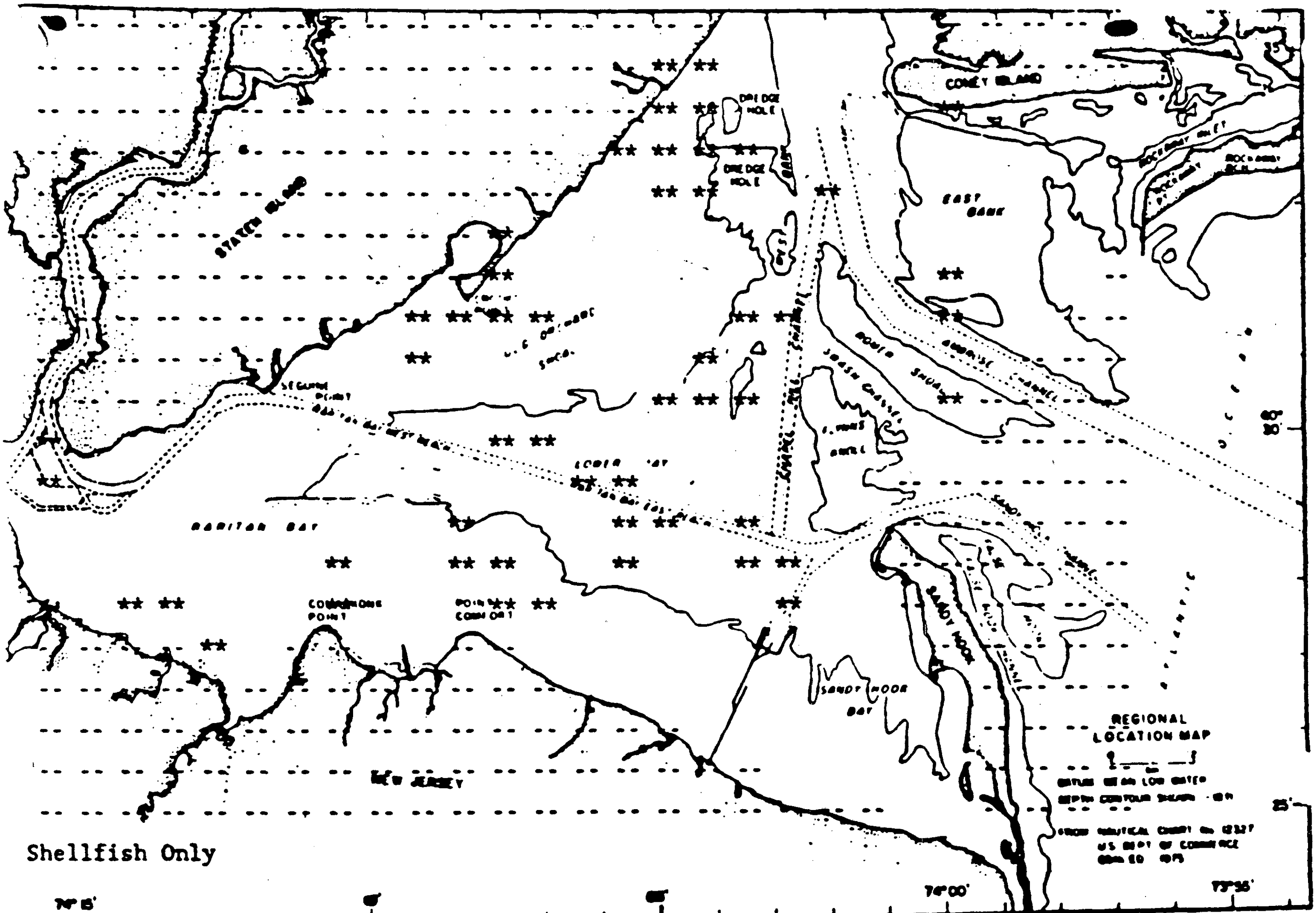
Shellfish Only

Fields	10	11	12	13	14
Wt	4.4	4.4	4.4	4.4	4.4

Cutoff Score >= 66 Tie Breaker Value >= 0

** Screening quadrant with lowest score for test level (low use).

Figure 29. Areas of Low Shellfish Use (lowest 18% of screened stations). From Cerrato et al, 1988.



Shellfish Only

Fields 10 11 12 13 14

Wt 4.4 4.4 4.4 4.4 4.4

Cutoff Score >= 62 Tie Breaker Value >= 0

** Screening quadrant with lowest score for test level (low use).

Figure 30. Total Hard Clam Distribution in the Lower NY Bay Complex (page 1 of 2).
Taken from Berg and Levinton, 1985; p48

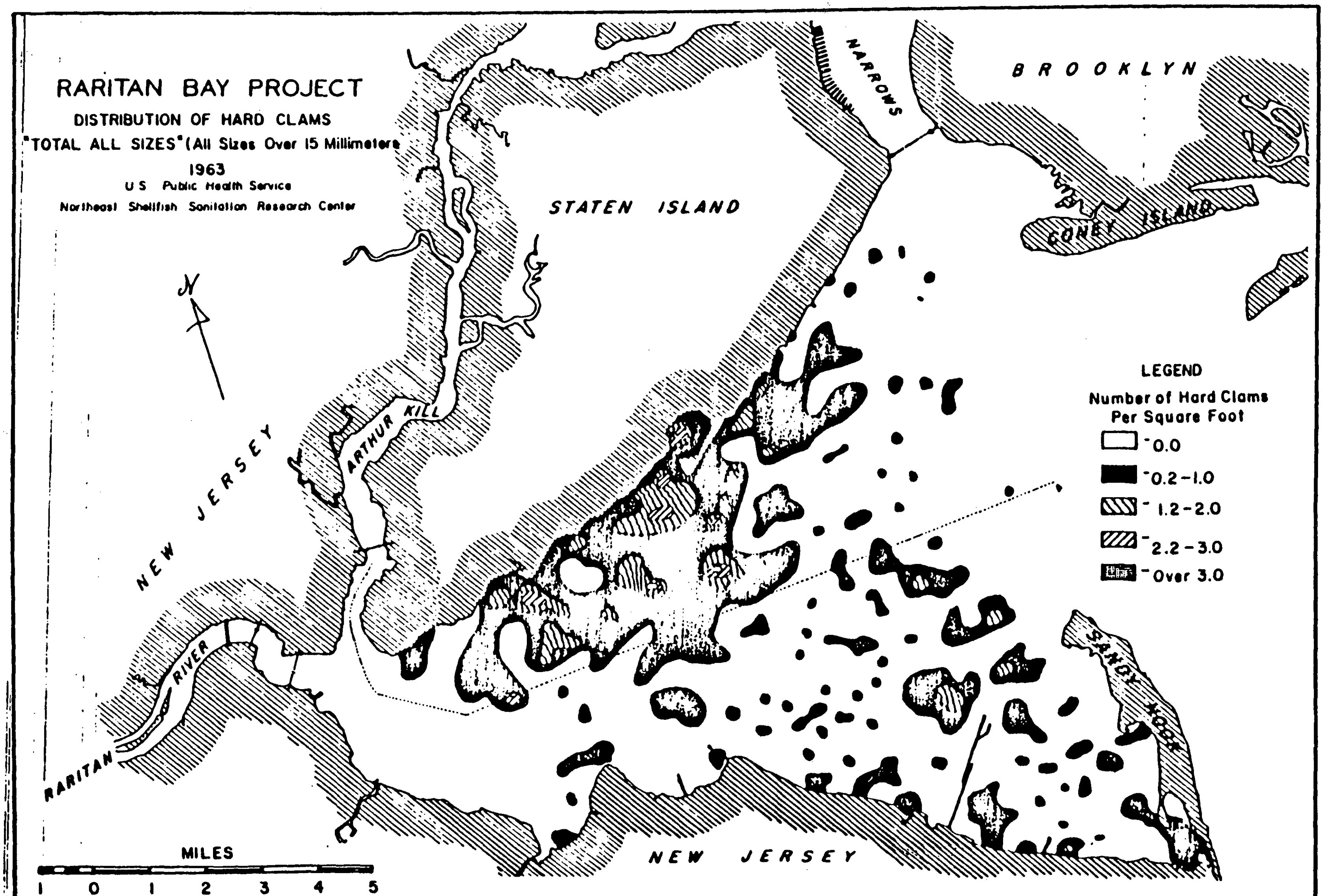
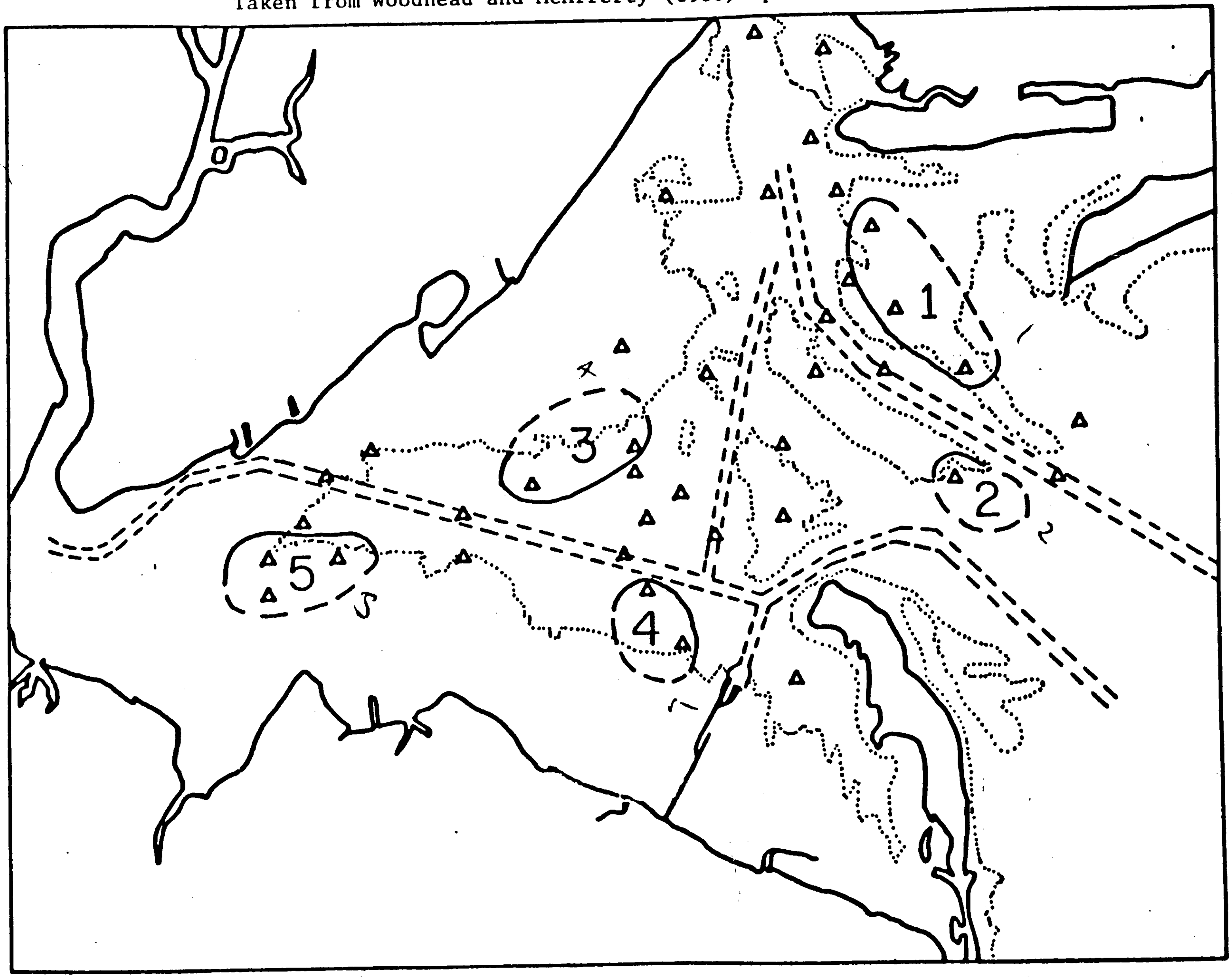


Figure 31. Low Fish Use Areas During 1984-85 SUNT Sampling of Lower NY Bay Complex. Taken from Woodhead and McAfferty (1986): p 57.



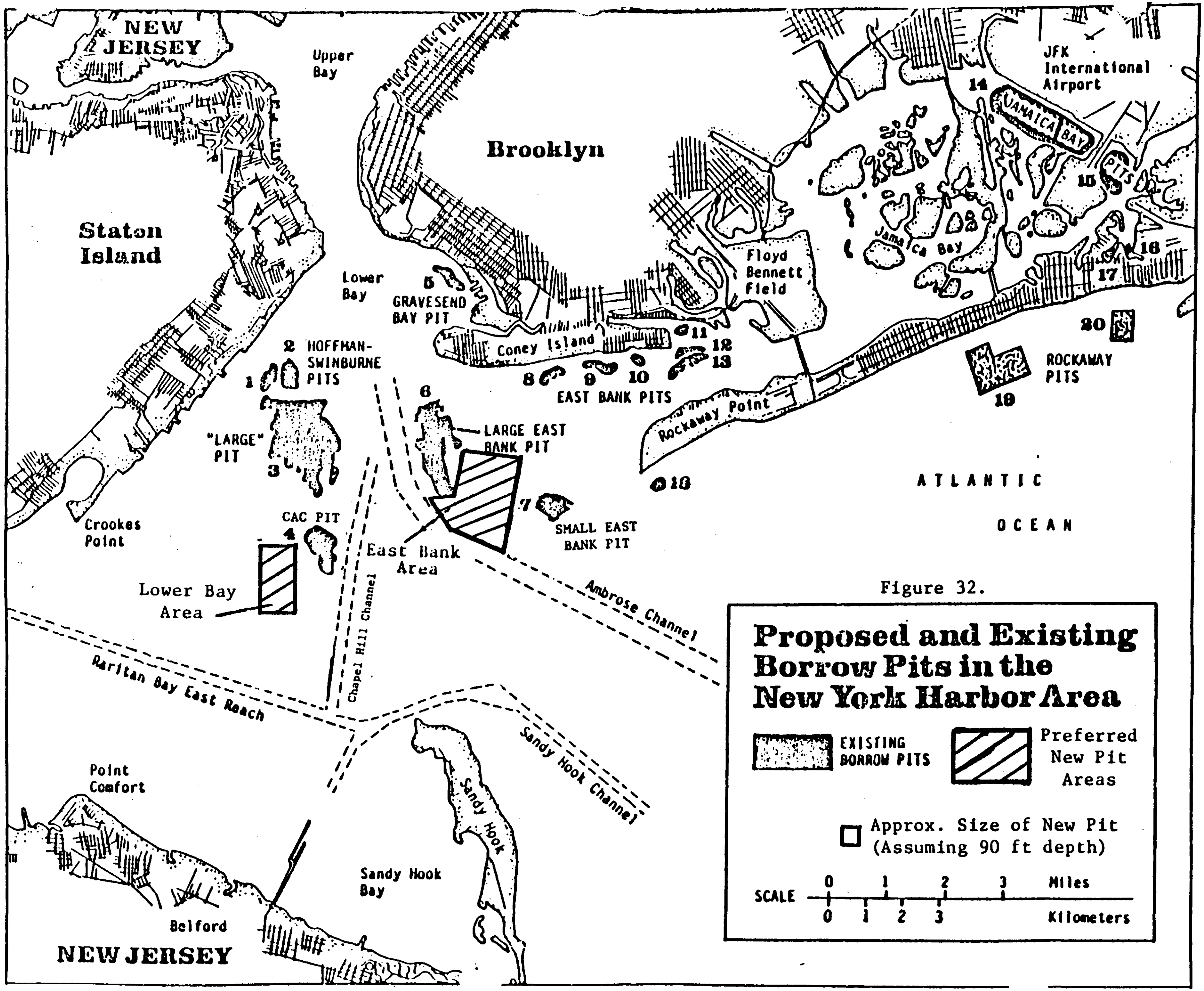

NEW JERSEY
Upper Bay
Brooklyn
JFK International Airport
14
JAMAICA BAY
15
PITS
Staton Island
Lower Bay
5
GRAVESEND BAY PIT
Floyd Bennett Field
Jamaica Bay
16
17
Coney Island
11
12
13
8
9
10
EAST BANK PITS
2 HOFFMAN-SWINBURNE PITS
1
6
LARGE EAST BANK PIT
"LARGE" PIT
3
Rockaway Point
20
ROCKAWAY PITS
19
18
ATLANTIC
OCEAN
7
SMALL EAST BANK PIT
Crookes Point
CAC PIT
4
East Bank Area
Lower Bay Area
Chapel Hill Channel
Ambrose Channel
Raritan Bay East Reach
Sandy Hook Channel
Point Comfort
Sandy Hook
Sandy Hook Bay
Belford
NEW JERSEY
Proposed and Existing Borrow Pits in the New York Harbor Area
EXISTING BORROW PITS
Preferred New Pit Areas
Approx. Size of New Pit (Assuming 90 ft depth)
SCALE
0 1 2 3 Miles
0 1 2 3 Kilometers

Figure 32.

Figure 33. Proposed New Borrow Pit Locations Based on Avoidance of Potential Cultural Resources. Taken from OSI, 1988.

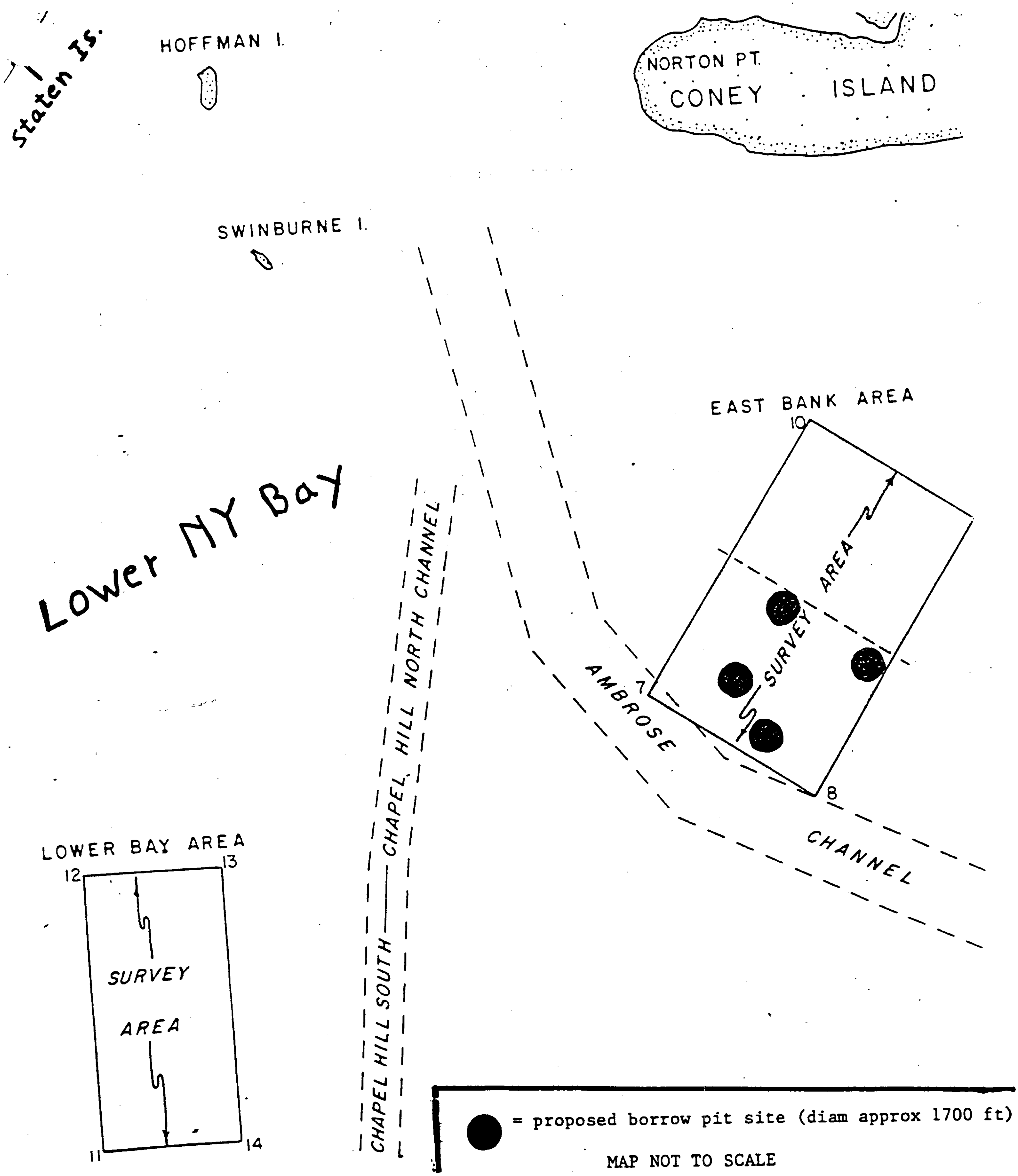


Figure 34. New York Bight and Bight Apex. Taken from NYD, 1983; p 5.

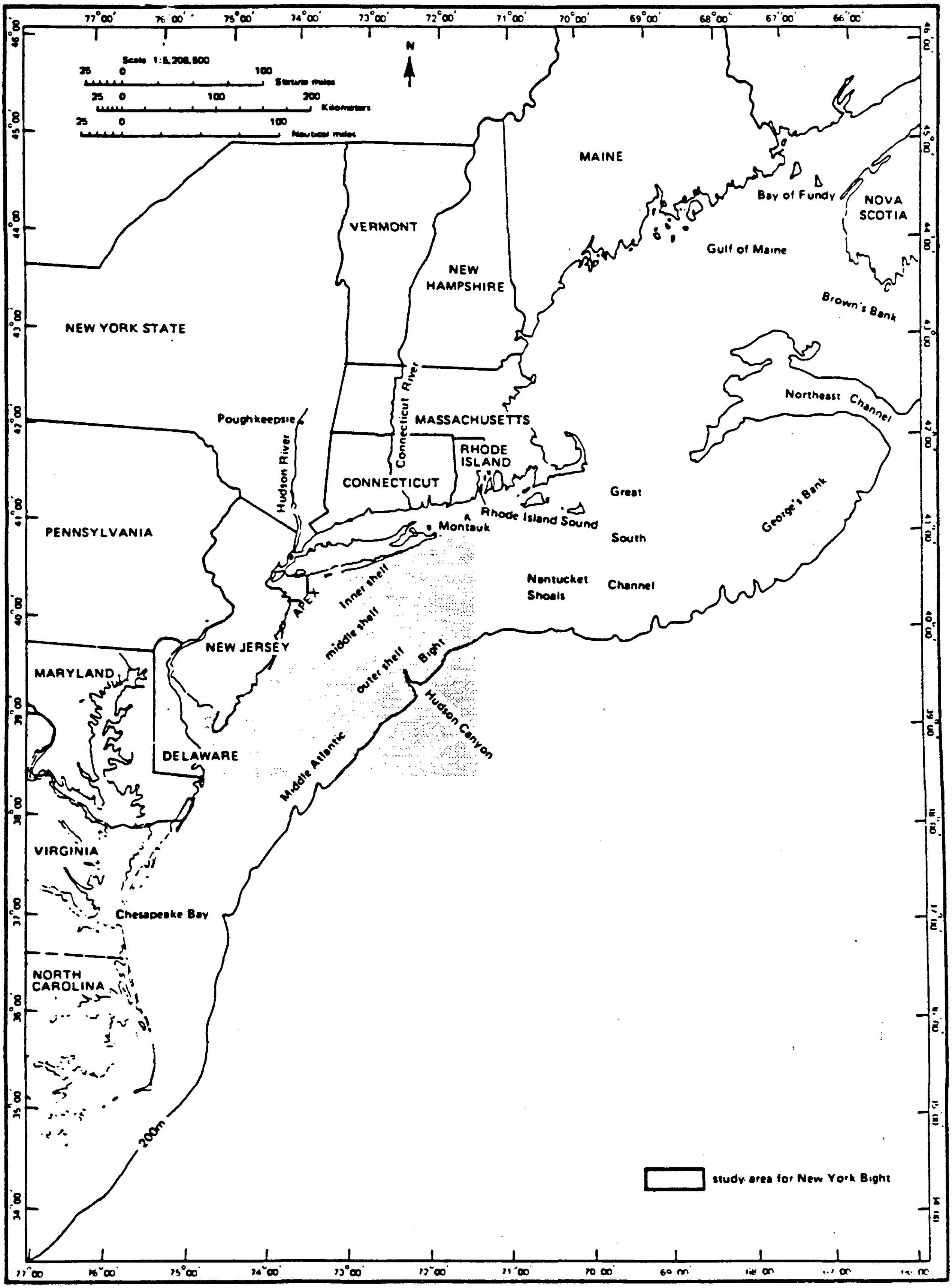


Figure 35. Net Current Flows in Lower Bay Complex. Taken from Berg & Levinton, 1985; p 6

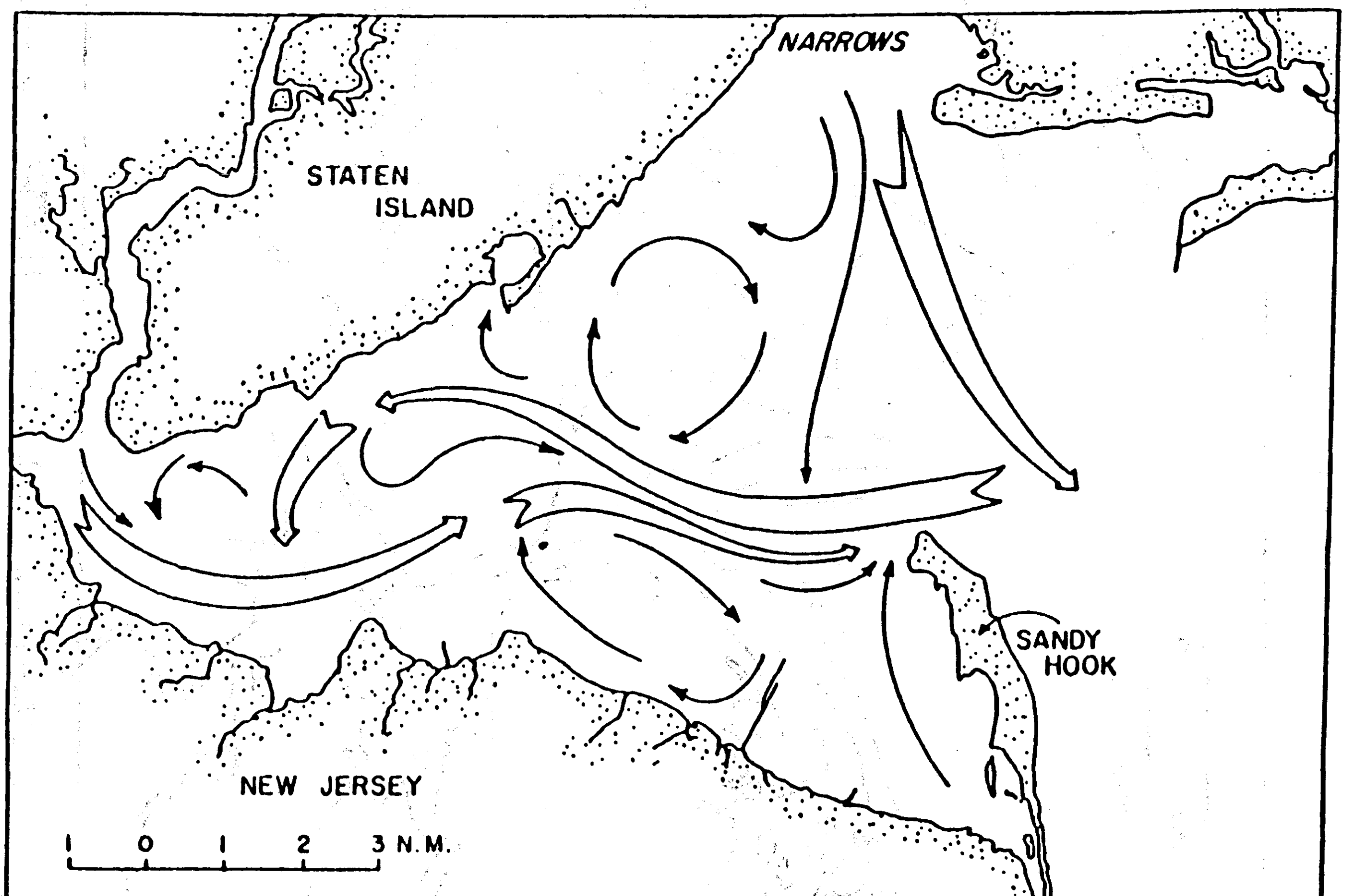


Figure 36. Nontidal Circulation Patterns in Lower New York Bay Complex. Taken from Kastens et al, 1978; p 21.

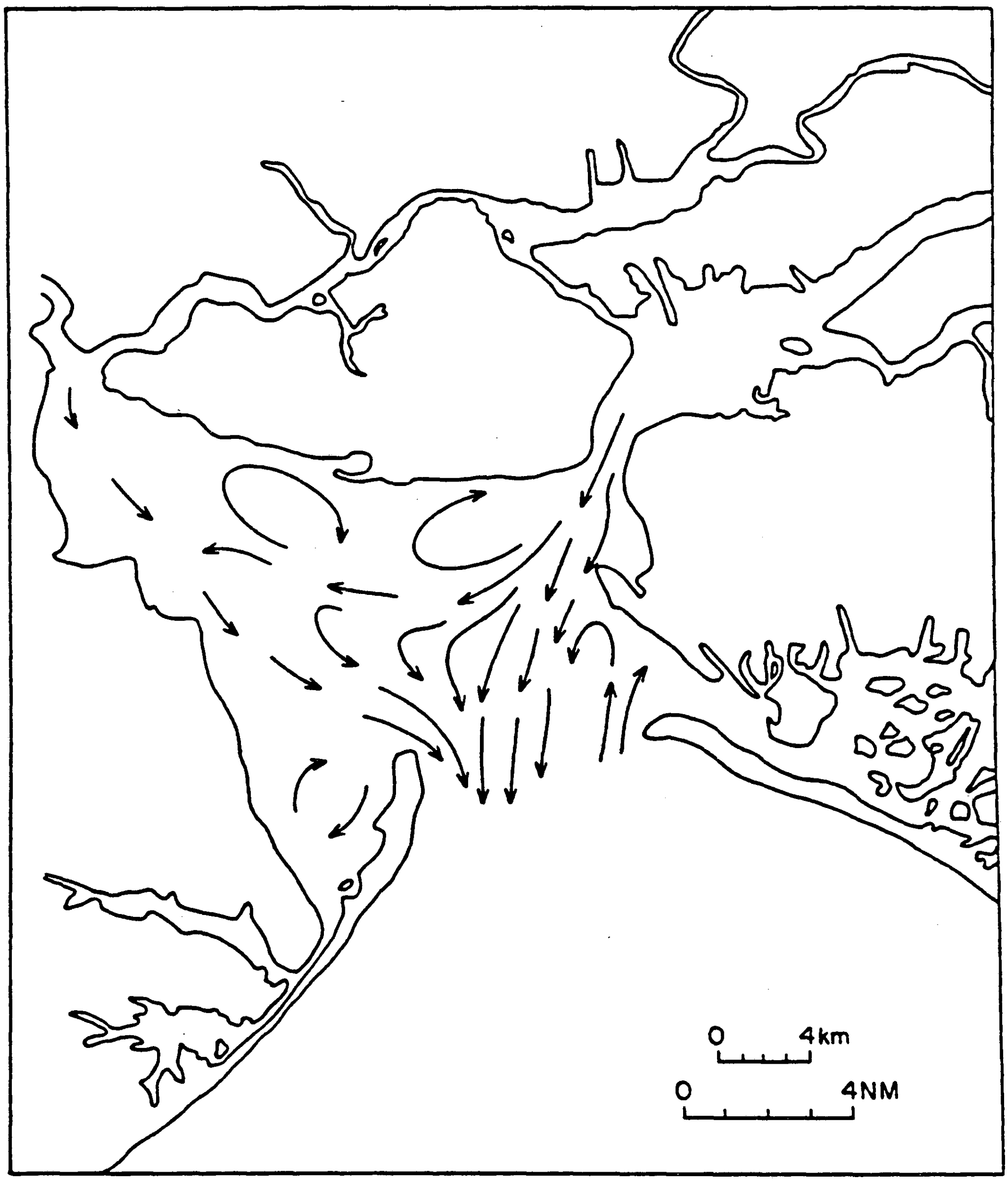


Figure 37. Physiographic Diagram of Study Area. Taken from Kastens et al, 1978; p 4.

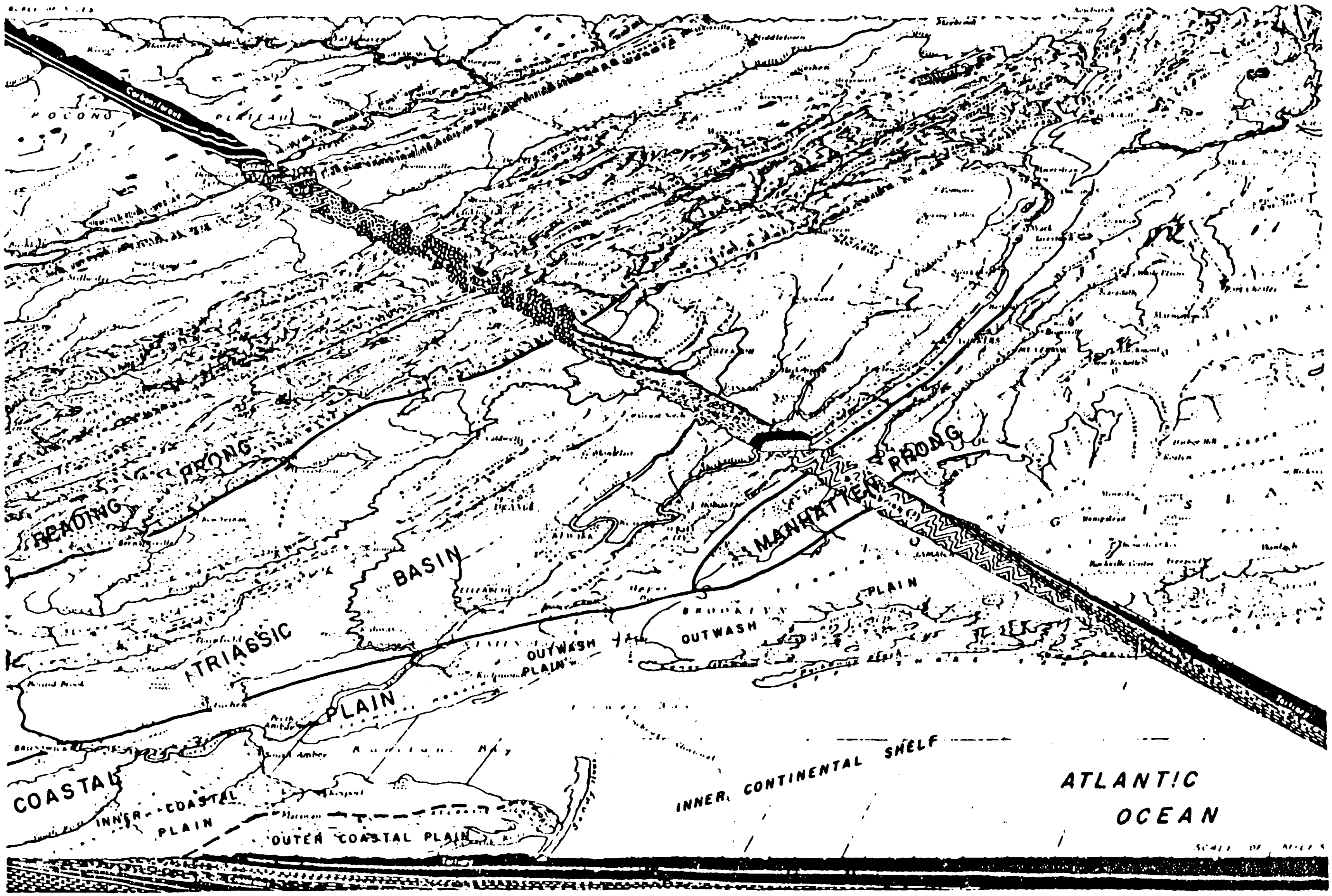


Figure 38. Geological Map of Lower Bay Complex. Taken from Kastens et al, 1978; p 8.

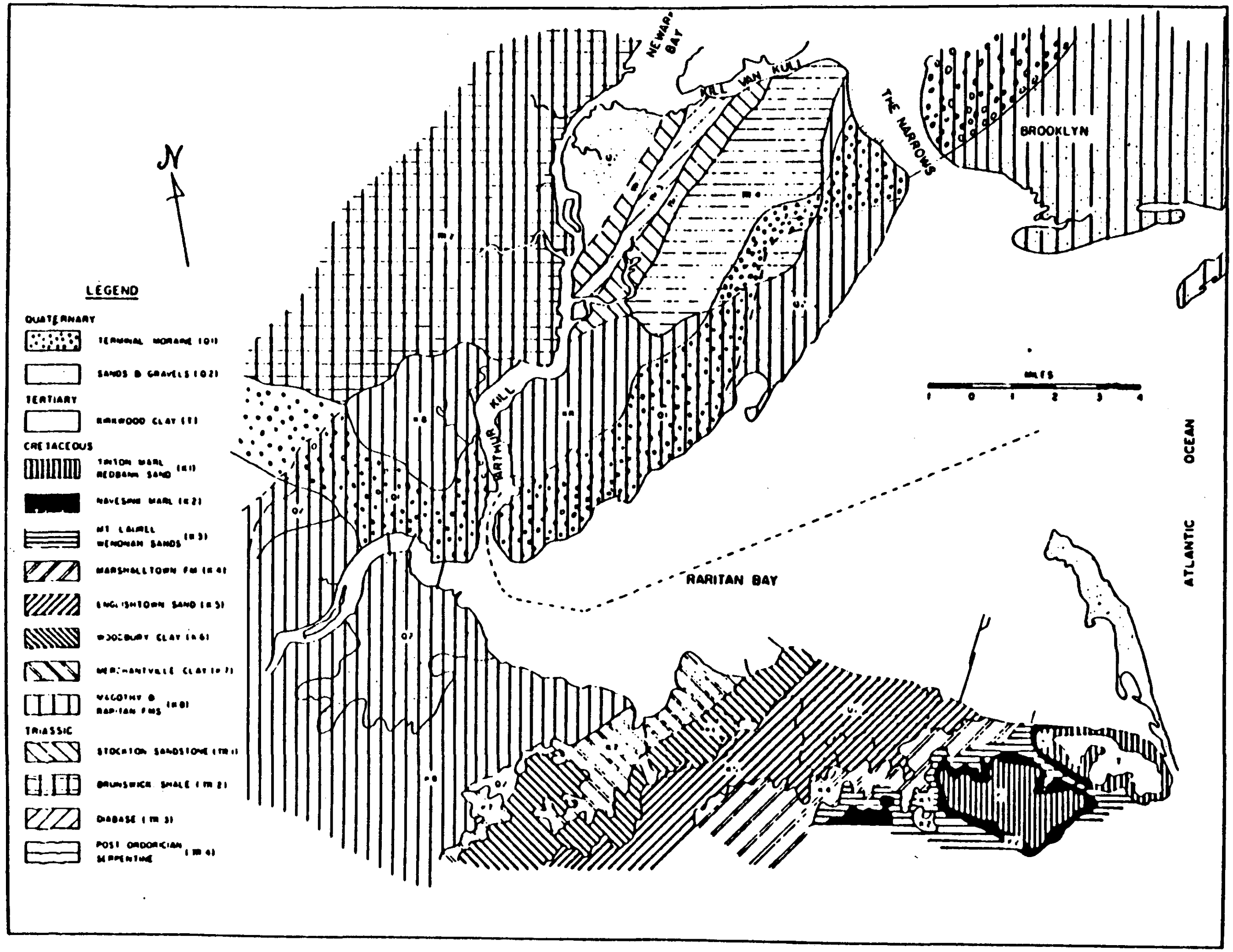


Figure 39. Surficial Sediment Bodies in the Lower Bay Complex. Taken from NYD, 1985; p 39

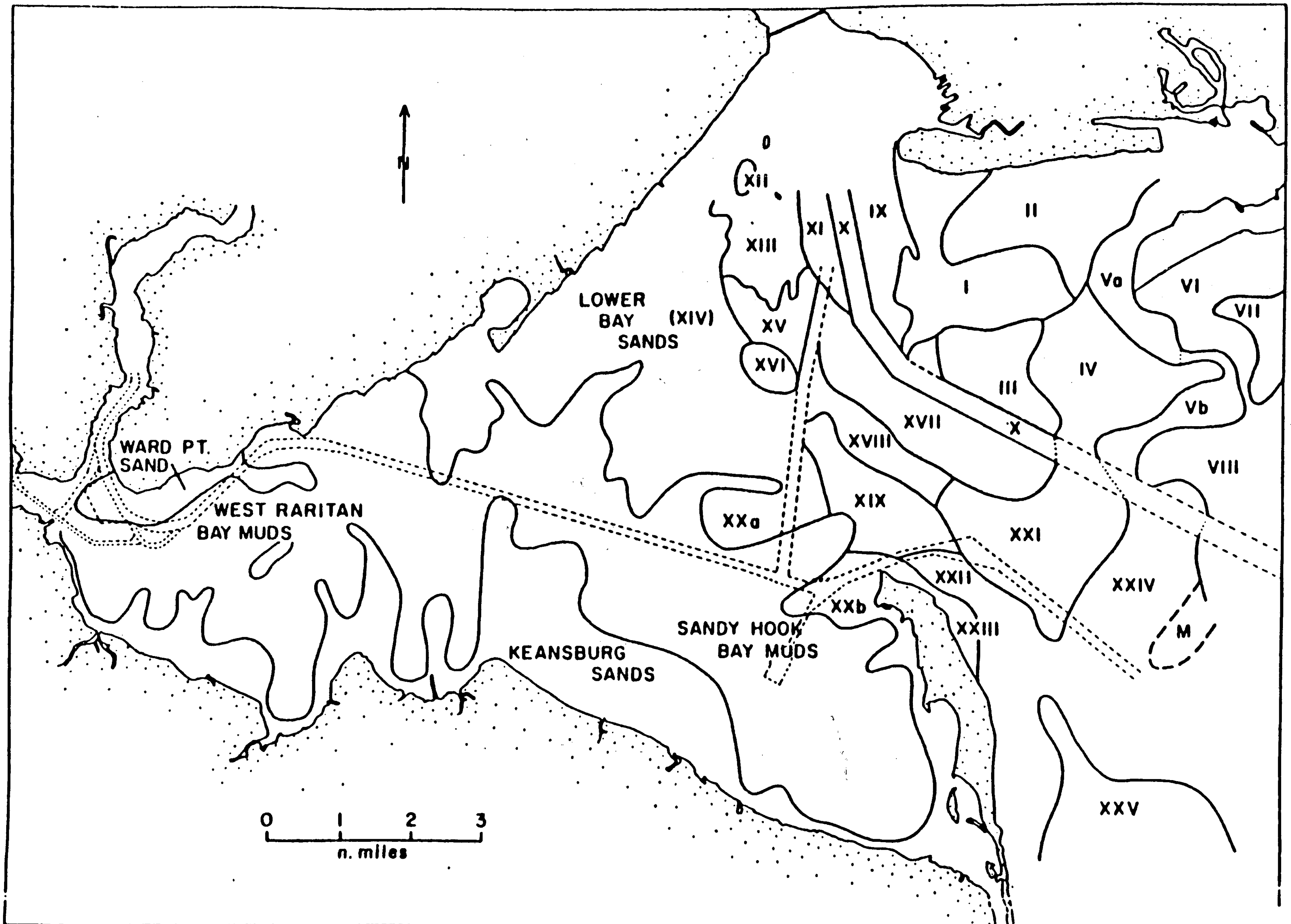


Figure 40. Idealized Sediment Transport in Lower Bay Complex. Taken from Brinkhuis, 1980; p 20.

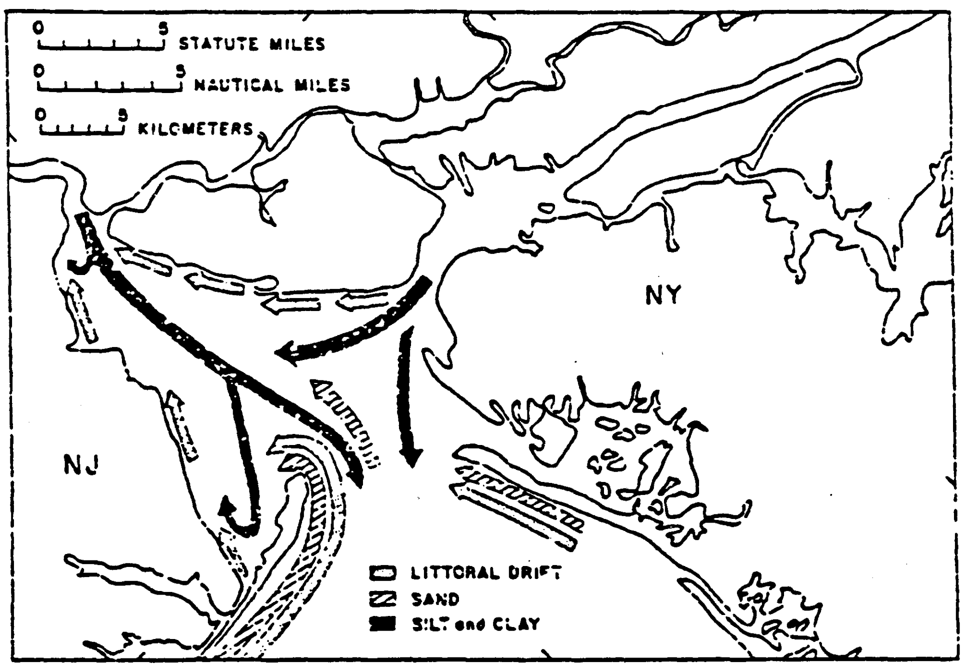


Figure 41. Distribution of Sediment types and Median diameter (mm) of Surface Samples in the Lower Bay Complex. Taken from Kastens et al, 1978; p45.

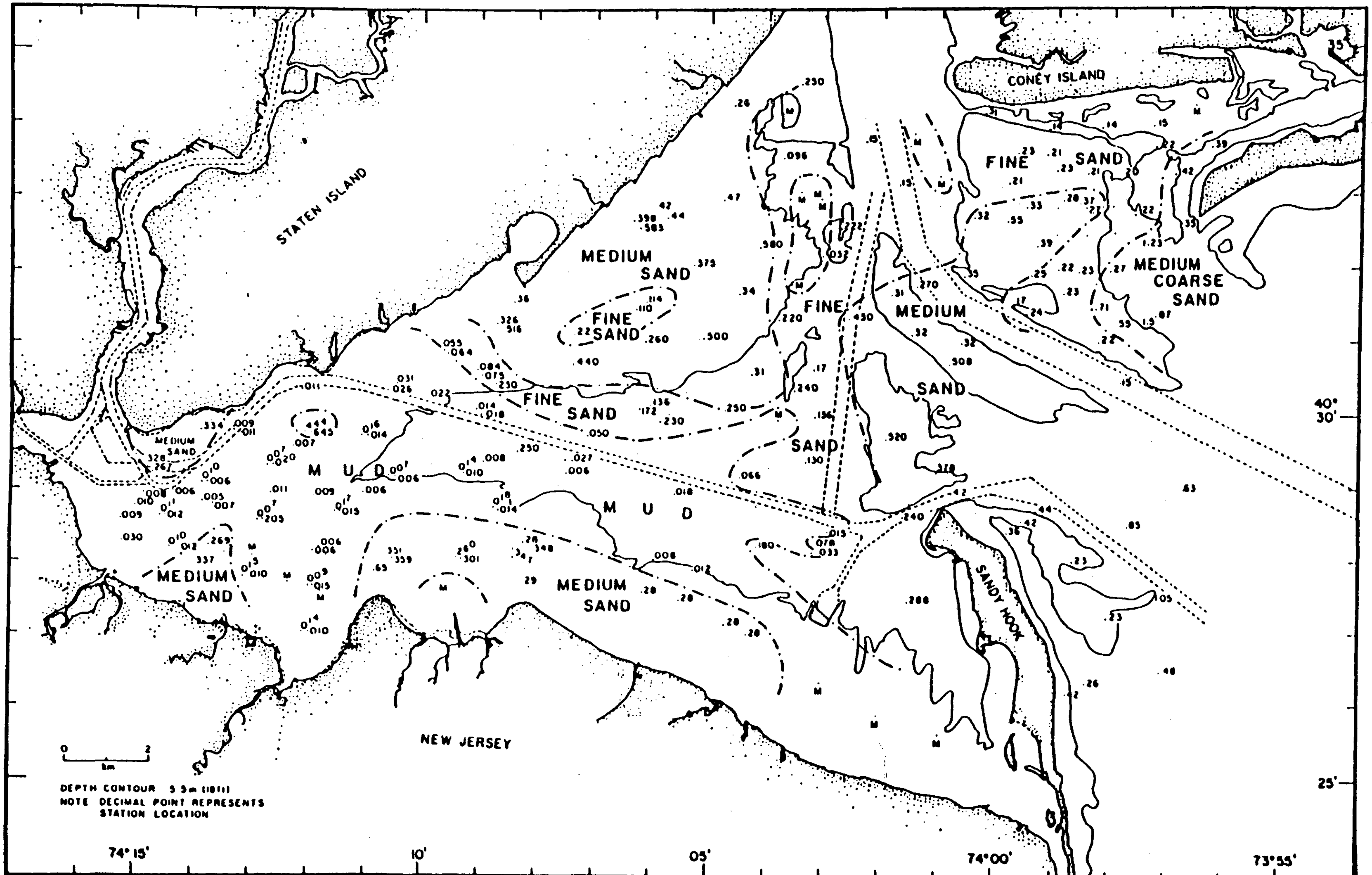


Figure 42. Sampling Stations Used by McGrath Benthic Survey. Taken from Brinkhuis, 1980; p 48.

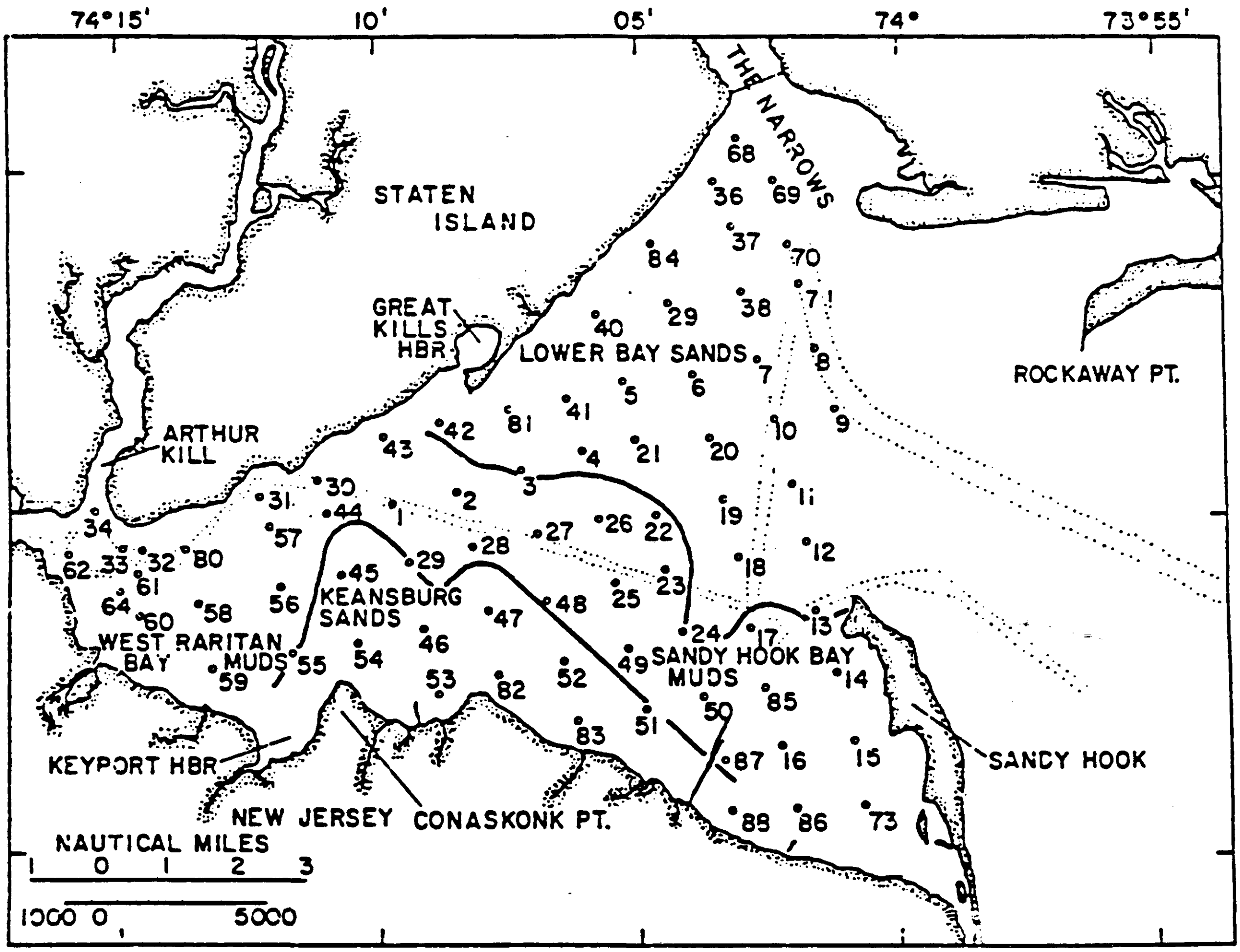
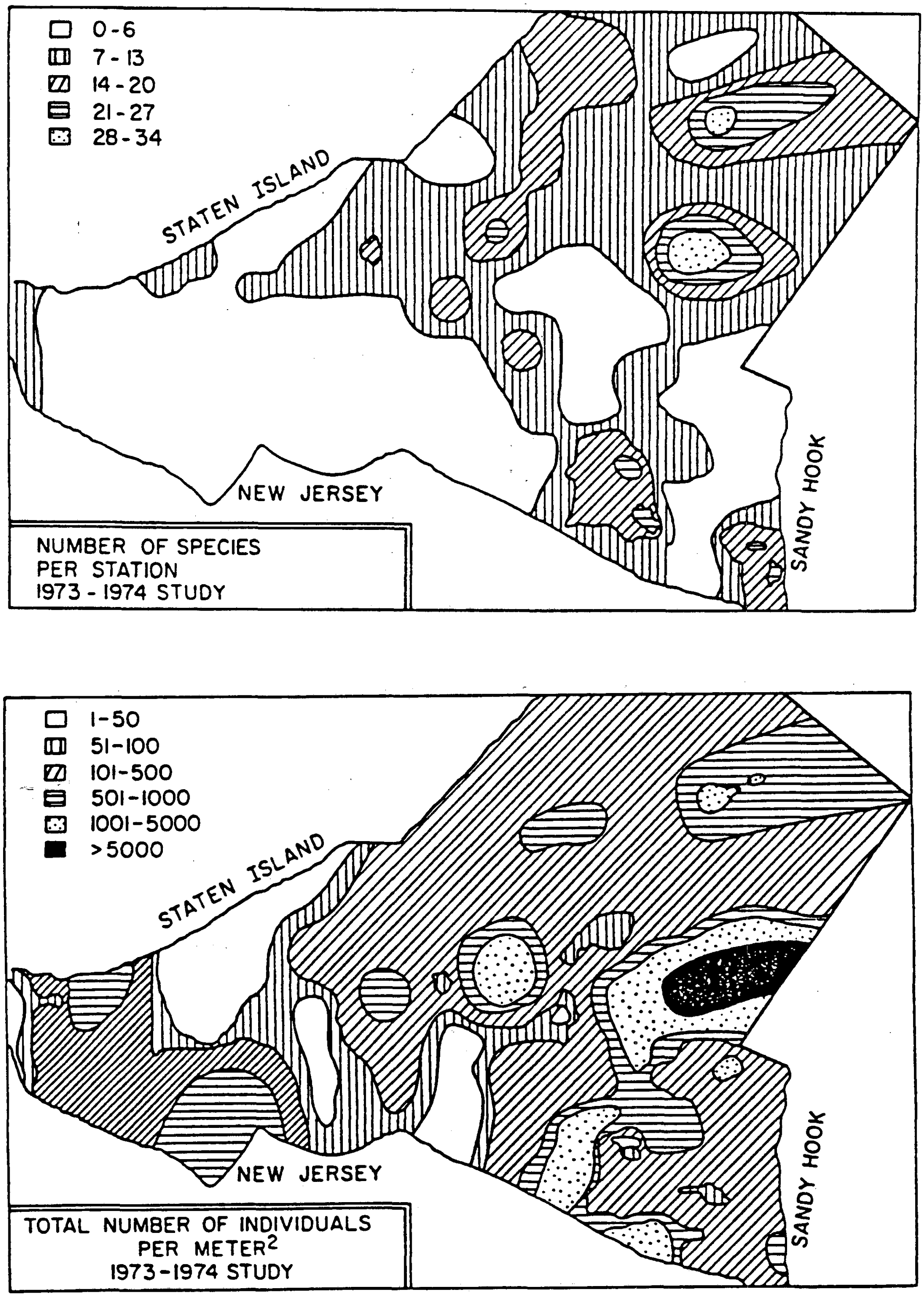
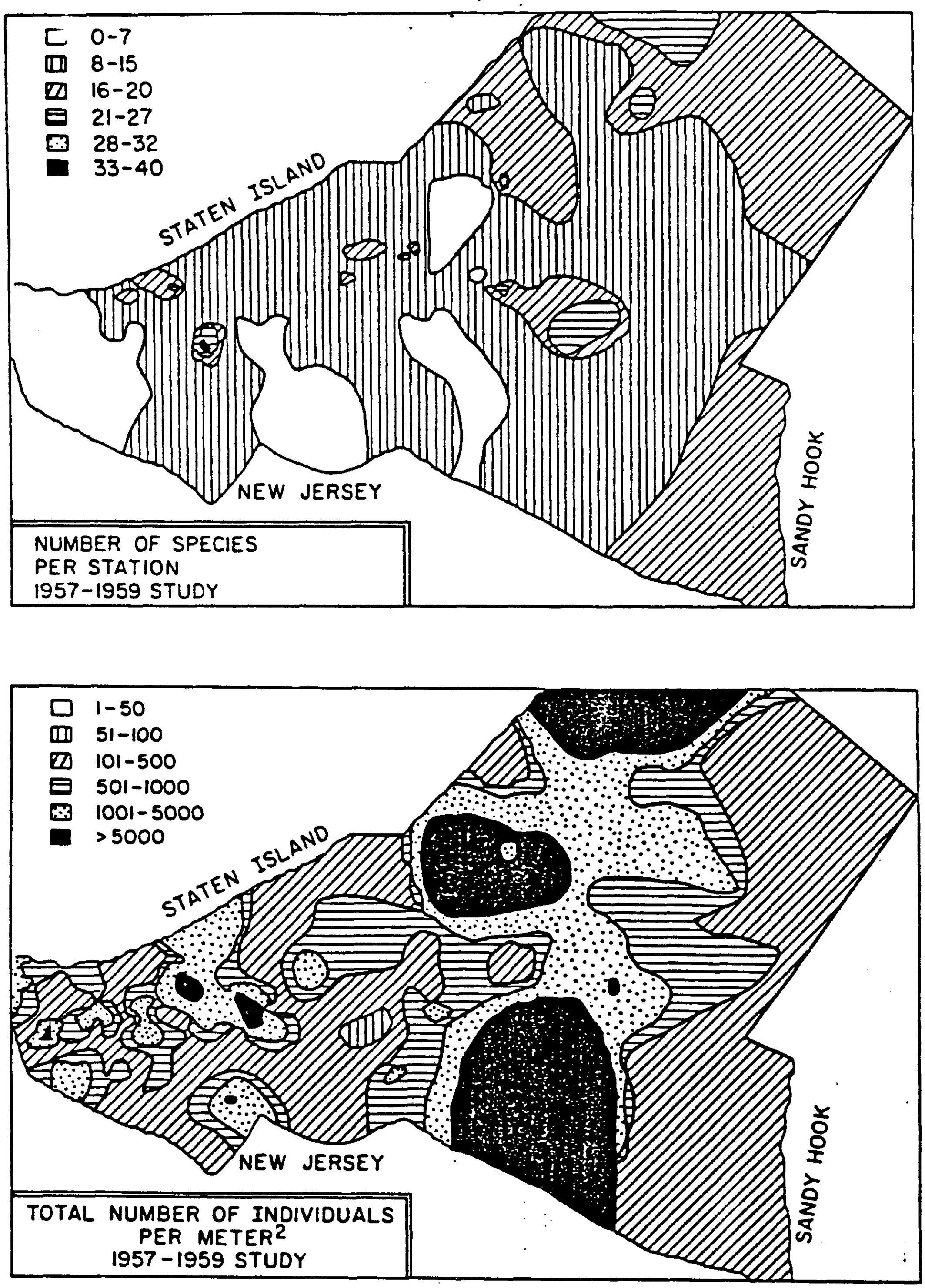


Figure 43. Benthic Abundance and Diversity of the Lower NY Bay Complex, Derived from 1973-74 Study of McGrath (1974). Taken from Berg and Levinton, 1985.



note: see Figure 42 for station locations

Figure 44. Benthic Abundance and Diversity Diagrams of the Lower NY Bay Complex Based on the 1957-59 Studies of Dean (1975). Taken from Berg and Levinton, 1985.



note; see Figure 45 for station locations

Figure 45. Location of Dean's (1975) Benthic Sampling Stations. Taken from Brinkhuis, 1980.

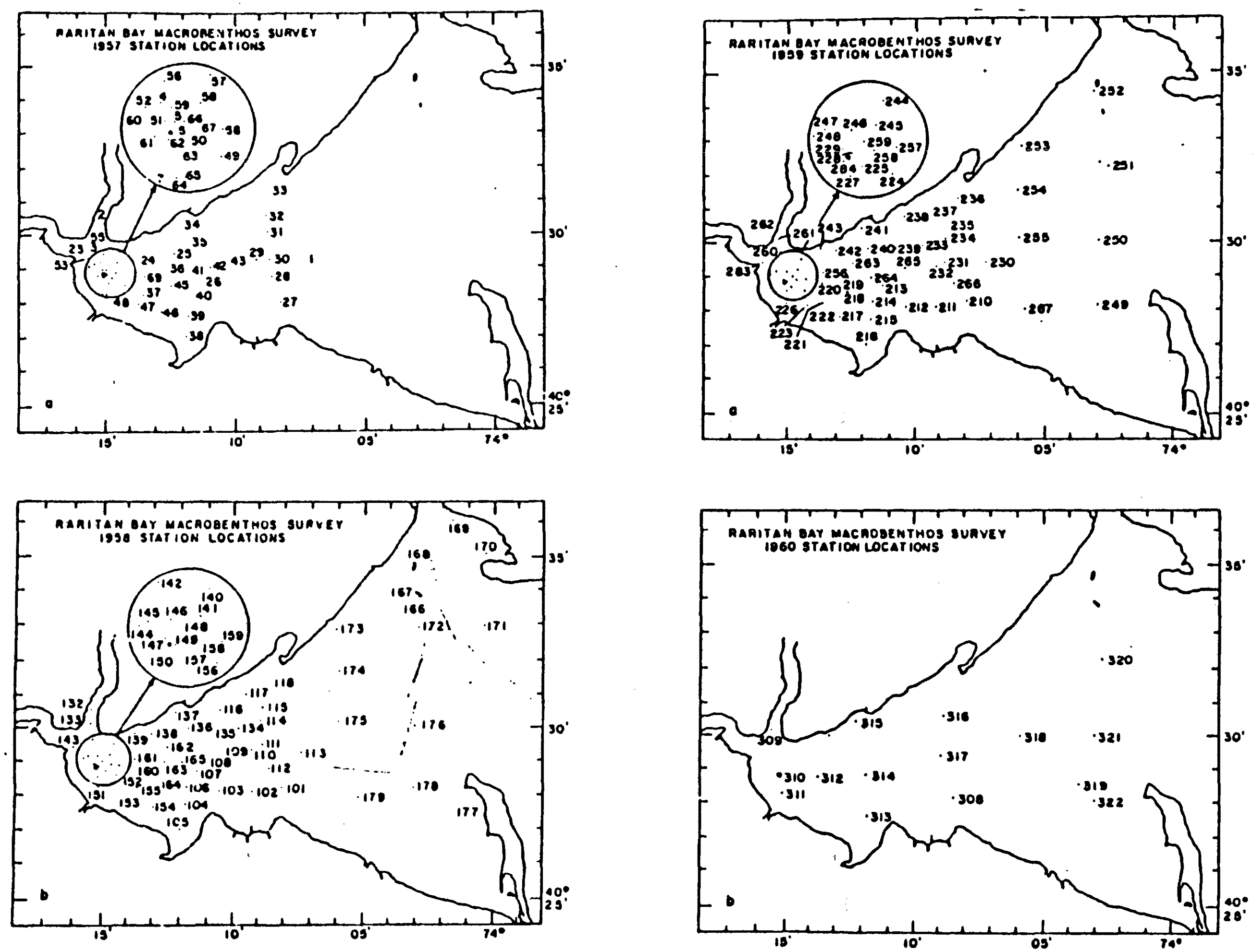


Figure 46. Sampling Stations Used by Steimle & Stone, 1973, Benthic Survey, Taken from Brinkhuis, 1980; p 53.

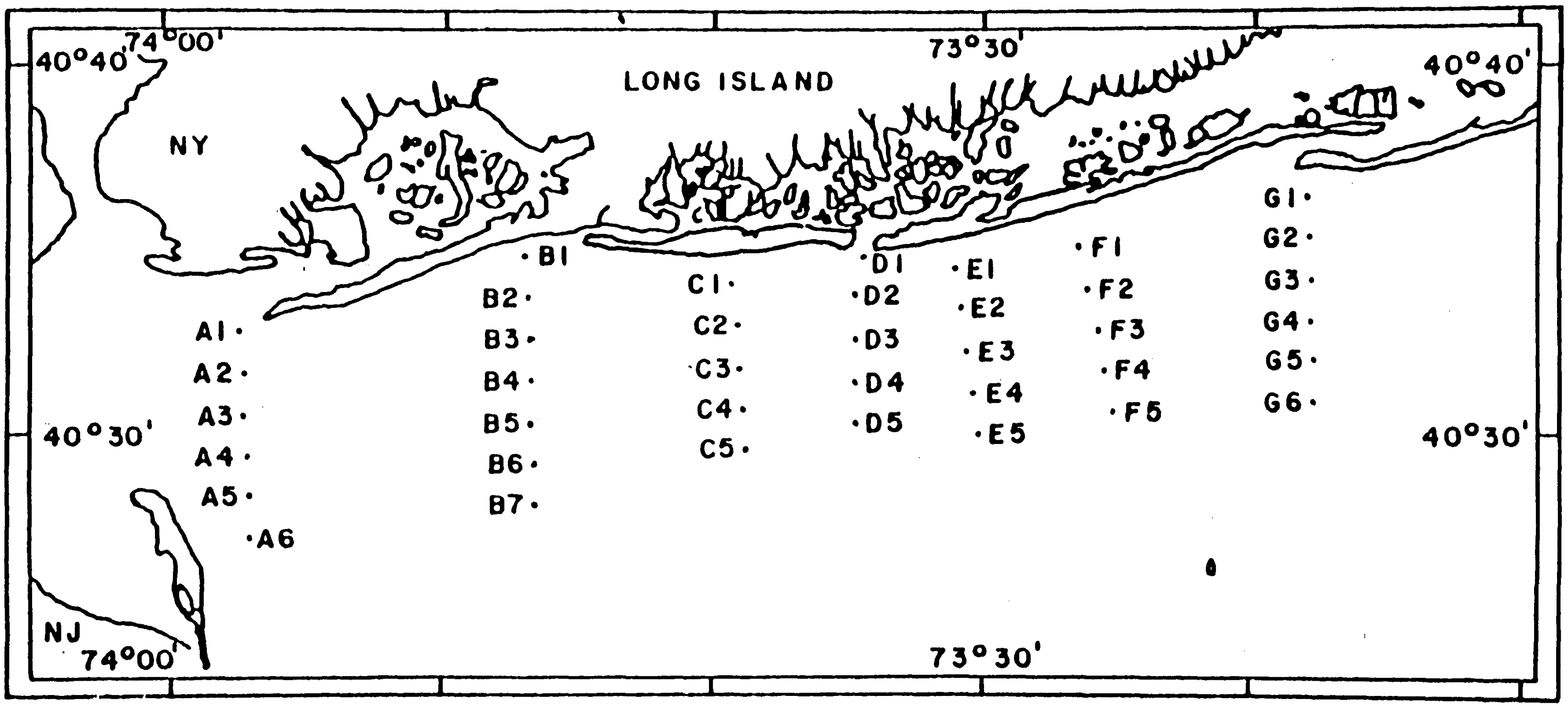


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Figure 47. Sample Locations for East and West Bank Benthic Study. Taken from Brinkhuis (1980), page 54.

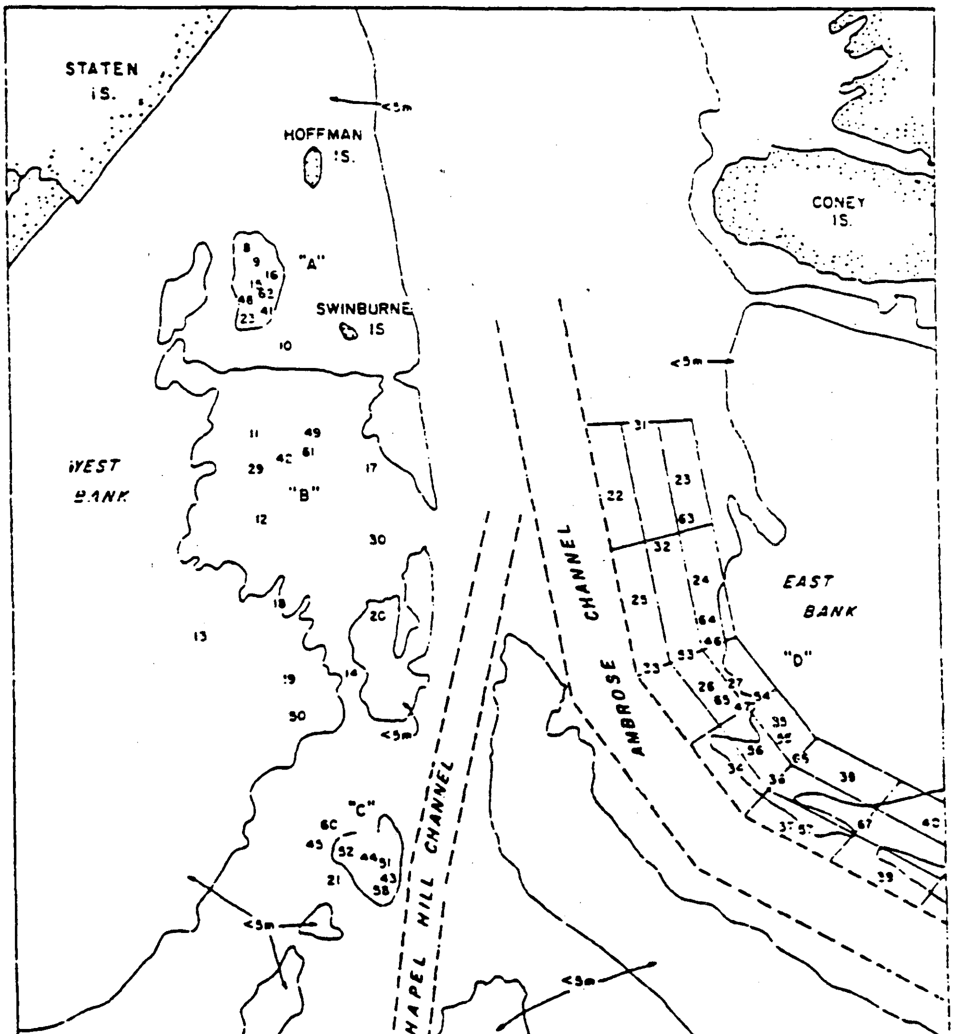


Figure 48. Location of Woodward-Clyde (1975) East Bank Benthic Sampling Stations.

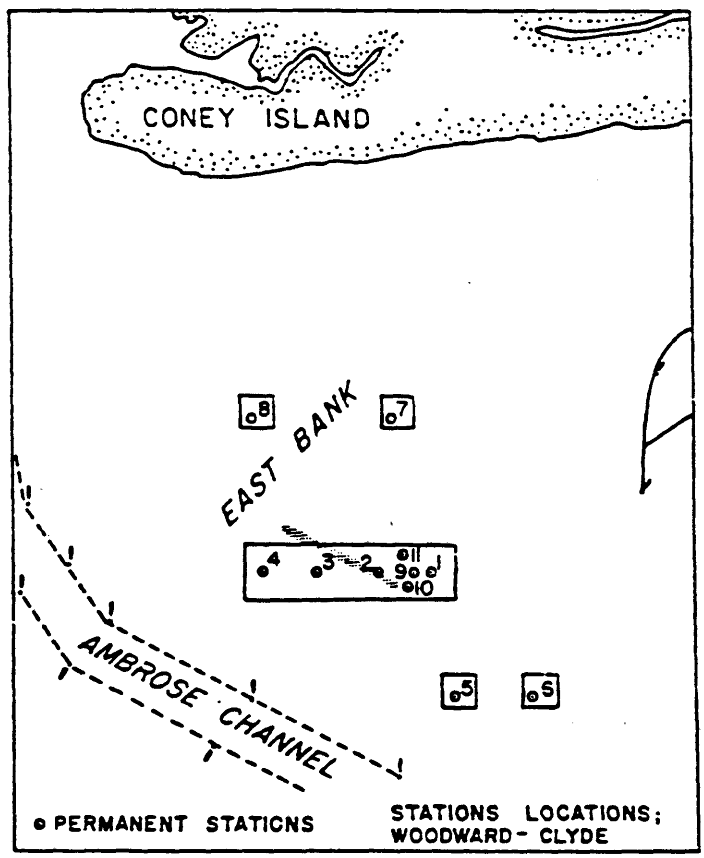


Figure 49. Benthic Seasonal Abundance Diagrams based on 1986-1987 MSRC Benthic Survey of Lower Bay Complex. From Cerrato et al, 1988

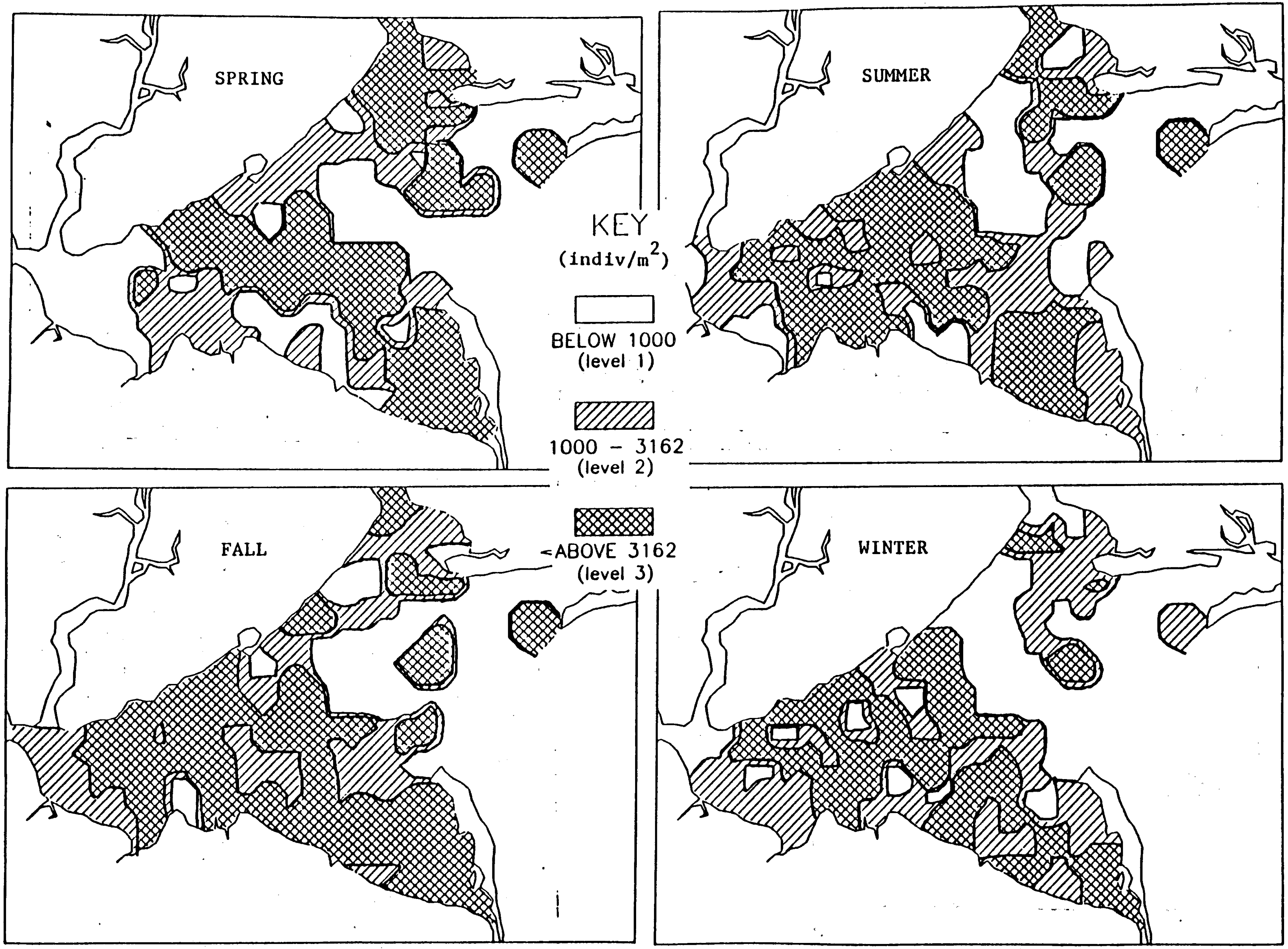


Figure 50. Seasonal Benthic Species Richness Diagram based on 1986-1987 MSRC Benthic Survey of Lower Bay Complex. From Cerrato et al, 1988

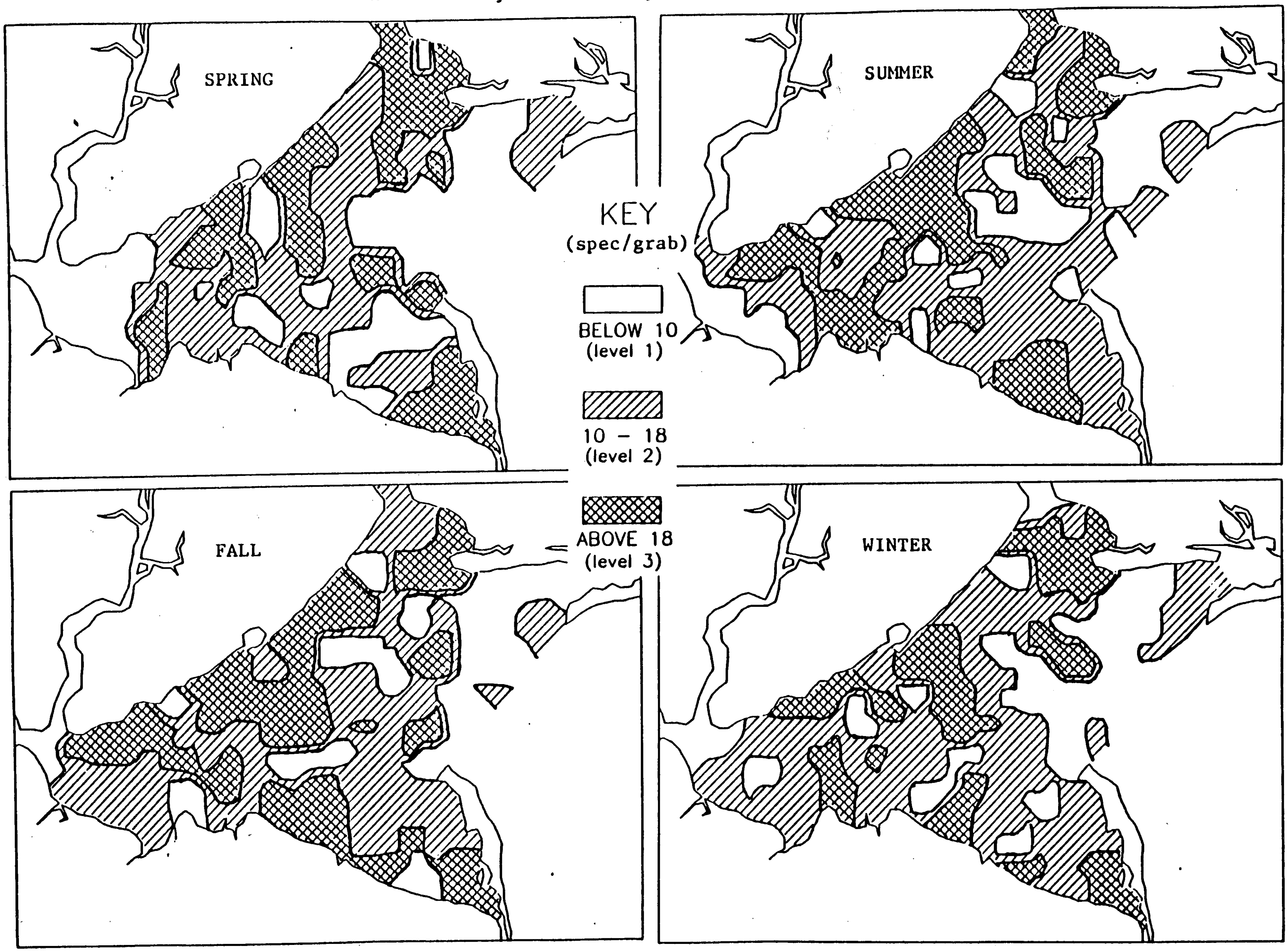


Figure 51. Station Locations for 1984-85 SUNY Sampling of Lower Bay Complex. Taken from Woodhead and McAfferty (1986): p 6.

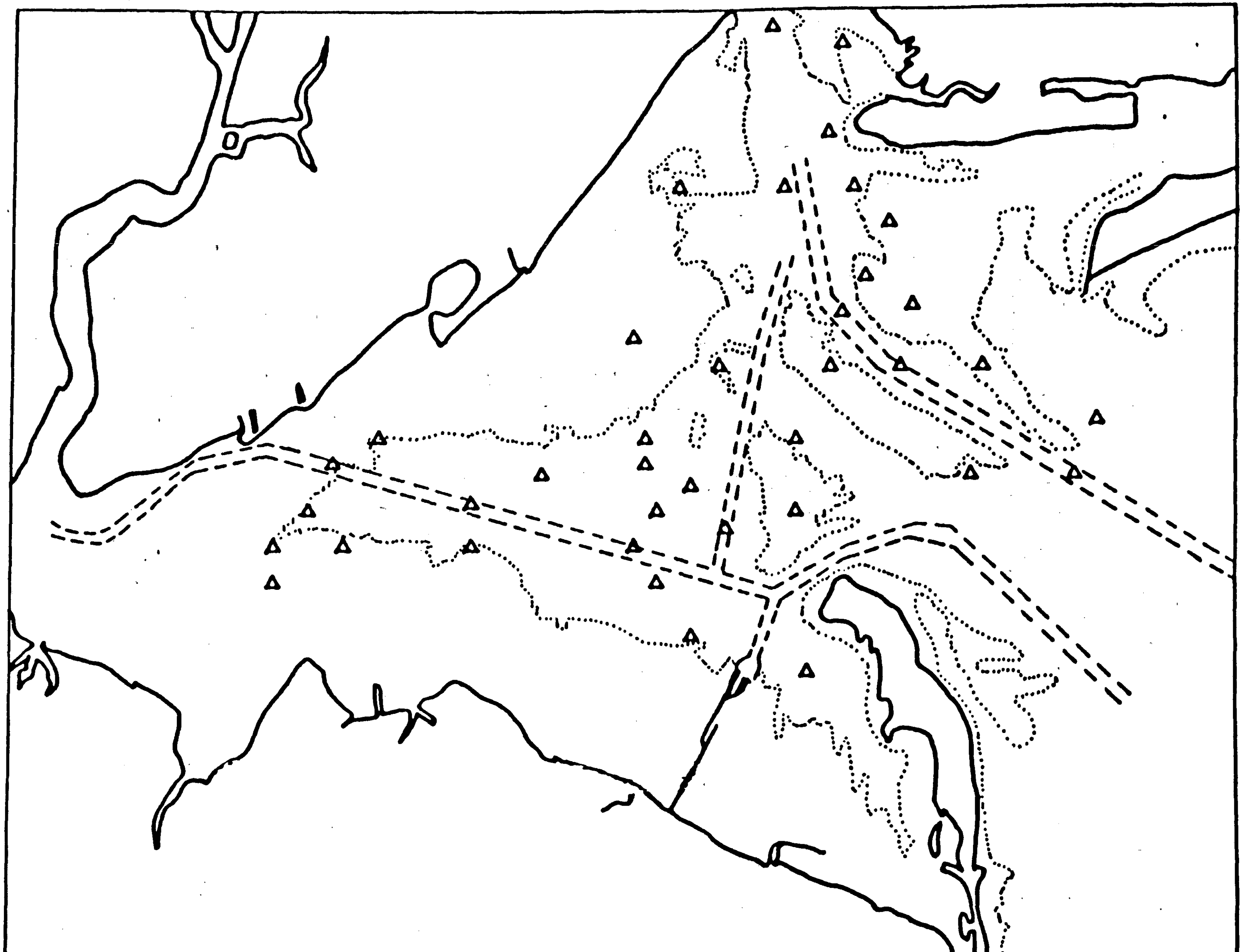


Figure 52. Sampling Stations Used by Wilk & Silverman, 1970 Fish Survey, Taken from Brinkhuis, 1980; p 72

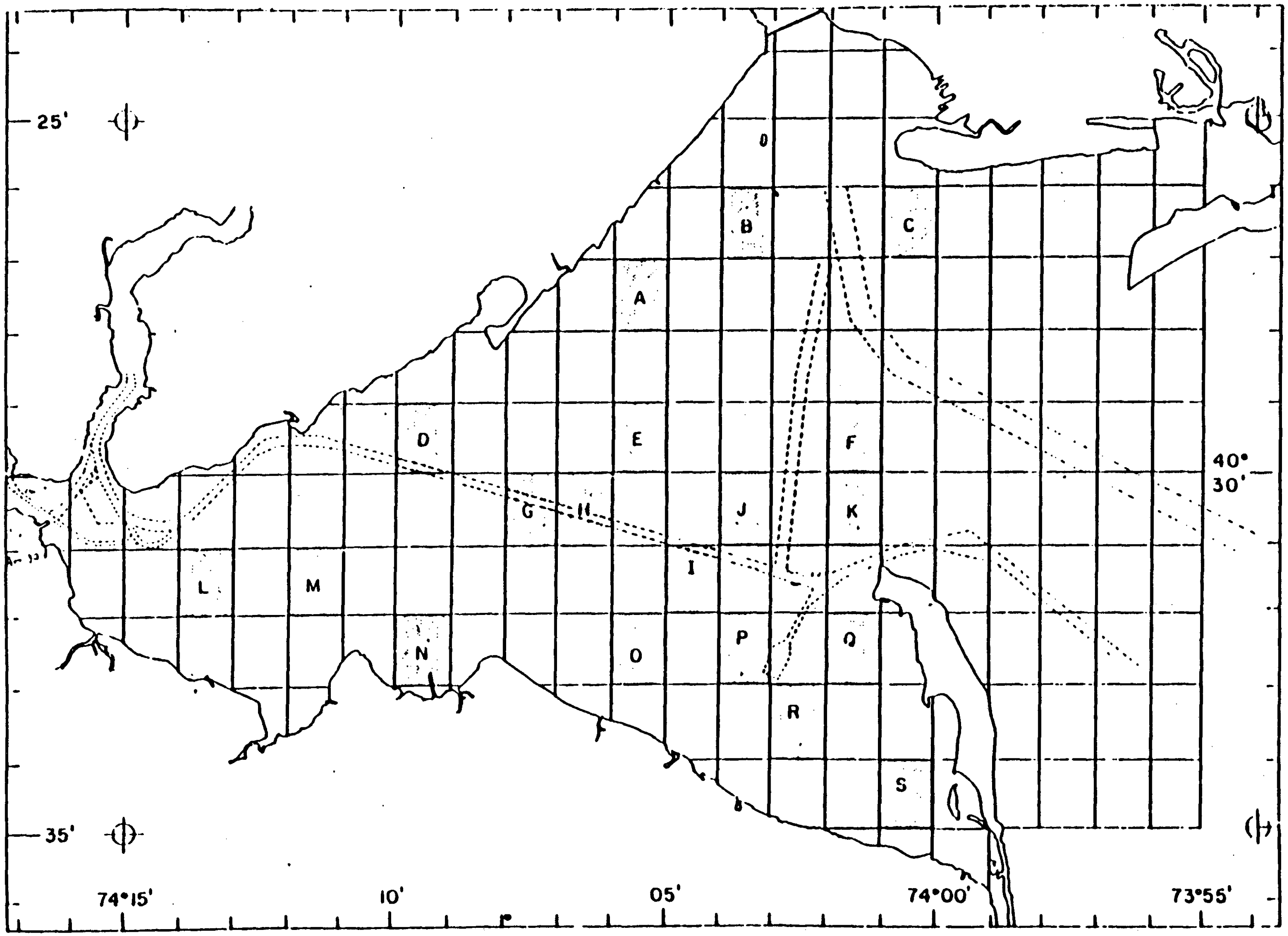


Figure 53. Mean Annual Fish Densities in Lower Bay Complex. Taken from Levinton & Berg, 1985; p 67.

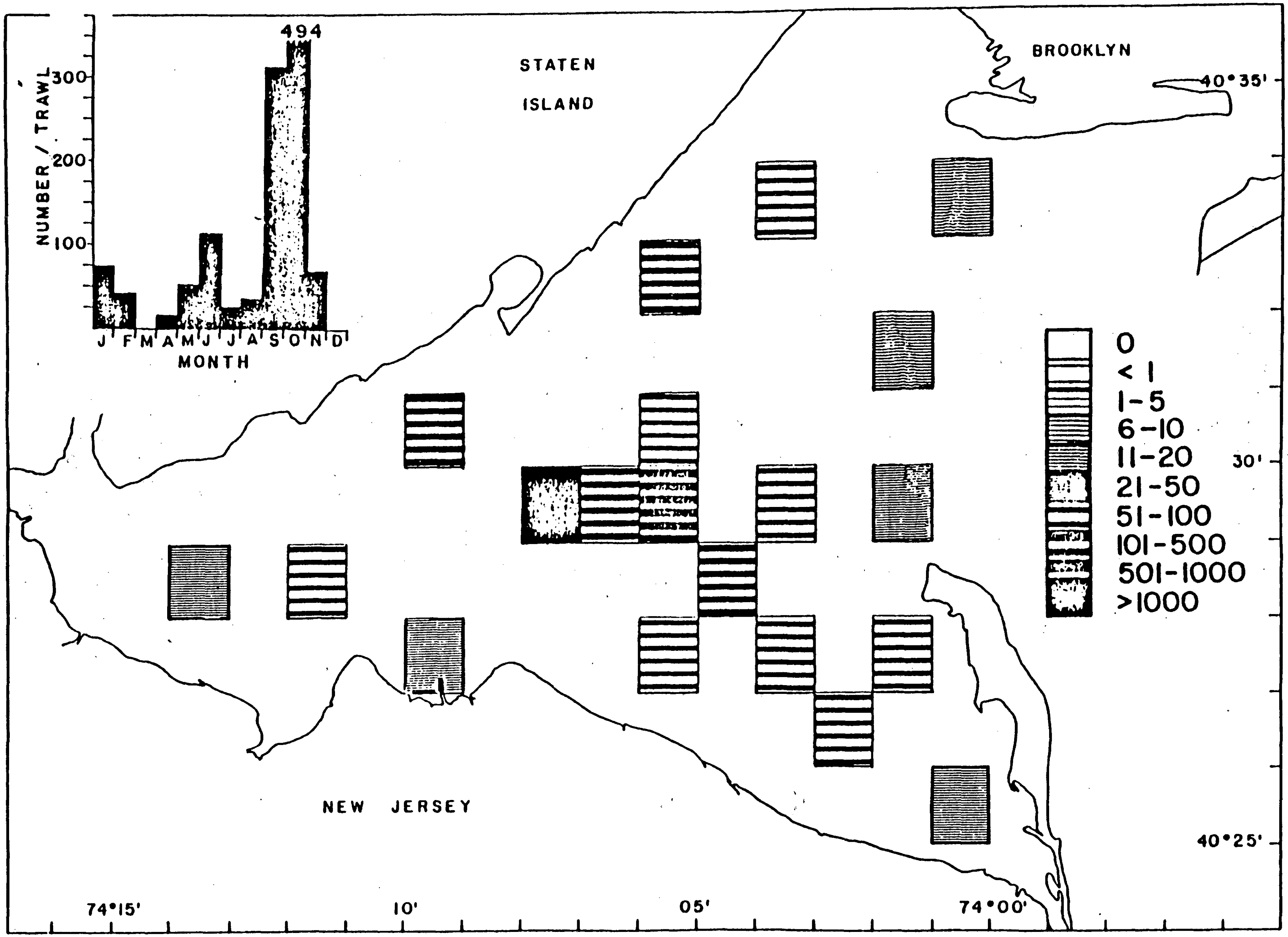
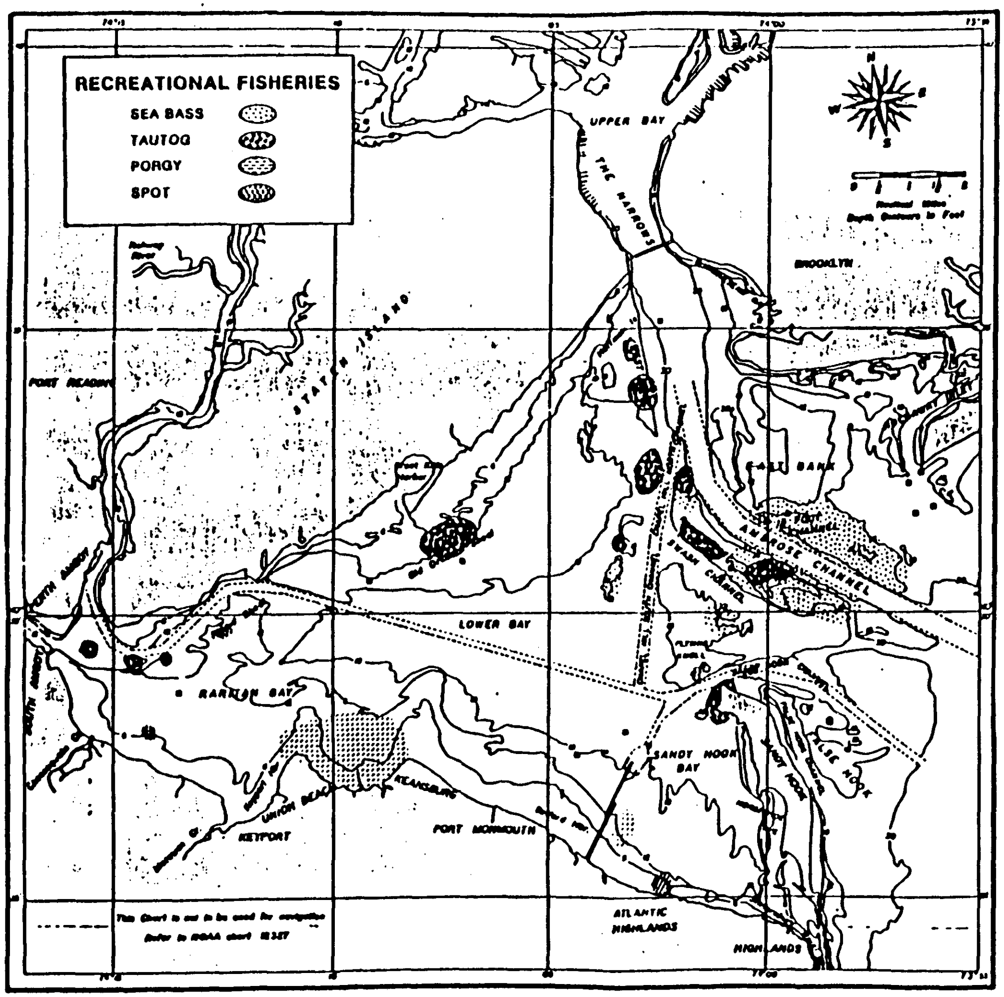


Figure 54. Recreational Fishing Areas in the Lower Bay Complex (part 1 of 3).
Taken from Figley, 1984.



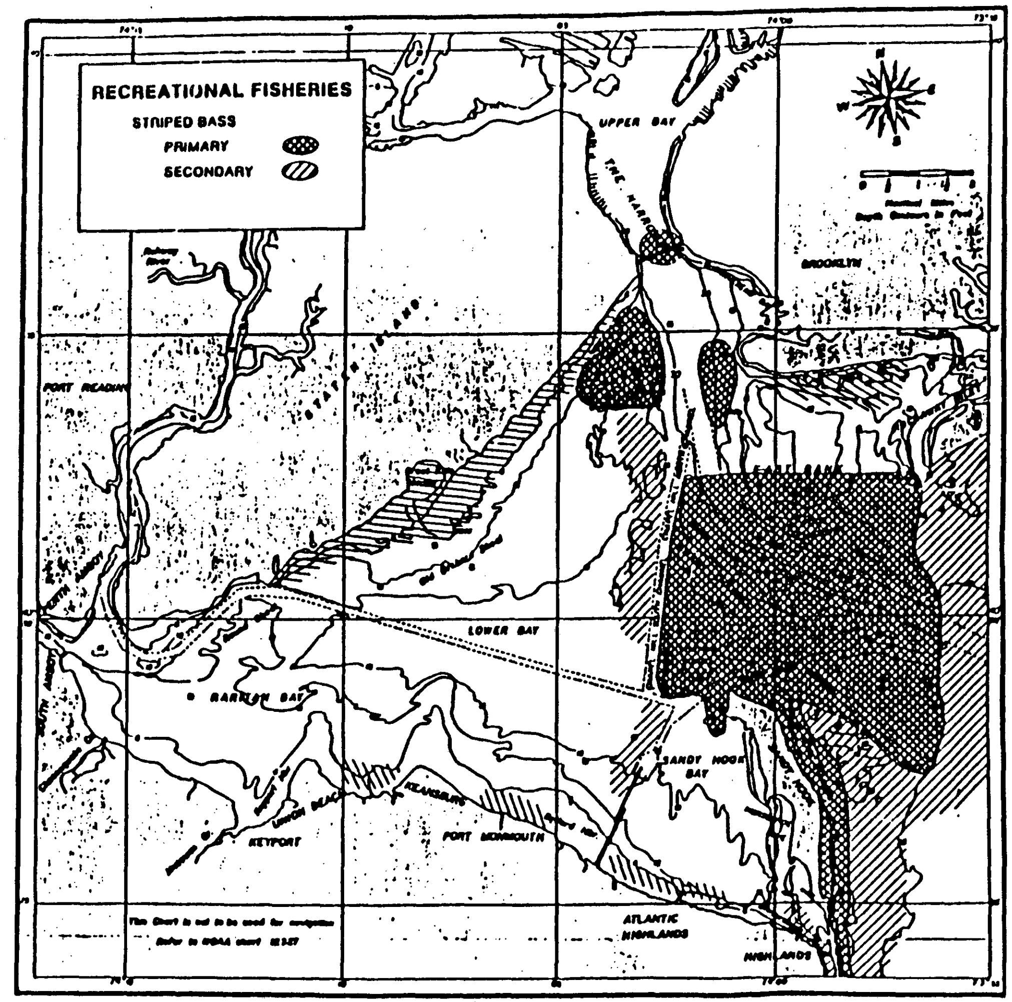
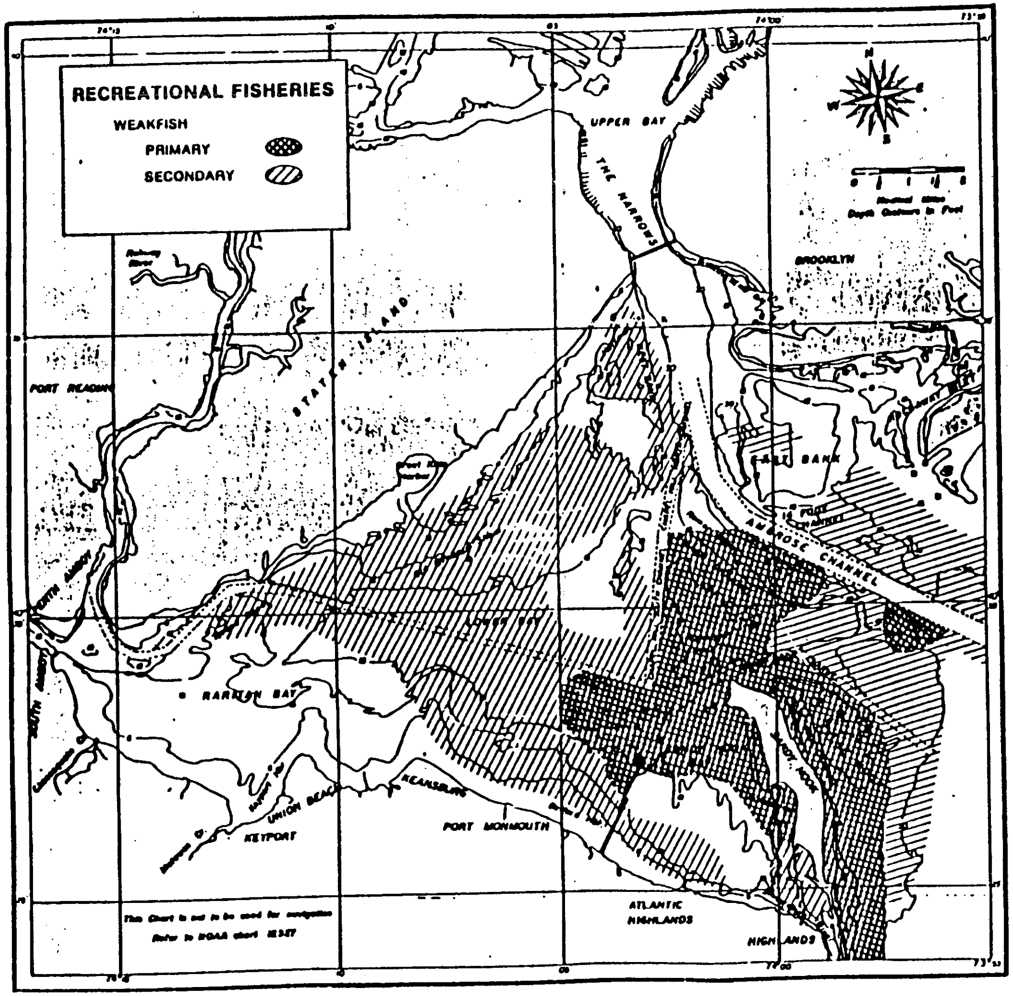


Figure 54. (con't). Recreational Fishing Areas in the Lower Bay Complex (part 2 of 3).



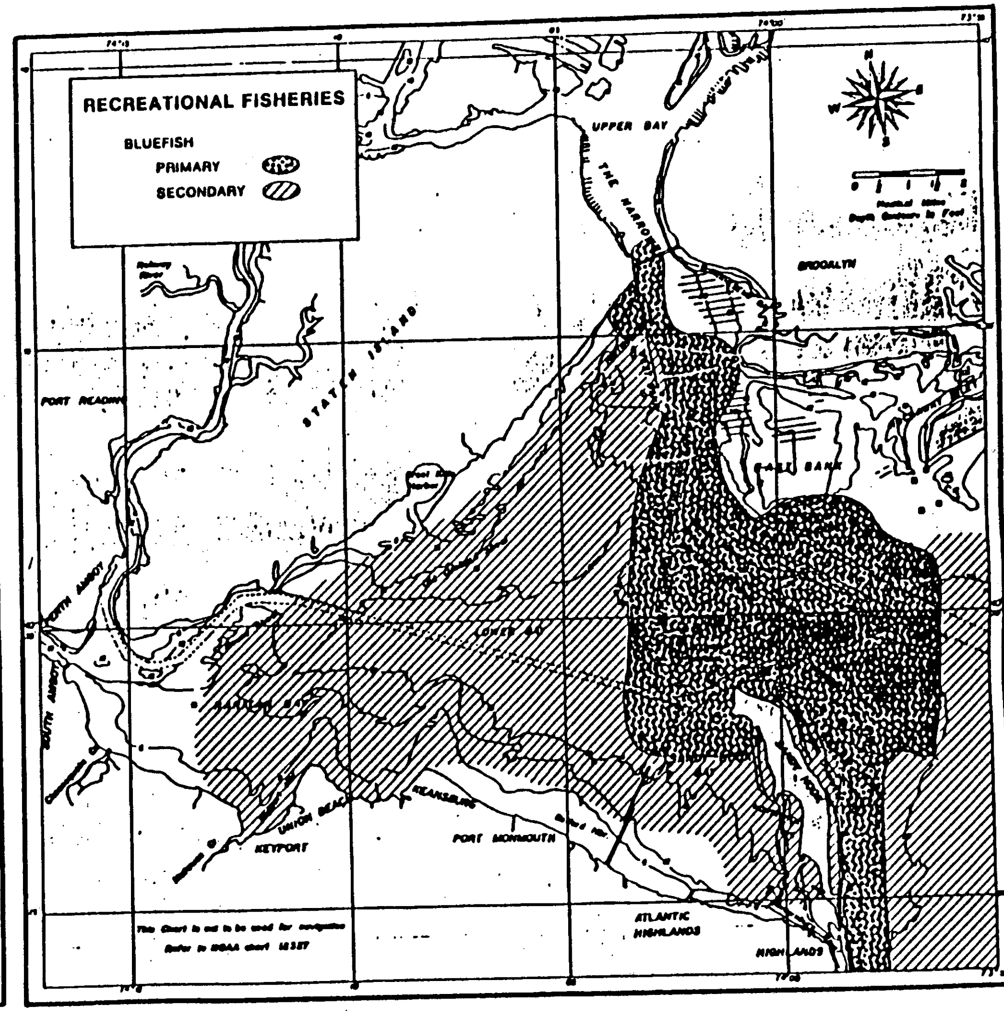
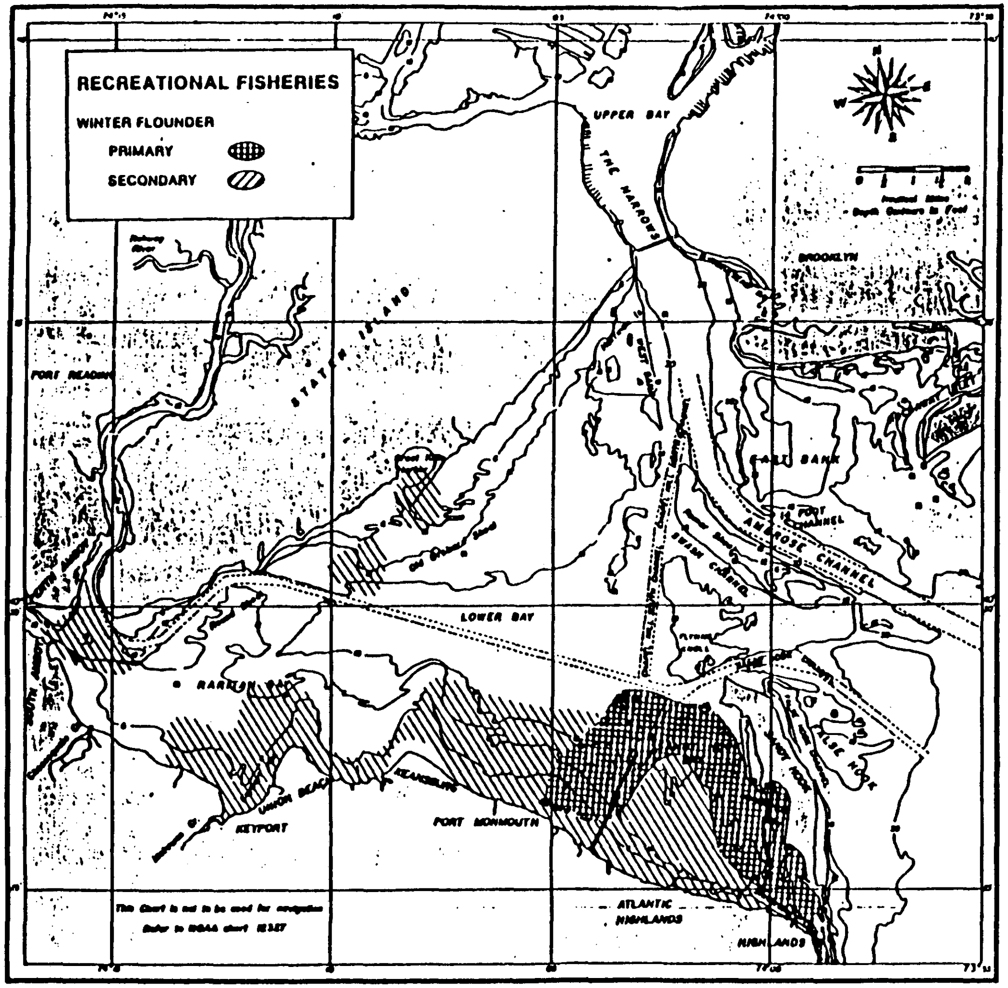


Figure 54. (con't). Recreational Fishing Areas in the Lower Bay Complex (part 3 of 3).



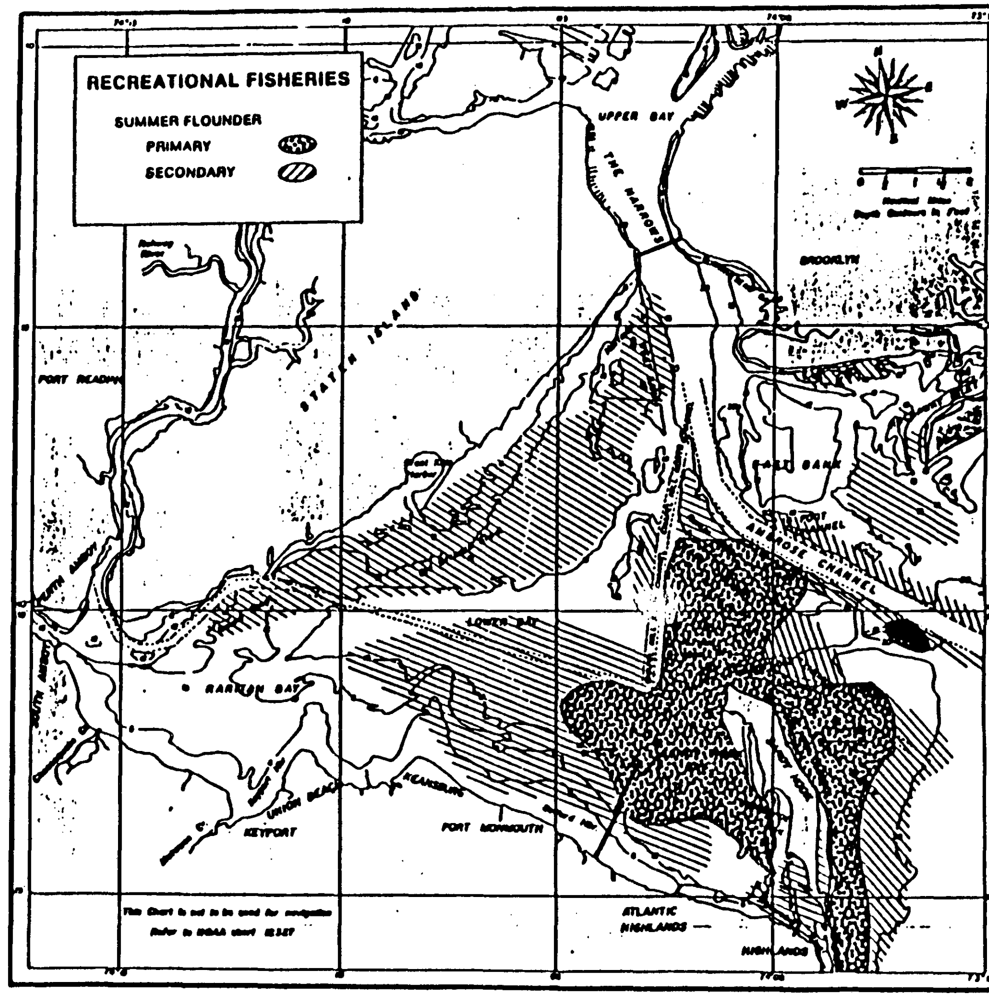


Figure 55. Depth Strata of Stations Sampled During 1984-85 SUNY Sampling of Lower Bay Complex.
Taken from Woodhead and McAfferty (1986): p 11

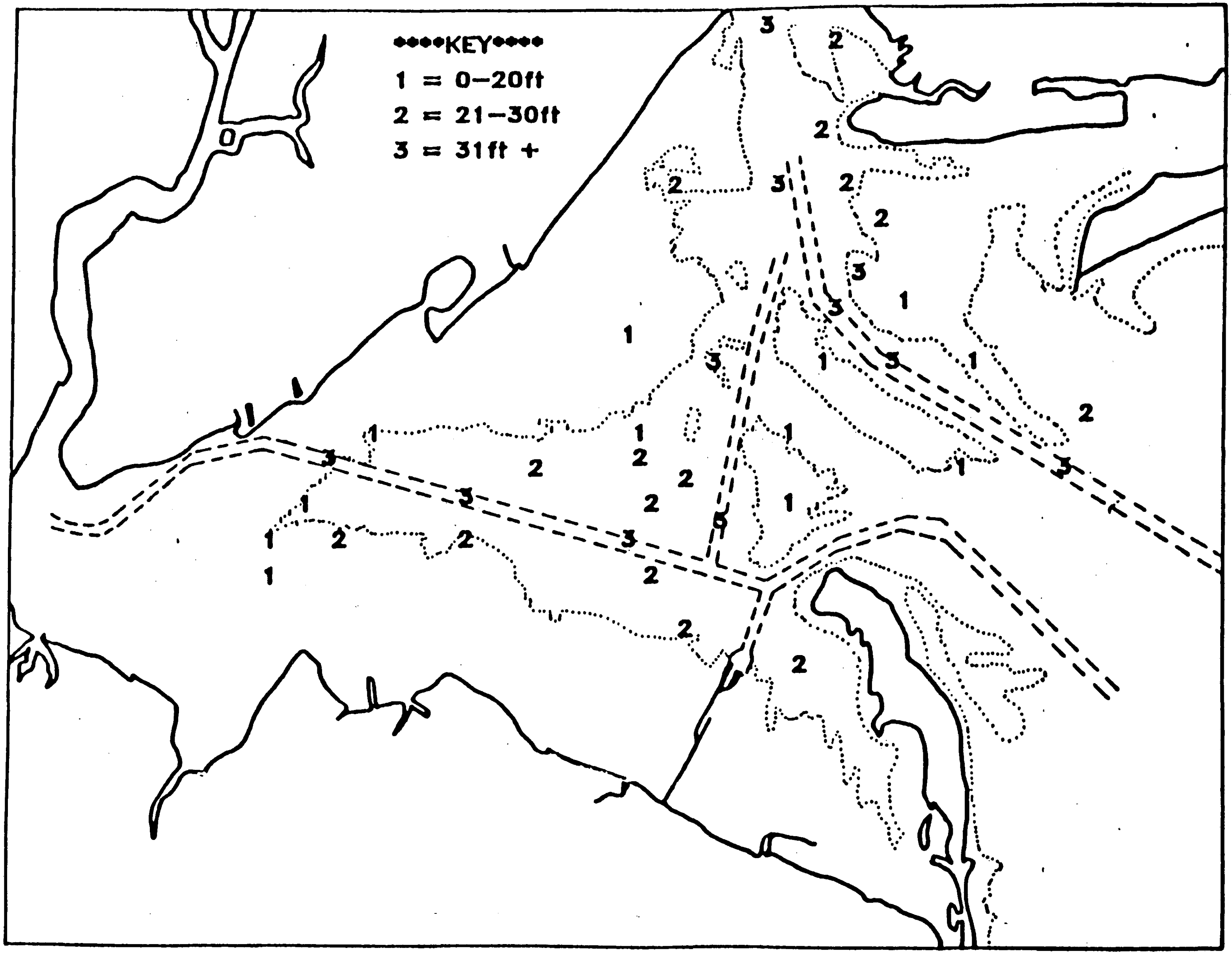
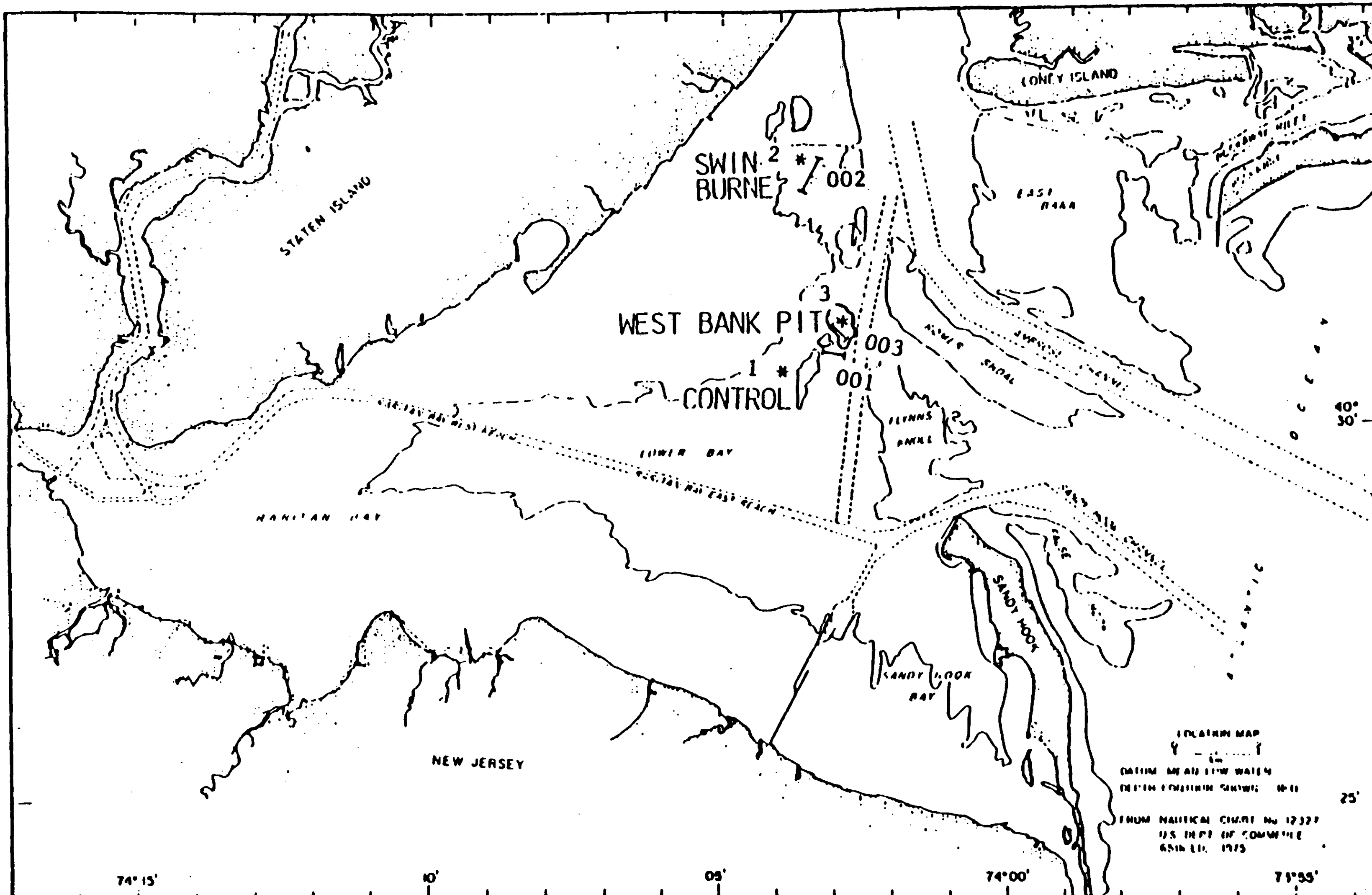


Figure 56. Sampling station locations for Two Studies of Borrow Pits and Adjacent Shoals. Taken from NYD, 1984; p 81 & 83 (mod.).



* (1,2,3) = Conover et al Stations

(001,002,003) = Pacheco et al Stations

Figure 57. Annual Distribution of Fish Caught in Two Borrow Pits and an Adjacent Shoal. From Conover et al. (1983).

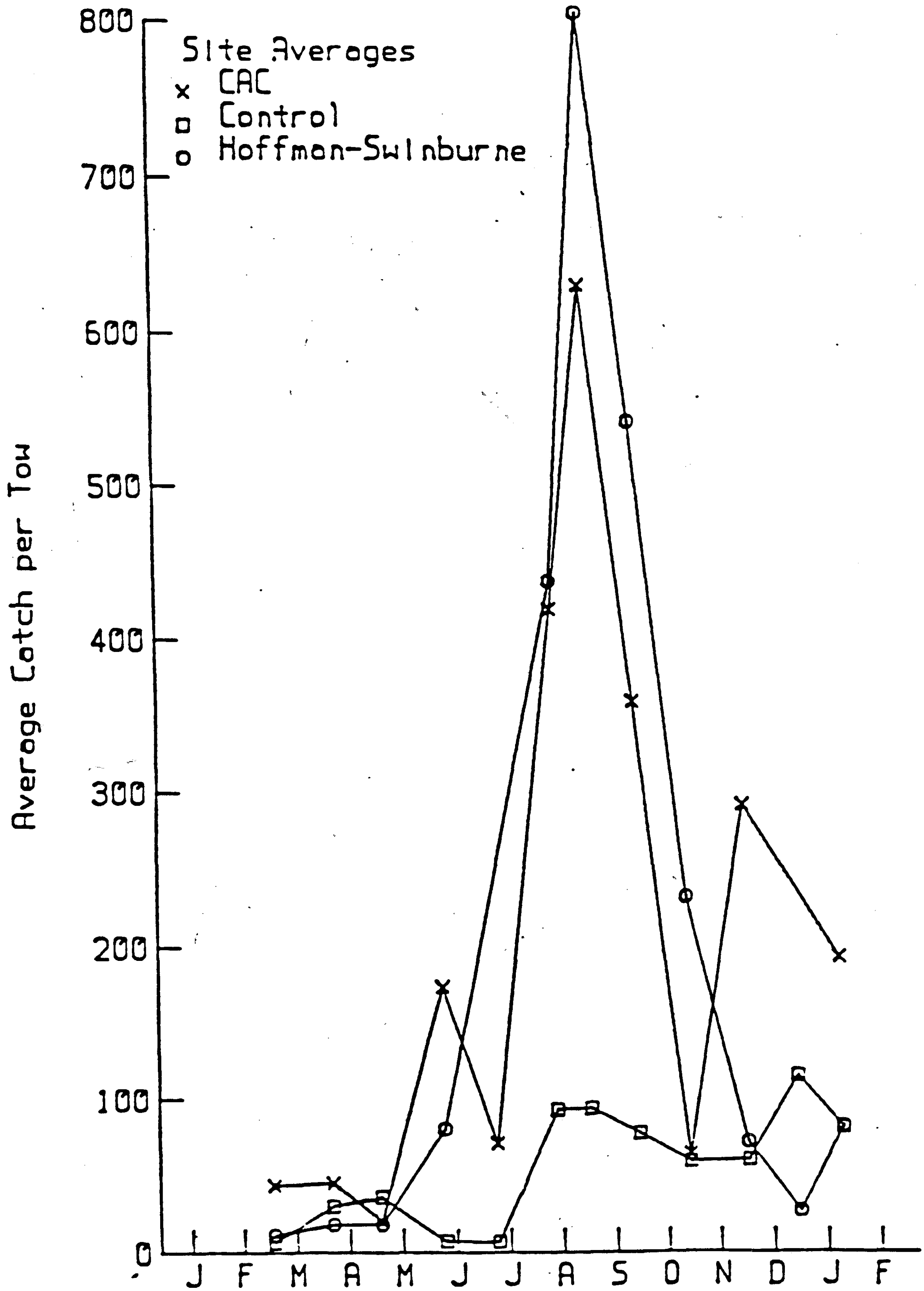


Figure 58. Location of NMFS 1984 Sampling Stations in Lower Bay Complex (including two Pits at Station 2 & 3). Taken from NYD, 1984; p 84.

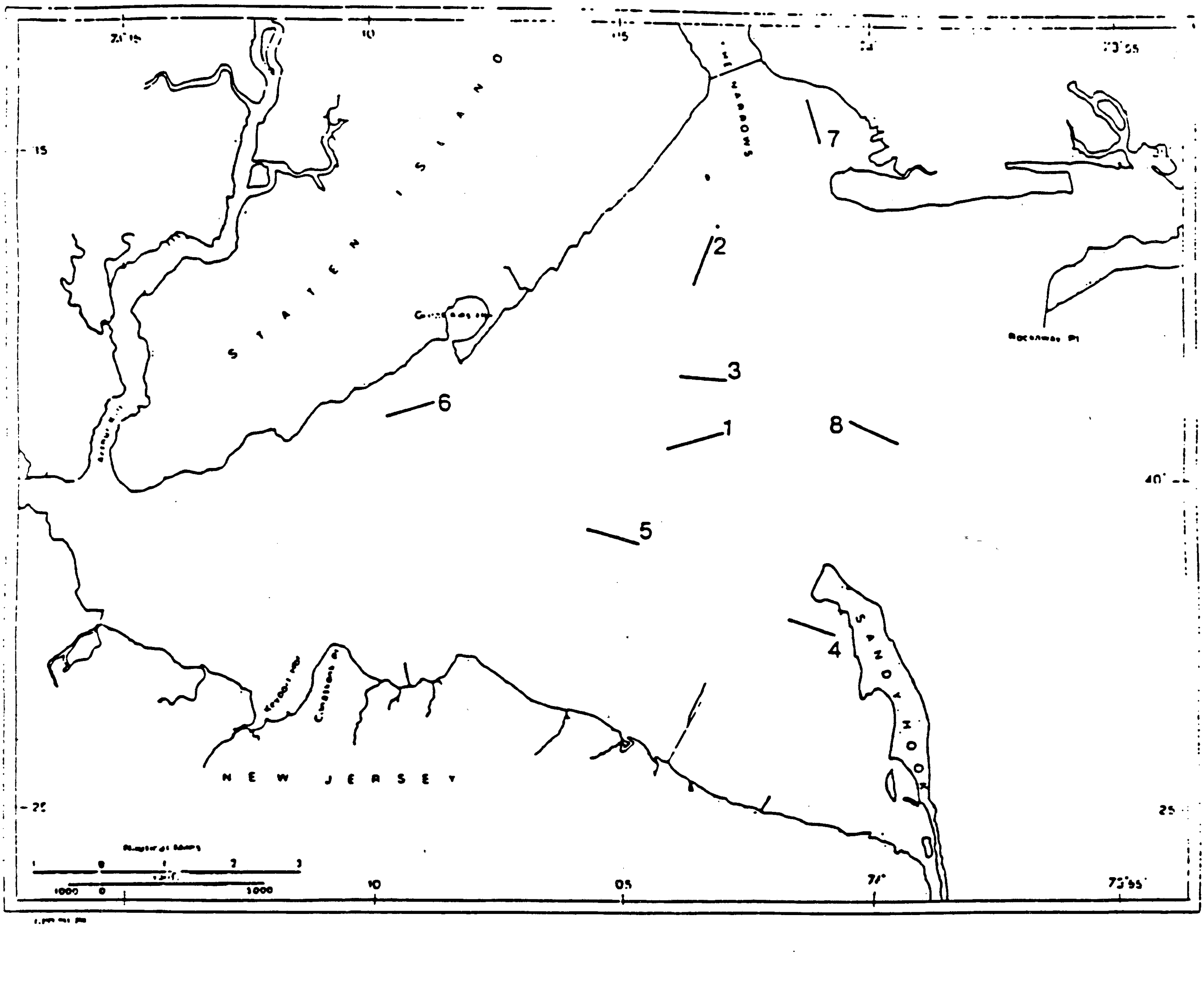


Figure 59. Commercial Fishing Areas in the Lower Bay Complex (part 1 of 2).
Taken from Figley, 1984

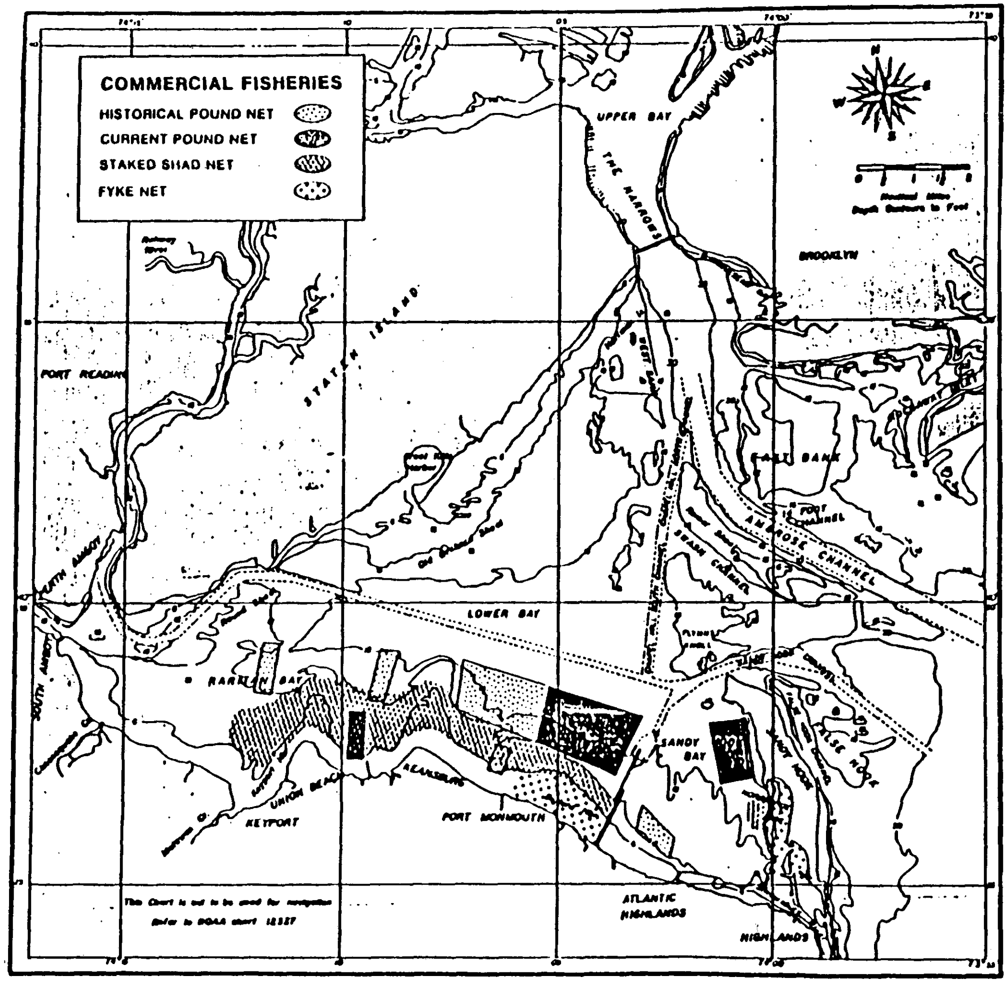
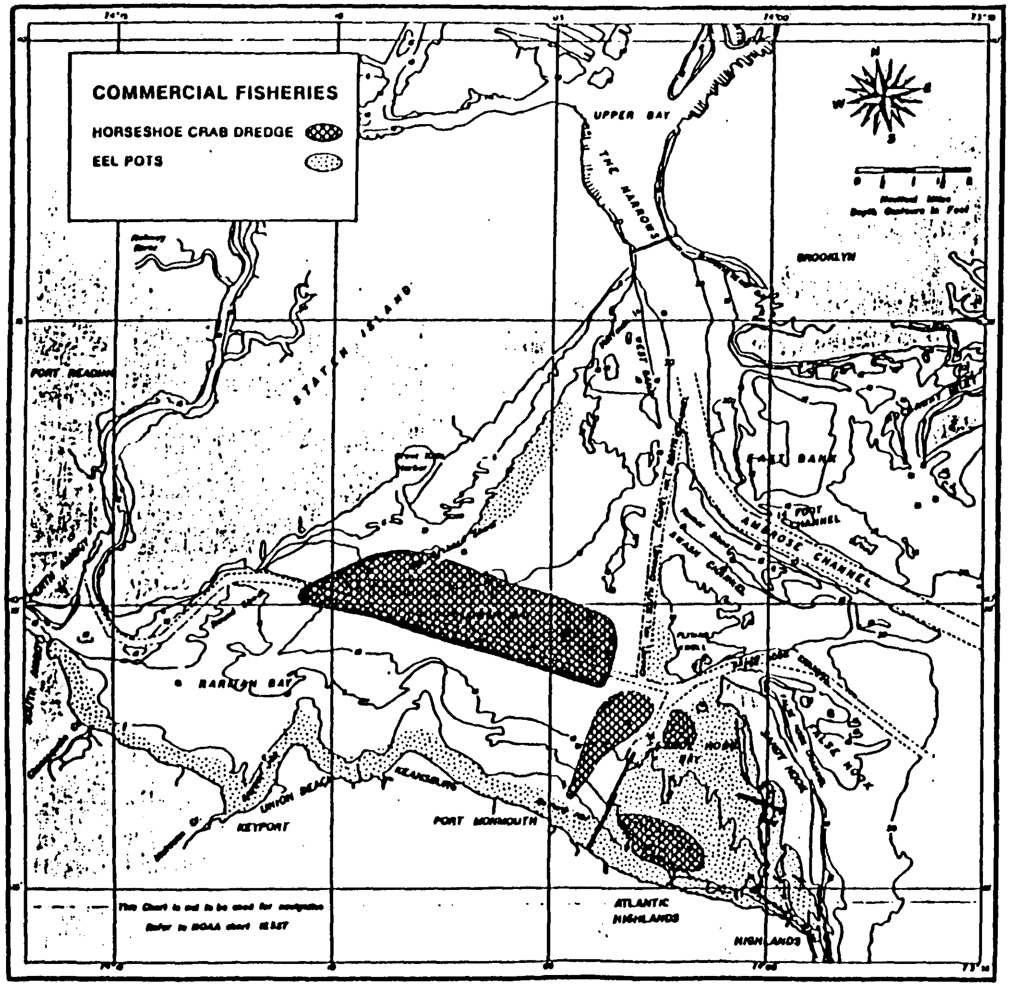


Figure 59. (con't). Commercial Fishing Areas in the Lower Bay Complex (part 2 of 2)



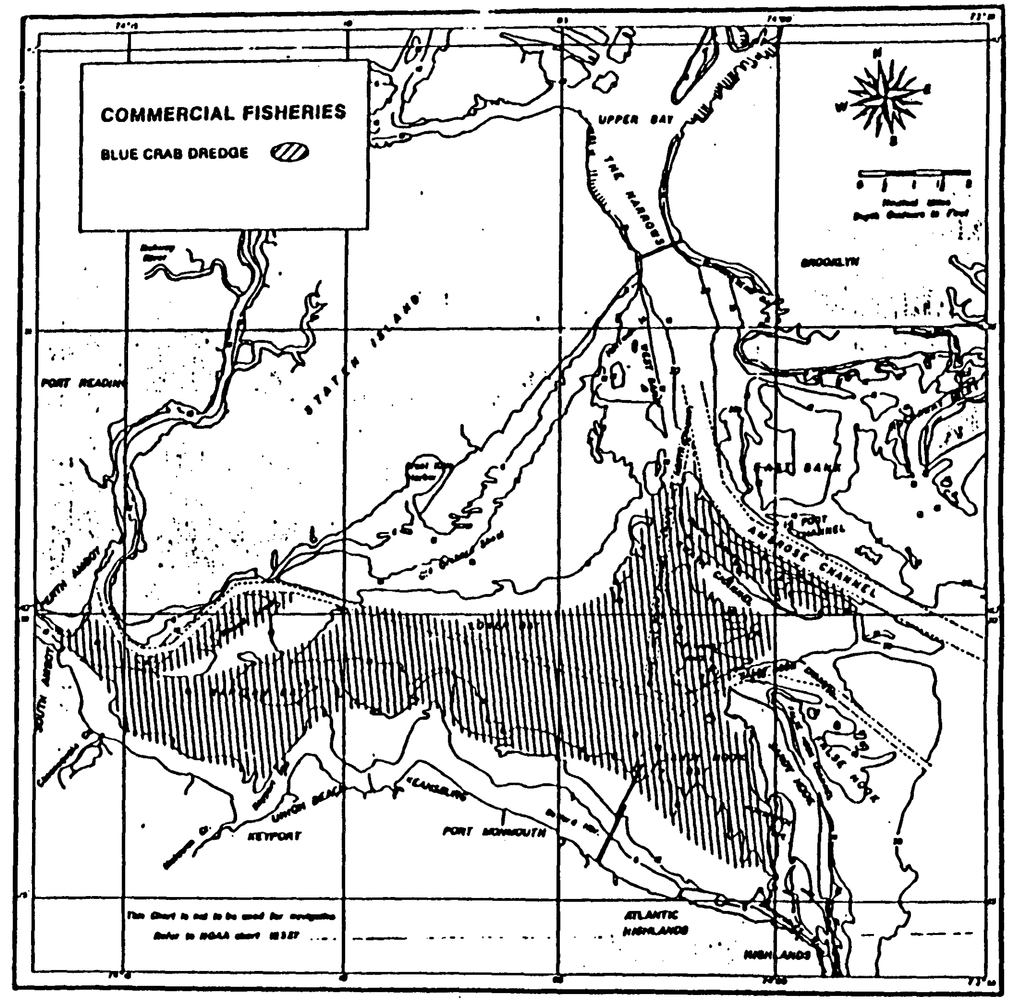


Figure 60. Newtown Creek Federal Navigation Project. Taken from NYD, 1985;p12

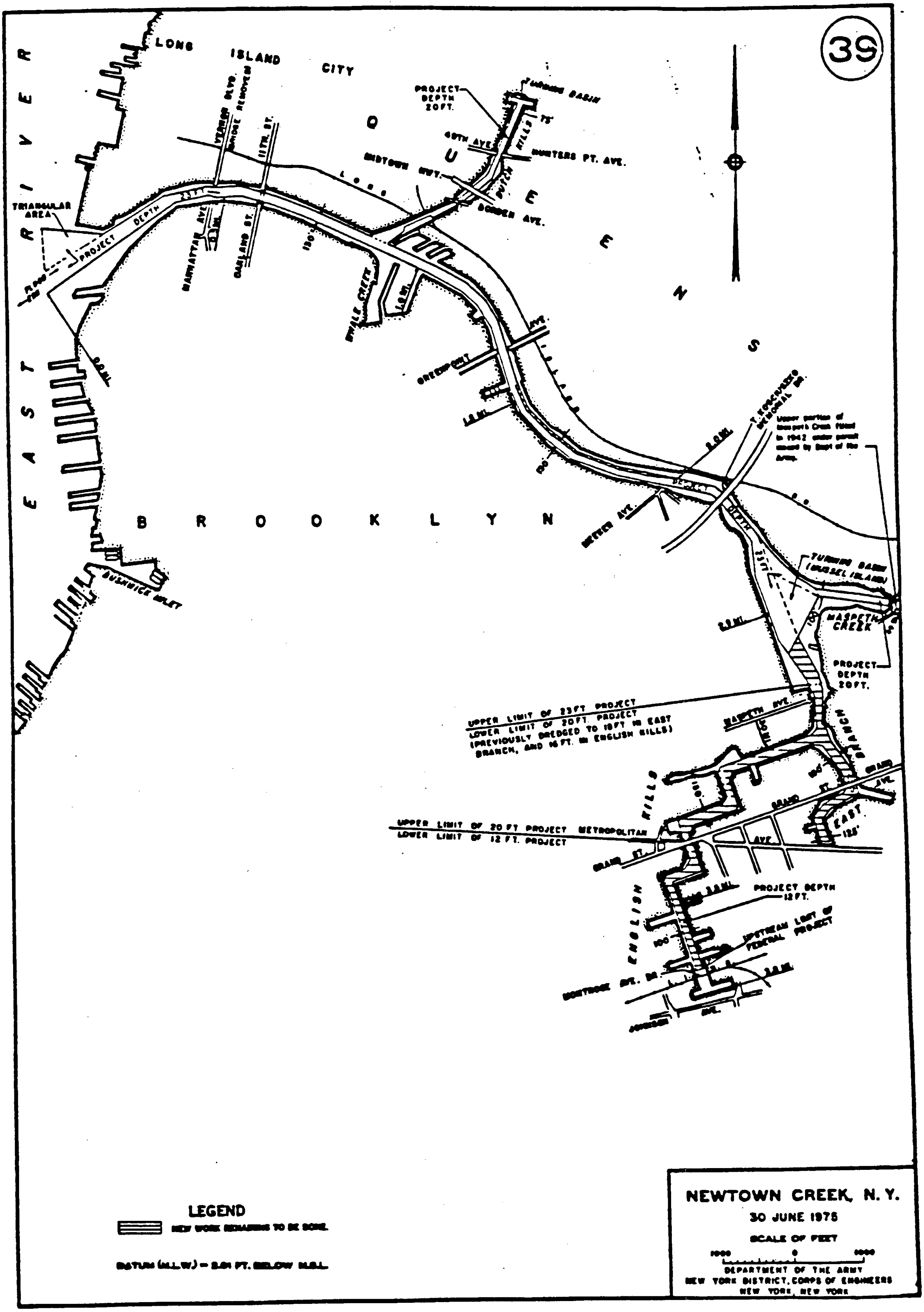
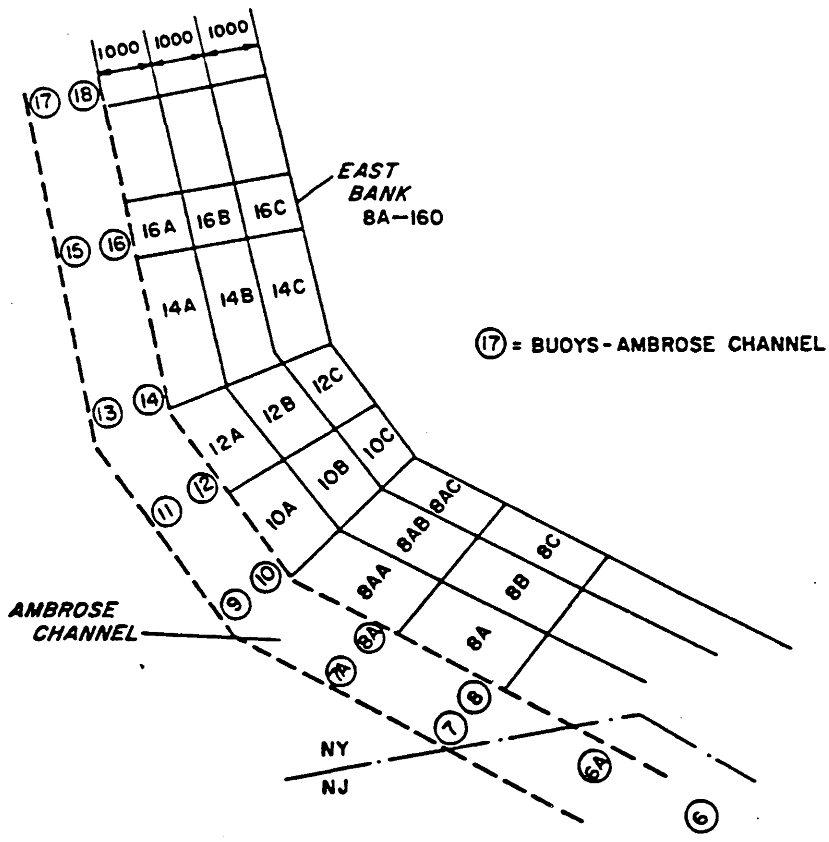


Figure 61. Hypothetical East Bank Sand Mining Locations Used to Model Impacts on Shoreline Wave Energy. Taken from Kinsman et al, 1979; p 7.



APPENDIX A

Examples of Typical Test Results for the Four Sediment Categories

Category I (Table A-1) A-2
Category IIa (Table A-2) A-7
Category IIb (Table A-3) A-13
Category III (Table A-4) A-19

NOTE: The bioassay and bioaccumulation test results contained within this Appendix are taken from past Public Notices published by the New York District, and are intended as examples of general categories of dredged material (as discussed in the FSEIS section 2.1). These examples are not intended as specific guidelines or criteria for evaluating any given sediment, which can only be done on a case by case basis

Table A-1. Type I Sediment; Currently Considered Suitable for Unrestricted Ocean Disposal

TABLE 1

Liquid Phase Chemical Analysis Results

CONSTITUENTS	ELUTRIATE	SITE WATER
Mercury	< 0.2 ug/liter	< 0.2 ug/liter
Cadmium	< 0.1 ug/liter	< 0.1 ug/liter
PCB	< 0.1 ug/liter	< 0.1 ug/liter
Petroleum hydrocarbons	< 50.0 ug/liter	< 50.0 ug/liter

ug/liter - micrograms per liter or parts per billion

Bioassay Results: In accordance with EPA's Ocean Dumping Regulations, published in the Federal Register on 11 January 1977, suspended particulate phase and solid phase bioassays are required for the proposed dredged material utilizing the test species as discussed below.

The suspended phase is considered to be the supernatant remaining after one hour of undisturbed settling of the mixture resulting from a vigorous 30 minute agitation of one part bottom sediment from the dredging site with four parts water collected from the dredging site or the disposal site, as appropriate for the type of dredging operation. The solid phase is considered to be all material settling to the bottom within one hour. For this permit applicant, natural seawater was substituted for disposal site water. This substitution conforms with the procedures in the Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters.

As pointed out in the Implementation Manual, "...the liquid phase may be analyzed in either of two ways, as specified in paragraph 227.13 (13)(c)(2) of The Register.... The liquid phase may be analyzed chemically and the results evaluated by comparison to water quality criteria... (or) if the water quality approach is not taken, the liquid phase must be evaluated by bioassays..."This office has adopted the direct bioassay approach as being more appropriate since the liquid phase may contain major constituents not included in the water quality criteria and there is reason to be concerned about possible synergistic effects.

For the suspended particulate phase bioassay, lethal concentrations (LC50) were used. LC50's, those concentrations of suspended particulate phase resulting in 50% mortality, were determined for the animal species (Menidia menidia, Mysidopsis bahia and Acartia tonsa). Based on these values, the LPC (Limiting Permissible Concentration) values are determined by applying a safety factor of 100 (LC50/100). The material can be considered for disposal only if the concentration of the disposal water in the suspended particulate phases is diluted to below that of the LPC after 4 hours of initial mixing.

As indicated in Table 2, for the suspended particulate phase, Menidia menida was the most sensitive of the three species examined. The LC50 was determined to be 11.5% of the 100% suspended particulate phase after 96 hours. The resulting LPC was therefore determined to be 0.12%.

The dilution of the proposed dredged material has been evaluated by use of the Tetra Tech computer model. A description of the model has been published as Technical Report D-78-47 of the Corps' Dredged Material Research Program, and is entitled Evaluation and Calibration of the Tetra Tech Dredged Material Disposal Models Based on Field Data. The New York District requested that a study be conducted which would give example dilutions resulting from typical disposal operations and dredged materials found in the New York District. This study has been completed and is entitled Discussion of Dredged Material Disposal Models and Their Application for the New York District.

Using the constraints in this study most closely approximating those of the disposal operation for this proposed dredged material, the dilution after four hours would be 0.0038%. It should be noted that the Tetra Tech model uses the total initial volume of dredged material and that therefore the resultant concentration serves for both the liquid phase and the suspended particulate phase.

Table 2. BIOASSAY RESULTS. (96 Hour Test) (Application No. 85-713-OD)

	LCD50 EC50 (critical)	LPC after 4 hrs	Dilution after 4 hrs
SUSPENDED PARTICULATE PHASE			
Acartia tonsa	17%	0.17%	0.0038%
Mysidopsis bahia	28.5%	0.29%	0.0038%
Menidia menidia	11.5%	0.12%	0.0038%

SOLID PHASE (10 Days)	% Survival in Reference	%Survival in Test Sediment	Difference (Reference-Test)	Is difference statistically significant (p=0.05)
Palaemonetes pugio	97.0 (2.74)	92.0 (5.70)	5.0 (2.83)	No
Mercenaria mercenaria	99.0 (2.24)	98.0 (2.74)	1.0 (1.58)	No
Nereis virens	97.0 (4.47)	96.0 (4.18)	1.0 (2.74)	No
Total Community	97.67(3.20)	95.33(4.18)	2.34(1.49)	No

LC50 - Lethal Concentration resulting in 50% mortality
EC50 - Effective Concentration resulting in 50% inhibition (applies to phytoplankton)
LPC - Limiting Permissible Concentration (0.01 times critical EC50 or LC50)

The dilution after four hours of 0.0038% is below the LPC of 0.12% for the suspended particulate phase. Therefore, no constraints on the point disposal or non-point disposal of the dredged material appears warranted.

For the solid phase bioassay, the results are evaluated for biological and statistically significant differences in mortality between test organisms subjected to both proposed dredged sediment and a reference sediment, representing existing background conditions in the vicinity of the dumpsite, but away from the influence of any disposal operation. The Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters, published by USEPA and the Corps of Engineers in July 1977, specifies that differences in survival of the test organisms in the control and test treatments be evaluated either individually by species or on a pooled community basis. In addition, the Manual has defined the LPC for the solid phase to be exceeded when the difference in mortality between animals in the control and test sediments is statistically significant and greater than 10 percent.

As indicated in Table 2, differences in mortality between reference and test organisms subjected to the proposed dredged sediment were neither statistically significant at the 95% confidence level, nor greater than 10%, either on an individual species or on a pooled community basis.

Body burden analyses of the solid phase organisms surviving the 10 day test to estimate bioaccumulation potential were made for mercury, cadmium, PCBs, and petroleum hydrocarbons. Mean levels for each constituent occurring in the test animals exposed to the proposed dredged material and to the reference sediment are shown in Table 3 below (reference values are in parentheses). Detection limits are shown for each of the chemical constituents analyzed.

Table 3 Body Burden Levels (ppm) In Test Species

Constituents	(D. L.)	Palaemonetes pugio		Nereis virens		Mercenaria mercenaria	
Mercury	(0.20)	<0.20	<(0.20)	<0.20	<(0.20)	<0.20	<(0.20)
Cadmium	(0.25)	<0.25	<(0.25)	<0.25	<(0.25)	<0.25	<(0.25)
PCB	(0.04)	<0.04	<(0.04)	<0.04	<(0.04)	<0.04	<(0.40)
Petroleum hydrocarbons	(0.10)	<0.10	<(0.10)	0.35	(0.30)	0.30	(0.26)

ppm - parts per million
D.L. - Detection Limits
N.D. - Not detected
* - Statistically significant (95% Confidence Level)

The data listed for the analysis of petroleum hydrocarbons includes petroleum compounds plus natural body lipids within the organism. As a result, the values indicated for the test are environmentally conservative.
Guidance presented in the EPA/COE Manual recommends "...the environmentally protective approach of assuming that any statistically significant differences in tissue concentrations between control and exposed organisms are a potential cause for concern". However, the manual also states "Before making the final assessment of bioaccumulation, the District Engineer and Regional Administrator must objectively consider the magnitude of bioaccumulation shown, the toxicological significance of the material(s) bioaccumulated, the proportion of sediment sampling sites which produced uptake, the number of different constituents bioaccumulated from the sediment in question, the position in human and non-human food webs of the species showing uptake, the presence of mobile species at the site that might serve as transportation vectors removing bioaccumulated materials from the disposal area, and other factors relevant to the particular operation in question."

No statistically significant differences in uptake between test and reference species were found for mercury, PCB's, cadmium or petroleum hydrocarbons.

In summary, the proposed dredged material does not exceed the LPC for any of the two phases (suspended particulate and solid) as defined in the Ocean Dumping Criteria, nor do laboratory tests for bioaccumulation indicate a significant environmental effect at the ocean disposal site.

As stated in the Criteria "(40 CFR 227.6(b))"...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental impacts associated with the use of alternatives to ocean dumping...." The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal Within the New York District." The alternatives considered include land disposal, use as sanitary landfill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetland, transport and placement in deep mines, and incineration. Of these, only land disposal is considered a viable alternative at the present time for the particular material proposed for disposal.

The permittee has evaluated methods of upland disposal of the dredged material as an alternative to ocean disposal. He has stated that there is no vacant land in the vicinity of the project area upon which the dredged material could be disposed of or dewatered. Therefore, it becomes necessary to transport this material by truck in a semi-fluid state to some available inland disposal site. If a site could be found the permittee has determined that the logistics of dealing with their associated constraints (i.e., drying of material, trucking dumping fees, upland disposal approvals, etc.) would increase the projected cost of the project beyond the point that would make the project economically feasible.

Table A-2. Type IIA Sediment; An Example of the Least Contaminated Material Currently Requiring Capping for Ocean Disposal.

As pointed out in the Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters, "...the liquid phase may be analyzed in either of two ways, as specified in paragraph 227.13(c)(2) of The Register.... The liquid phase may be analyzed chemically and the results evaluated by comparison to water quality criteria... (or) if the water quality approach is not taken, the liquid phase must be evaluated by bioassays..."

EPA Region II, under the authority of Section 225.2(b), has requested that liquid phase chemical analysis be performed for mercury, cadmium, PCBs, and petroleum hydrocarbons. The results of this analysis are shown in Table 1.

Table 1

Liquid Phase Chemical Analysis Results

CONSTITUENTS	ELUTRIATE	SITE WATER
Mercury	0.9 ug/liter*	0.3 ug/liter
Cadmium	$<$ 0.1 ug/liter	$<$ 0.1 ug/liter
PCB	$<$ 0.1 ug/liter	$<$ 0.1 ug/liter
Petroleum hydrocarbons	$<$ 50.0 ug/liter	$<$ 50.0 ug/liter

ug/liter - micrograms per liter or parts per billion
* Statistically significant at a 95% confidence level

Bioassay Results: In accordance with EPA's Ocean Dumping Regulations, published in the Federal Register on 11 January 1977, suspended particulate phase and solid phase bioassays are required for the proposed dredged material utilizing the test species as discussed below.

The suspended particulate phase is considered to be the supernatant remaining after one hour of undisturbed settling of the mixture resulting from a vigorous 30 minute agitation of one part bottom sediment from the dredging site with four parts water collected from the dredging site or the disposal site, as appropriate for the type of dredging operation. The solid phase is considered to be all material settling to the bottom within one hour. For this permit applicant, natural seawater was substituted for disposal site water. This substitution conforms with the procedures in the Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters.

For the suspended particulate phase bioassay, lethal concentrations (LC50) were used. LC50s, those concentrations of suspended particulate phase resulting in 50% mortality, were determined for the animal species *Menidia menidia*, *Mysidopsis bahia* and *Acartia tonsa*. Based on these values, the LPC (Limiting Permissible Concentration) values are determined by applying a safety factor of 100 (LC50/100). The material can be considered for disposal only if the concentration of the disposal water in the suspended particulate phase is diluted to below that of the LPC after 4 hours of initial mixing.

As indicated in Table 2, for the suspended particulate phase, Acartia tonsa & Menidia menida were the most sensitive of the three species examined. The LC50 was determined to be 32% of the 100% suspended particulate phase after 96 hours. The resulting LPC was therefore determined to be 0.32%.

The dilution of the proposed dredged material has been evaluated by use of the Tetra Tech computer model. A description of the model has been published as Technical Report D-78-47 of the Corps' Dredged Material Research Program, and is entitled Evaluation and Calibration of the Tetra Tech Dredged Material Disposal Models Based on Field Data. The New York District requested that a study be conducted which would give example dilutions resulting from typical disposal operations and dredged materials found in the New York District. This study has been completed and is entitled Discussion of Dredged Material Disposal Models and Their Application for the New York District.

Using the constraints in this study most closely approximating those of the disposal operation for this proposed dredged material, the dilution after four hours would be 0.0038%. It should be noted that the Tetra Tech model uses the total initial volume of dredged material and that therefore the resultant concentration serves for the suspended particulate phase.

Table 2. BIOASSAY RESULTS. (Application No. 85-439-OD)

	LCD50 (critical)	LPC after 4 hrs	Dilution after 4 hrs
SUSPENDED PARTICULATE PHASE (96 Hour Test)			
Acartia tonsa	32%	0.32%	0.0038%
Mysidopsis bahia	100%	1.00%	0.0038%
Menidia menidia	32%	0.32%	0.0038%

SOLID PHASE (10 Day Test)	% Survival in Reference	%Survival in Test Sediment	Difference (Reference-Test)	Is difference statistically significant (p=0.05)
Palaemonetes pugio	96.0	94.0	2.0	No
Mercenaria mercenaria	99.0	98.0	1.0	No
Nereis virens	95.0	94.0	1.0	No
Total Community	96.67	95.33	1.34	No

LC50 - Lethal Concentration resulting in 50% mortality
EC50 - Effective Concentration resulting in 50% inhibition (applies to phytoplankton)
LPC - Limiting Permissible Concentration (0.01 times critical EC50 or LC50)

The dilution after four hours of 0.0038% is below the LPC of 0.32% for the suspended particulate phase. Therefore, no constraints on the point disposal or non-point disposal of the dredged material appears warranted.

For the solid phase bioassay, the results are evaluated for biological and statistically significant differences in mortality between test organisms subjected to both proposed dredged sediment and a reference sediment, representing existing background conditions in the vicinity of the dumpsite, but away from the influence of any disposal operation. The Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters, published by USEPA and the Corps of Engineers in July 1977, specifies that differences in survival of the test organisms in the control and test treatments be evaluated either individually by species or on a pooled community basis. In addition, the Manual has defined the LPC for the solid phase to be exceeded when the difference in mortality between animals in the reference and test sediments is statistically significant and greater than 10 percent.

As indicated in Table 2, differences in mortality between reference and test organisms subjected to the proposed dredged sediment were neither statistically significant at the 95% confidence level, nor greater than 10%, either on an individual species or on a pooled community basis.

Body burden analyses of the solid phase organisms surviving the 10 day test to estimate bioaccumulation potential were made for mercury, cadmium, PCBs, and petroleum hydrocarbons. Mean levels for each constituent occurring in the test animals exposed to the proposed dredged material and to the reference sediment are shown in Table 3 below (reference values are in parentheses). Detection limits are shown for each of the chemical constituents analyzed.

Table 3 Body Burden Levels (ppm) In Test Species

Constituents	(D. L.)	Palaemonetes pugio	Nereis virens	Mercenaria mercenaria
Mercury	(0.20)	<0.20 (<0.20)	<0.20 (<0.20)	<0.20 (<0.20)
Cadmium	(0.25)	<0.25 (<0.25)	<0.25 (<0.25)	0.33 (<0.25)*
PCB	(0.04)	<0.04 (<0.04)	0.05 (<0.04)	0.05 (0.40)
Petroleum hydrocarbons	(0.10)	0.12 (0.10)	0.11 (0.44)*	0.45 (0.18)*

ppm - parts per million
D.L. - Detection Limits
N.D. - Not detected
* - Statistically significant (95% Confidence Level)

The data listed for the analysis of petroleum hydrocarbons includes petroleum compounds plus natural body lipids within the organism. As a result, the values indicated for the test are environmentally conservative.

Guidance presented in the EPA/COE Manual recommends "...the environmentally protective approach of assuming that any statistically significant differences in tissue concentrations between control and exposed organisms are a potential cause for concern". However, the manual also states "Before making the final assessment of bioaccumulation, the District Engineer and Regional Administrator must objectively consider the magnitude of bioaccumulation shown, the toxicological significance of the material(s) bioaccumulated, the proportion of sediment sampling sites which produced uptake, the number of different constituents bioaccumulated from the sediment in question, the position in human and non-human food webs of the species showing uptake, the presence of mobile species at the site that might serve as transportation vectors removing bioaccumulated materials from the disposal area, and other factors relevant to the particular operation in question."

Petroleum hydrocarbons were found to bioaccumulate in both Mercenaria and Nereis virens in statistically significant amounts. Significant food chain biomagnification of petroleum hydrocarbons is not generally known to occur. There are no Federal Food and Drug Adminstration limits currently in effect for petroleum hydrocarbons. It should be noted that EPA-Region II has commented to previous test results showing similar petroleum hydrocarbon levels and has concluded that the material complies with the criteria.

No statistically significant differences in uptake between test and reference species were found for mercury or PCBs. However, Mercenaria mercenaria did bioaccumulate cadmium in a statistically significant amount that was above the USEPA/COE interpretative matrix value of 0.30 ppm.

In light of the above, this office recommends the use of "clean" material to cap the aforementioned dredged material in a ratio of 2:1.

Since an intentional overflow of material from the dump scow occurs during the course of some dredging operations, an evaluation was made to determine the environmental significance of this overflow in accordance with Section 404 of the Clean Water Act.

In this application, the liquid phase (elutriate) chemical analysis revealed a site water mercury level of 0.3 micrograms/liter and an elutriate mercury level of 0.9 micrograms/liter. Both of these levels exceed the United States Environmental Protection Agency's recommended level of 0.1 micrograms/liter for marine waters as stated in the 1976 USEPA "Quality Criteria for Water." The mercury level differences between the dredging site water and elutriate were also found to be statistically significant. An analysis of the elutriate barge overflow for this project indicated no significant negative impact would occur, in the project area, from the dredging operation.

In summary, the proposed dredged material does not exceed the LPC for any of the two phases (suspended particulate and solid) as defined in the Ocean Dumping Criteria, but laboratory tests do indicate bioaccumulation of petroleum hydrocarbons in Mercenaria and Nereis. Tests also indicate bioaccumulation of cadmium in Mercenaria in statistically significant amounts above the interpretative matrix and the Corps recommends 2:1 capping to mitigate this situation. The barge overflow from the dredging portion of the project has been analyzed and will not negatively impact the project area in a significant way.

The applicant has stated the need for the proposed dumping based on the unavailability of practicble alternative methods of disposal as stated in the Criteria "(40 CFR 227.6(b))"...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental impacts associated with the use of alternatives to ocean dumping...." The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal Within the New York District." The alternatives considered include land disposal, use as sanitary landfill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetland, transport and placement in deep mines, and incineration. Of these, only land dipsosal is considered a viable alternative at the present time for the particular material proposed for disposal.

The permittee has evaluated methods of upland disposal of the dredged material as an alternative to ocean disposal. He has stated that there is no vacant land in the vicinity of the project area upon which the dredged material could be disposed of or dewatered. Therefore, it becomes necessary to transport this material by truck in a semi-fluid state to some available inland disposal site. If a site could be found, the permittee has determined that the logistics of dealing with the associated constraints (i.e., drying of material, trucking dumping fees, upland disposal approvals, etc.) would increase the projected cost of the project beyond the point that would make the project economically feasible.

Table A-3. Type IIB Sediment; An Example of the Most Contaminated Material Currently Allowed to be Ocean Dumped with Capping.

Liquid Phase Results

CONSTITUENTS	ELUTRIATE	SITE WATER
Mercury	<0.2 ug/liter	<0.2 ug/liter
Cadmium	11.43 ug/liter*	0.13 ug/liter
PCB	<0.1 ug/liter	<0.1 ug/liter
Petroleum hydrocarbons	<50.0 ug/liter	<50.0 ug/liter

ug/liter - micrograms per liter or parts per billion
* - Statistical significance at a 95% confidence level

Bioassay Results: In accordance with EPA's Ocean Dumping Regulations, published in the Federal Register on 11 January 1977, liquid phase, suspended particulate phase and solid phase bioassays are required for the proposed dredged material utilizing the test species as discussed below.

The liquid phase is considered to be the centrifuged and 0.45 micron filtered supernatant remaining after one hour of undisturbed settling of the mixture resulting from a vigorous 30 minute agitation of one part bottom sediment from the dredging site with four parts water collected from the dredging site or the disposal site, as appropriate for the type of dredging operation. The suspended particulate phase is the supernatant obtained prior to centrifugation and filtration, while the solid phase is considered to be all material settling to the bottom within one hour. For this permit applicant, natural seawater was substituted for disposal site water. This substitution conforms with the procedures in the Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters.

As pointed out in the Implementation Manual, "...the liquid phase may be analyzed in either of two ways, as specified in paragraph 227.13 (13)(c)(2) of The Register.... The liquid phase may be analyzed chemically and the results evaluated by comparison to water quality criteria... (or) if the water quality approach is not taken, the liquid phase must be evaluated by bioassays..."

This office has adopted the direct bioassay approach as being more appropriate since the liquid phase may contain major constituents not included in the water quality criteria and there is reason to be concerned about possible synergistic effects. The liquid phase bioassay is appropriate in evaluating the total net impact of dissolved chemical constituents released from the sediment during disposal operations.

For the liquid and suspended particulate phase bioassays, lethal concentrations (LC50) and effective concentrations (EC50) were used. LC50's, those concentrations of liquid or suspended particulate phase resulting in 50% mortality, were determined for the animal species (Menidia menidia, Mysidopsis bahia and Acartia tonsa). EC50, that concentrations of liquid phase resulting in 50% inhibition, was determined for the phytoplankton species (Skeletonema costatum). Based on these values, the LPC (Limiting Permissible Concentration) values are determined by applying a safety factor of 100 (LC50/100). The material can be considered for disposal only if the concentration of the disposal water in both liquid and suspended particulate phases is diluted to below that of the LPC after 4 hours of initial mixing.

As indicated in Table 2, Skeletonema costatum was found to be the most sensitive of the three species examined in the liquid phase bioassays. The critical EC50 was calculated to be 2% of the 100% liquid phase concentration after 96 hours. The resulting LPC was therefore determined to be 0.02%. For the suspended particulate phase, Acartia tonsa was the most sensitive of the three species examined. The LC50 was determined to be 8% of the suspended particulate phase after 96 hours. The resulting LPC was therefore determined to be 0.08%

The dilution of the proposed dredged material has been evaluated by use of the Tetra Tech computer model. A description of the model has been published as Technical Report D-78-47 of the Corps' Dredged Material Research Program, and is entitled Evaluation and Calibration of the Tetra Tech Dredged Material Disposal Models Based on Field Data. The New York District requested that a study be conducted which would give example dilutions resulting from typical disposal operations and dredged materials found in the New York District. This study has been completed and is entitled Discussion of Dredged Material Disposal Models and Their Application for the New York District.

Using the constraints in this study most closely approximating those of the disposal operation for this proposed dredged material, the dilution after four hours would be 0.0038%. It should be noted that the Tetra Tech model uses the total initial volume of dredged material and that therefore the resultant concentration serves for both the liquid phase and the suspended particulate phase.

able 2. BIOASSAY RESULTS. (96 Hour Test) (Application No. 85-045-0D)

	LCD50 EC50 (critical)	LPC after 4 hrs	Dilution after 4 hrs
IQUID PHASE			
<u>Skeletonema</u> <u>costatum</u>	2%	0.02%	0.0038%
<u>Mysidopsis</u> <u>bahia</u>	33%	0.33%	0.0038%
<u>Menidia</u> <u>menidia</u>	28%	0.28%	0.0038%
SUSPENDED PARTICULATE PHASE			
<u>Acartia</u> <u>tonsa</u>	8%	0.08%	0.0038%
<u>Mysidopsis</u> <u>bahia</u>	78%	0.78%	0.0038%
<u>Menidia</u> <u>menidia</u>	33%	0.33%	0.0038%

SOLID PHASE (10 Days)	% Survival in Reference	%Survival in Test Sediment	Difference (Reference-Test)	Is difference statistically significant (p=0.05)
<u>Palaemonetes</u> <u>pugio</u>	93.7	91.8	1.9	No
<u>Mercenaria</u> <u>mercenaria</u>	96.0	93.5	2.5	No
<u>Nereis</u> <u>virens</u>	81.0	83.0	-2.0	No
Total Community	90.2	89.4	0.8	No

LC50 - Lethal Concentration resulting in 50% mortality
EC50 - Effective Concentration resulting in 50% inhibition (applies to phytoplankton)
LPC - Limiting Permissible Concentration (0.01 times critical EC50 or LC50)

The dilution after four hours, of 0.0038% is below the LPC of 0.02% and 0.08% for the liquid and suspended particulate phases, respectively. Therefore, no constraints on the point disposal or non-point disposal of the dredged material appears warranted.

For the solid phase bioassay, the results are evaluated for biological and statistically significant differences in mortality between test organisms subjected to both proposed dredged sediment and a reference sediment, representing existing background conditions in the vicinity of the dumpsite, but away from the influence of any disposal operation. The Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters, published by USEPA and the Corps of Engineers in July 1977, specifies that differences in survival of the test organisms in the control and test treatments be evaluated either individually by species or on a pooled community basis. In addition, the Manual has defined the LPC for the solid phase to be exceeded when the difference in mortality between animals in the control and test sediments is statistically significant and greater than 10 percent.

As indicated in Table 2, differences in mortality between reference and test organisms subjected to the proposed dredged sediment were neither statistically significant at the 95% confidence level, nor greater than 10%, either on an individual species or on a pooled community basis.

Body burden analyses of the solid phase organisms surviving the 10 day test to estimate bioaccumulation potential were made for mercury, cadmium, PCBs, and petroleum hydrocarbons. Mean levels for each constituent occurring in the test animals exposed to the proposed dredged material and to the reference sediment are shown in Table 3 below (reference values are in parentheses). Detection limits are shown for each of the chemical constituents analyzed.

Table 3 Body Burden Levels (ppm) In Test Species

Constituents	(D. L.)	Palaemonetes vulgaris	Nereis virens	Mercenaria mercenaria
Mercury	(0.20)	N.D. (N.D.)	N.D. (N.D.)	N.D. (N.D.)
Cadmium	(0.25)	0.41 (N.D.)*	0.26 (N.D.)*	0.63 (N.D.) *
PCB	(0.04)	N.D. (N.D.)	N.D. (N.D.)	N.D. (N.D.)
Petroleum hydrocarbons	(0.10)	N.D. (N.D.)	N.D. (N.D.)	N.D. (N.D.)

ppm - parts per million
D.L. - Detection Limits
N.D. - Not detected
* - Statistically significant (95% Confidence Level)

The data listed for the analysis of petroleum hydrocarbons includes petroleum compounds plus natural body lipids within the organism. As a result, the values indicated for the test are environmentally conservative.

Table A-3 (con't)

Guidance presented in the EPA/COE Manual recommends "...the environmentally protective approach of assuming that any statistically significant differences in tissue concentrations between control and exposed organisms are a potential cause for concern". However, the manual also states "Before making the final assessment of bioaccumulation, the District Engineer and Regional Administrator must objectively consider the magnitude of bioaccumulation shown, the toxicological significance of the material(s) bioaccumulated, the proportion of sediment sampling sites which produced uptake, the number of different constituents bioaccumulated from the sediment in question, the position in human and non-human food webs of the species showing uptake, the presence of mobile species at the site that might serve as transportation vectors removing bioaccumulated materials from the disposal area, and other factors relevant to the particular operation in question."

No statistically significant differences in uptake between test and reference organisms were found for mercury, PCB's, or petroleum hydrocarbons.

Statistically significant differences in uptake between test and reference organisms were found for all three test species for cadmuim. In addition, the body burden levels for the shrimp (Palaemonetes pugio) and the clam (Mercenaria mercenaria) were above the interpretive guidance value of 0.30 parts per million. The interpretive guidance stated that when statistical significant different body burden levels are observed in all three test species, regardless of their magnitude, the proposed dredged material is unsuitable for unrestricted ocean disposal. 3:1 capping

In summary, the proposed dredged material does not exceed the LPC for any of the three phases (liquid, suspended particulate and solid) as defined in the Ocean Dumping Criteria. Laboratory tests for bioaccumulation indicate a potentially significant environmental effect at the ocean disposal site because of elevated levels of cadmium. Therefore the project material would be point ocean disposed at the taut-moored buoy in the northeast quandrant of the Mud Dump site and subsequently capped by material which satisfies the Ocean Dumping Criteria for unrestricted ocean disposal. The capping material would be three times (3x) the volume of the project material, at a minimum. Capping would commence within two weeks of the date of completion of the ocean disposal of the material. It should also be remembered that, as part of routine management of the dumpsite, material from future projects will be point disposed at the taut-moored buoy. This procedure would continue to provide increasingly thick cover for the project material.

The applicant has demonstrated the need for the proposed dumping based on the unavailability of practicable alternative methods of disposal. As stated in the Criteria "(40 CFR 227.6(b))"...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental impacts associated with the use of alternatives to ocean dumping...." The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal Within the New York District." The alternatives considered include land disposal, use as sanitary landfill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetland, transport and placement in deep mines, and incineration. Of these, only land disposal is considered a viable alternative at the present time for the particular material proposed for disposal.

The permittee has evaluated methods of upland disposal of the dredged material as an alternative to ocean disposal. He has stated that there is no vacant land in the vicinity of the project area upon which the dredged material could be disposed of or dewatered. Therefore, it becomes necessary to transport this material by truck in a semi-fluid state to some available inland disposal site. If a site could be found the permittee has determined that the logistics of dealing with their associated constraints (i.e., drying of material, trucking dumping fees, upland disposal approvals, etc.) would increase the projected cost of the project beyond the point that would make the project economically feasible.

Table A-4. Type III Sediment; Currently Considered Unsuitable for Ocean Disposal Even With Capping.

1. Inclosed is an interpretive summary of results of three-phased bioassays performed on dredged material composited from 6 sampling sites (shown on inclosed map) located in Newtown Creek (off East River). Bioassays were run in accordance with "Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters", which is the Implementation Manual for Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. At the time that samples were collected, the 18 April 1982 edition of the NYD/EPA Region 2 Guidance Manual was in effect.

2. Bioassays were performed by New York Testing Laboratories, Inc. Samples were collected on 12 September 1984 and test results were completed on 28 November 1984.

3. All samples consisted of cores to project depth. According to the testing laboratory's report, stratification was not observed in sample cores. Grain size analyses indicate the proposed material to average: 28.9 % sand
49.3 % silt
21.8 % clay

4. Analysis of the results for the three phases indicates that the LPC for this material is within acceptable limits as defined in the EPA Ocean Dumping Regulations and the Corps/EPA Implementation Manual.

5. Results of bioaccumulation analyses performed on organisms surviving the solid phase testing are also inclosed. An evaluation of these data indicates that the proposed dredged material does exhibit an environmentally significant bioaccumulation potential.(*)

(*) NOTE: Bioaccumulation of cadmium was measured at 0.31 ppm in Mercenaria mercenaria. It was found to be statistically significantly different from the reference sediment, and is also above the value of 0.30 ppm set by the Interpretive Matrix.

This same area was tested in October 1979. At that time the sediment met the criteria for unrestricted ocean disposal.

The current testing indicates that the sediment fails the matrix for Cd, and would need to be capped.

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Table 1. BIOASSAY RESULTS (96 hr test)

	LC_{50} or EC_{50} (critical)	LPC after 4 hours	DILUTION after 4 hours
LIQUID PHASE			
Skeletomena costatum	31 %	0.31 %	0.0038 %
Mysidopsis bahia	>100 %	1.00 %	0.0038 %
Menidia menidia	72 %	0.72 %	0.0038 %
SUSPENDED PARTICULATE PHASE			
Acartia tonsa	>100%	1.00 %	0.0038 %
Mysidopsis bahia	>100 %	1.00 %	0.0038 %
Menidia menidia	>100 %	1.00 %	0.0038 %

LC_{50} - Lethal Concentration resulting in 50% mortality
EC_{50} - Effective Concentration resulting in 50% inhibition (applies to phytoplankton)
LPC - Limiting Permissible Concentration (0.01 times critical EC_{50} or LC_{50})

	% SURVIVAL Control (SD_c)	Ref. (SD_r)	Test (SD_t)	DIFFERENCE (SD_d) (Reference -Test)	Is difference statistically significant (p=.05)	"F" statistic $(= \frac{\bar{d}}{SD_d})^2$	D.F.
SOLID PHASE (10 day test)							
Palaemonetes pugio	95.0(5.00)	96.0(4.18)	93.0(5.70)	3.0(3.16)	NO	0.900	8
Mercenaria mercenaria	100.0(0)	97.0(2.74)	100.0(0)	-3.0(1.22)	YES (1)	6.000 *	8
Nereis virens	98.3(2.89)	95.0(0)	98.0(2.74)	-3.0(1.22)	YES (1)	6.000 *	8
Total Community	97.8(3.63)	96.0(2.80)	97.0(1.55)	-1.0(1.38)	NO	0.525	28

organisms/species/replicates = 20

replicates = 5

Total # organisms/test = 100

* - significant at 95% confidence level
SD_c - standard deviation of control
SD_t - standard deviation of test sediment
SD_d - standard deviation of difference between means
D.F. - degrees of freedom
SD_r - standard deviation of reference sediment

(1) [illegible] The difference is not greater than 10% and test survival is greater than reference survival

Table 5a. BIOACCUMULATION TEST RESULTS (10 Day Laboratory Test)

Applicant: Newtown Creek (Fed. Proj. No. 39)

n=5

			$\bar{x}$	S.D.	Difference	$S.D._{\bar{d}}$	"F"	C.V.repl(3)	C.V.sub(n)	% Recover
Pet Hydro 0.10ppm	Palaemonetes	Ref	<0.10	–				–	–	***
		Test	<0.10	–	–	–	–	–	–	100%
	Mercenaria	Ref	0.113	0.027				6%	19%	***
		Test	0.350	0.130	0.237	0.059	16.136 *	24%	37%	100%
	Nereis	Ref	0.304	0.125				5%	41%	***
		Test	0.474	0.100	0.170	0.072	5.575 *	26%	21%	100%
		Ref								***
		Test								
PCB 0.04ppm	Palaemonetes	Ref	<0.04	–				–	–	***
		Test	<0.04	–	–	–	–	–	–	100%
	Mercenaria	Ref	<0.04	–				–	–	***
		Test	<0.04	–	–	–	–	–	–	100%
	Nereis	Ref	<0.04	–				–	–	***
		Test	<0.04	–	–	–	–	–	–	100%
		Ref								***
		Test								
Hg 0.20ppm	Palaemonetes	Ref	<0.20	–				–	–	***
		Test	<0.20	–	–	–	–	–	–	***
	Mercenaria	Ref	<0.20	–				–	–	***
		Test	<0.20	–	–	–	–	–	–	***
	Nereis	Ref	<0.20	–				–		***
		Test	<0.20	–	–	–	–			***
		Ref								***
		Test								***

* Statistically Significant (95% Confidence level)

Table 5b. BIOACCUMULATION TEST RESULTS (10 Day Laboratory Test)

Applicant: Newtown Creek (Fed. Proj. No. 39)

	n=5		$\bar{x}$	S.D.	Difference	S.D.$_{\bar{d}}$	"F"	C.V. repl(3)	C.V. sub(n)	% Recov
Cd 0.25ppm	Palaemonetes	Ref	<0.25	–	–	–	–	–	–	***
		Test	<0.25	–				–	–	***
	Mercenaria	Ref	0.253	0.004	0.061	0.012	25.840* ⊕	2%	2%	***
		Test	0.314	0.027				6%	9%	***
	Nereis	Ref	<0.25	–	–	–	–	–	–	***
		Test	<0.25	–				–	–	***
		Ref								***
		Test								***
	Palaemonetes	Ref								***
		Test								***
	Mercenaria	Ref								***
		Test								* *
	Nereis	Ref								***
		Test								***
		Ref								***
		Test								***

DDT

0.02ppm None Detected

*Statistically Significant (95% confidence level)

⊕ NOTE: The test value of 0.314 ppm is above the value in the Interpretive Matrix (which is 0.30 ppm)

Table 6. ELUTRIATE TEST RESULTS (10 Day Laboratory Tests)

Applicant: Newtown Creek (Fed. Pro. No.

CHEMICAL CONSTITUENT	SITE WATER (S.D.)	ELUTRIATE (S.D.)	$\bar{d}$ (SDd) DIFFERENCE (S.D.) Site Water/ Elutriate	"F" Statistic $\left(\frac{\bar{d}}{SD\bar{d}}\right)^2$	DF
Petroleum Hydrocarb.	<50. (-)	<50. (-)	—	--	4
PCB's	<0.1 (-)	<0.1 (-)	—	—	4
Hg	<0.2 (-)	<0.2 (-)	—	—	4
Cd	<0.1 (-)	<0.1 (-)	—	—	4
DDT	<0.05 (-)	<0.05 (-)	—	—	4

Values are in μg/l (ppb)

$$SDd = \sqrt{\frac{SDs^2 + SDe^2}{n}}$$

DF= Degrees of freedom 2(n-1)

APPENDIX B

Final section 404(b)(1) Evaluation

Project Description B-2

Factual Determinations .. B-2

Findings of Compliance .. B-7

Final Generic Section 404(b)(1) Evaluation Use of Sub-Aqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York/New Jersey

I. Project Description

a. Location: Lower New York Bay Complex

b. General Description: See Final Supplemental Environmental Impact Statement (FSEIS) section 3.0

c. Authority and Purpose: Provide for the safe disposal of dredged material under provisions of the River and Harbors Act of 1899, and the Clean Water Act of 1972 (see FSEIS section 1.2).

d. Dredged Material: Sediments tested according to procedures contained in the joint Corps of Engineers/EPA manual. Sediments would qualify for consideration for borrow pit disposal if they were found either unsuitable for ocean disposal (category III) or suitable only if capped (Category II) (see FSEIS section 2.1 and Appendix A).

e. Proposed Discharge Site: Either one of four existing subaqueous borrow pits (Figure 1 of FSEIS) or a new pit dug in one of two shoal areas of the Lower Bay (Figure 32).

f. Disposal Method: Controlled bottom-dumping barge discharge (see Appendix C).

II. Factual Determinations

a. Physical Substrate (1) Substrate elevation and slope: Use of a new pit would result in the short-term deepening of up to 75 acres of shallows, now approximately 20 feet deep or less, to a depth of 90 feet greater than existing conditions. The created pit would then be filled back to its former depth, with no long-term change. The long-term impact from the filling of existing pits, now as deep as 60 feet MLW, would be to return them to the depths of the surrounding shallows, from which they were originally dug (section 4.2.2).

(2) Sediment type: Grain size of the deeper substrate within new pits would be permanently reduced from its current sandy nature by addition of some muds; existing pits would be increased from their current fine-grained state by addition of some sands. In either case, the final 3 - 5 feet of cap over a filled pit would be sand, similar to ambient conditions of surrounding shallows that were present before a pit was dug (see 4.2.3).

(3) Dredged material movement: none (see 2.2.2.1b and 4.2.1b,e).

(4) Physical effect on benthos: Short-term loss of existing

stable sand community when new pit is dug, and long-term return of similar community when pit is filled (see 4.3.2h-j). Long-term loss of less-stable mud community when existing pit is filled, and its long-term replacement by more stable sand community (see 4.3.2d-f).

(5) Other effects: Not applicable (N/A).

(6) Actions to minimize impacts: Implementation of a site-specific management plan to maximize usage and minimize loss of sediments from a pit (see 2.3.3 and appendix D). Development of a physical and biological monitoring program to provide input for implementing management plan (see 2.3.4.2.1 and appendix D).

b. Water Circulation, Fluctuations, and Salinity Determinations

(1) Water (a) Salinity: No impacts (see 4.2.1 and 4.2.2).

(b) Water chemistry: Potential long-term reduction in contaminant levels (see 4.2.1).

(c) Clarity: Short-term , minimal increases in turbidity during disposal events. No long-term impact (see 4.2.1).

(d) Color: Possible minimal, short-term impact during disposal event, depending on nature of sediment.

(e) Odor: Possible minimal, short-term impact during disposal event, depending on sediment constituents (organics, petroleum hydrocarbons).

(f) Taste: N/A

(g) Dissolved gas levels: Possible slight short-term variations due to turbulence of discharge; potential short-term increase in dissolved oxygen during disposal event.

(h) Nutrients: No impacts (see 4.2.1).

(i) Eutrophication: Potential elimination of seasonally eutrophic habitat from filling in existing pit, otherwise no impact (see 4.2.1, 4.3.2f). Potential creation of short-term seasonally anoxic habitats in new pits until they are filled enough to prevent stratification (see 3.2.2).

(j) Other: N/A

(2) Current Patterns and Circulation: Potential for altering long-term localized current patterns adjacent to existing pits (which now cause a slow movement towards deeper pits), conversely, new pit could create slow, short-term localized flow toward it until filled. Neither would have any long-term impact on overall Lower Bay circulation (see 4.2.2b). Filling existing pits could disperse wave

attack and minimally alter shore erosion, while digging new pits similarly might disperse wave action, but less so, and with an opposite effect (see 4.2.2d,e).

(3) Normal Water Level Fluctuations: Potential short-term, minor alteration of tidal range if new pit is dug (four inches at most, for worst-case), and potentially lesser, but long-term change (actually return to former conditions) if existing pit is filled (see 3.2.2).

(4) Salinity Gradients: Elimination of localized salinity stratification in existing pit when it is filled (see 3.2.2).

(5) Actions to Minimize Impacts: Use of sand cap of similar grain size as surrounding bottom, and interim caps (as needed) to reduce potential impacts to water quality and benthic communities during and after site use (see 2.3.3.1). Implementation of physical and biological monitoring program to maximize capacity and minimize losses (see 2.3.4.2 and appendix D). Use of clam shell dredge to maximize the cohesiveness of the deposit and minimize loss during disposal.

c. Suspended Particulate/Turbidity Determination

(1) Change at Disposal Site: Minor, short-term increases during disposal event, with rapid settling and quick dilution of unsettled fraction (worst-case under 5% of a given load - see 4.2.1). Generation of very confined, narrow turbidity plumes during construction of new pit (see 2.3.1.3 and 4.3.2i).

(2) Effects on Chemical and Physical Properties of Water Column: No significant increases in contaminant or nutrient levels during a disposal event. Potential long-term decrease in contaminant levels from reduced exposure of contaminated sediments to water column (see 4.2.2).

(3) Effects on Biota: None, due to limited, short-term, localized water column impacts discussed above.

(4) Actions to Minimize Impacts: Clam shell dredging of all contaminated sediments, and management plan for site use (see 2.3.4; appendices C & D).

d. Contaminant Determination

(1) This is a generic evaluation, specific dredging projects have not yet been identified for the use of a borrow pit disposal site. However, the test requirements and the means by which project sediments will be evaluated to determine their suitability for borrow pit disposal are discussed in the FSEIS section 2.1. Tables A.3 and A.4 of Appendix A (of FSEIS) are worst-case examples of actual sediments that would be considered for borrow pit disposal; specific test results will be identified in a Public Notice for each proposed project. It is to

be anticipated that the sediments will contain sufficient levels of contaminants to show either statistically significant bioaccumulation in at least one test organism or direct toxicity. Once the borrow pit disposal site has been filled and capped (either on an interim basis by specified or random caps, or at its closure by the final sand cap) the contaminants will not be available to the water column or biota (see 4.2.1 and 4.3.2). During a disposal event there will be sufficiently rapid settlement and dilution as to avoid any long-term impacts from the small portion of contaminants that may escape (see 4.2.1). As a result of the above two points, the disposal of category II or III sediments into a new or existing borrow pit would not be environmentally significant, and could be a positive long-term impact on the aquatic community (see 2.2.3 and 4.3.2).

(2) Since the material to be placed into a borrow pit will be dredged with a clam shell operation (see 2.3.3.3), a 404(b)(1) evaluation of barge overflow would be conducted for each specific dredging project, to determine its potential impacts to the dredging site. There will be no separate 404(b)(1) evaluation of the suitability of sediment for borrow pit disposal, as that is the function of this generic evaluation and the FSEIS.

e. Aquatic Ecosystems and Organisms Determination:

(1) Effects on Plankton: None (see 4.3.5)

(2) Effects on Benthos: Potentially positive by converting the less stable, seasonally anoxic existing pit community into the more stable shoal habitat (see 4.3.2). New pit use would result in a short-term loss of some small portion (50 acres) of shoal habitat selected for its low productivity. Upon completion the new pit would be returned to its former condition and recolonized.

(3) Effects on Nekton: Use of an existing pit would result in the long-term loss of under 1% of the deep water habitat in the Lower Bay that is most heavily occupied by fish. The filled pit would return some of the lost fishery habitat, though likely at a lesser density. Based on the predicted value of this habitat (see 3.4.2i) and the small portion of overall habitat impacted, the loss is not expected to be an adverse impact to the Lower Bay fishery (see 4.3.2a-e). As existing pits are rapidly accumulating the fine-grained sediments most associated with contaminants, filling such a habitat could reduce potential adverse impacts to fish that concentrate there. Use of a new pit would result in a short-term loss of even less of the shallow water habitat, which is less used by fish. Filling of that pit would return the same habitat quantity and quality to the Lower Bay: no long-term adverse impacts to the fishery would thus result from this option either (see 4.3.2g-i).

(4) Effects on Aquatic Food Web: Potentially positive from removal of an existing sink for fine-grained sediments that concentrate contaminants for uptake by pit biota other wise minimal (see 4.3.2b).

(5) Effects on Special Aquatic Sites:

(a) **Sanctuaries and refuges:** N/A

(b) **Wetlands:** none (see 4.4)

(c) **Mud Flats:** N/A

(d) **Vegetated Shallows:** N/A
(e) **Coral reefs:** N/A

(f) **Riffle and Pool Complexes:** N/A

(6) Threatened and Endangered Species: None impacted (see 4.4)

(7) Other Wildlife: N/A

(8) Actions to Minimize Impacts: Screening new pit sites fort areas of low fish and benthic use (see 2.3.2.2) and ranking existing pits based on least biological impact (see 2.3.1.5). Implementation of biological monitoring program (see 2.3.4.2.2).

f. Proposed Disposal Site Determination:

(1) Mixing Zone Determination: N/A, this is a generic disposa site designation so that specifics regarding materials deposited and site locations are not available (see appendix A for typical examples of past sediment and mixing zone calculations).

(2) Determination of Compliance with Applicable Water Quality Standards: Complies with NY class SB and NJ class FW2-NT/SEI standards as discussed in section 3.2.4 and 4.2.1 of the FSEIS.

(3) Potential Effects on Human Use Characteristic:

(a) **Municipal and Private Water Supply:** N/A

(b) **Recreational and Commercial Fisheries:** Loss of existing pit habitat containing greater abundances of fish and shellfish than surrounding shallows could impact recreational fishing success. However, fish will relocate to their natural distribution patterns (before pit was dug) or concentrate in the other pits, and only one such habitat would be effected. Overall impact to the estuary is therefore considered minimal (see 4.7a,b).

(c) **Water Related Recreation:** By sequestering contaminants in a secure facility water quality will be improved long-term, thereby providing a positive benefit to recreational activities such as swimming and boating (see 4.7d).

(d) **Aesthetics:** No impact (see 4.7c).

(e) **Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites and Similar Preserves:** No impact.

g. Determination of Cumulative Impacts: Potential long-term benefit to the aquatic ecosystem from removal of contaminants otherwise available for uptake into water column and biota (see 4.9a-e).

h. Determination of Secondary Impacts: Minimal short-term impacts, with no long-term effects on the aquatic ecosystem (see 4.9i).

III. Findings of Compliance or Non-Compliance

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

b. There are no practicable alternatives for the proposed action which would result in less environmental impact under the jurisdiction of section 404(b)(1) guidelines (see 2.2.3 & 2.3.5).

c. The proposed action does not appear to violate applicable state water quality or effluent standards (see 3.2.4 & 4.2.1).

d. No threatened or endangered species will be affected by the proposed action. No marine sanctuaries are present.

e. The proposed action will not result in significant adverse impacts on human health or welfare, including municipal or private water supplies, recreational or commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites (see 4.0).

f. All appropriate steps to minimize adverse impacts have been taken (see 2.3.1, 2.3.2, 2.3.3, 2.3.4).

e. Based on all of the above, the proposed action is specified as being in compliance with section 404(b)(1) guidelines.

APPENDIX C

Physical Criteria for Selecting Borrow Pit Disposal Sites

H.J.Bokuniewicz, 1987
SUNY, Stonybrook - Marine Science Research Center Report

CRITERIA FOR SUBAQUEOUS BORROW-PIT DISPOSAL SITES

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INTRODUCTION

In 1977, the New York District of the U.S. Army Corps of Engineers began a comprehensive study of alternative methods of dredged sediment disposal (Conner, et al., 1979). The burial of dredged sediment in subaqueous borrow pits was one of three alternatives that were deemed possible in special cases and feasible for large volumes of dredged materials (The other two options were shallow ocean disposal and confined upland disposal). A variety of studies have been completed not only to examine the particulars of such an operation in New York Harbor (e.g. Bokuniewicz, 1983) but also to investigate generic processes that would be involved in the implementation of this disposal alternative. These include the studies of covering or capping dredged sediment with sand at subaqueous sites (Morton, 1983; O'Connor, 1982); the consolidation of capped deposits (Demars et al., 1984); the stability of sand caps (Freeland et al., 1983); and the isolation of contaminants by s (O'Connor, 1982; Brannon et al., 1984). In addition, the burial and capping of contaminated dredged material in a subaqueous depression in the Duwanish Waterway, Seattle, Washington has been successfully completed (Sumeri, 1984). The basic principles of all the essential features of a borrow-pit disposal project have been demonstrated and an Environmental Impact Statement is being prepared to implement this disposal alternative in New York Harbor.

Some general technical criteria are discussed in this article for the selection or construction of borrow-pit disposal sites with emphasis on the New York metropolitan area.

BACKGROUND

The size and shape of a suitable subaqueous pit for the burial of dredged sediment depends both on the physical limitations of the equipment and on the fate of dredged sediment released at open-water disposal sites. A great deal has been learned about the discharge process over the past decade and before I proceed to calculate the critical characteristics of pit disposal sites, it will be necessary to review some of the results and evidence upon which the calculation is made.

The disposal operation will be assumed to have the following characteristics:

1. The dredged sediment will be fine-grained. Subaqueous burial is intended to be a disposal option for contaminated sediments and many of the most troublesome contaminants are associated with fine-grained sediments including petroleum hydrocarbons, heavy metals, polychlorinated biphenyls, and other chlorinated hydrocarbons, polynuclear aromatics, pesticides, and some radio-nuclides. As a result it is likely that the dredged sediment designated for burial will be fine-grained.

2. The sediment will be dredged with a clamshell dredged and discharged from a barge. In addition to this being the most common method of dredging and disposal in the New York metropolitan region there are some technical advantages to using this method. This method is most likely to result in the discharge of blocks of dredged sediment which will form a compact deposit on the sea floor (Bokuniewicz and Gordon, 1980). There are also limits to the strength of the dredged sediment deposit required to support the sand cap (Bokuniewicz and Liu, 1981) and blocks of sediment resulting from a clamshell dredging operation are most likely to retain a sufficient strength during the dredging and disposal process. In this region all deposits of dredged mud that have been successfully capped have been dredged with a clamshell dredge and discharged from a barge (e.g. Morton 1983; O'Connor, 1982).

3. The barges will be about 200 feet (61 m) long, 50 feet (15 m) wide, and draw 18 feet (5.5 m) of water. This is slightly larger than barges used, for example, by the American Dredge Company.

4. Discharges will take place in water less than 220 feet (67 m) deep. This is the maximum water depth for which the discharge processes that will be next described have been observed (Bokuniewicz, et al. 1978).

Such a disposal operation will have the following characteristics:

1. During the disposal operation from a scow or hopper dredge, less than 5% of the released sediment will remain in suspension and to be dispersed from the disposal site. This conclusion was first reached by Gordon (1974). He made measurements during disposal operations in Long Island Sound and showed that less than 1% of the dredged silt released at the disposal site remained in suspension long enough to be dispersed by the tides. A similar conclusion was reached by Sustar and Wakeman (1977) as a result of operations they made in San Francisco Bay. They

found that only between 1 and 5% of the mud that was discharged remained in suspension above 2 m (6.6 feet) of the bottom. They also conducted laboratory experiments that reinforced their conclusion that the disposal operation causes very little disturbance in the upper part of the water column. A similar conclusion was reached by Bokuniewicz et al. (1978) from observations they made for the Dredged Material Research Program during disposal operations in Puget Sound, Long Island Sound, Lake Erie, and Lake Ontario.

At the Mud Dump Site on the Atlantic continental shelf outside of New York Harbor, a detailed accounting of the dry mass in the subsequently formed deposit at the disposal site, showed that an average of about 4% was lost during transport and discharge (Tavolaro, 1984).

The same conclusion was reached after the study of three disposal mounds in Long Island Sound (Morton, 1983). The volume of dredged material on disposal sites was measured by careful bathymetric surveys and compared to the volume dredged, although the volume dredged was estimated by the volume in the scows and the uncertainty is relatively large (Morton, 1983). In each of two mounds 95% of the amount discharged was found on the disposal site (Morton, 1983) indicating a loss of 5%. At the third site 90% was found at the site but additional material was present beyond the immediate mound and "it was possible for significant amounts of dredged material to be undetected by acoustic measurements" (Morton, 1983).

The Mitre Report (Conner et al., 1979) also claims that almost all of the released sand and silt will be deposited quickly based on exploratory calculations for the New York Bight using the Tetra Tech model (Holiday et al., 1978; Brandsma and Divoky, 1976). In the model calculations, all of the sand and silt were deposited within about 20 minutes and within 200 yards (183 m) of the point of discharge. For a clay slurry the time may be considerably longer; some of the model calculations showed that three hours would be needed to deposit 90% of the clay particles that were released as a slurry from the scow or hopper. Of course, blocks of dredged mud would reach their terminal fall velocity quickly after discharge (Bokuniewicz and Gordon, 1980) and reach the bottom, presumably with little or no dispersion during descent.

2. More than 95% of the sediment will be deposited on a flat sea floor within a few hundred yards of the discharge point. Blocks of cohesive sediment may either disintegrate or deposit intact upon impact with the bottom. The size of the block as well as its strength and the hardness of the sea floor all play a role in its fate (Bokuniewicz and Gordon, 1980). Blocks of silt and clay smaller than 0.85 m (2.8 feet) in diameter are unlikely to fragment upon impact with a hard sea floor (Bokuniewicz and Gordon, 1980). Clods about 0.2 m (0.7 feet) in diameter were found on the surface of one disposal mound in Long Island

Sound (Bokuniewicz and Gordon, 1980) and clods of cohesive sediment with diameters of about 0.4 m (1.3 feet) were found on another (Morton and Miller, 1980).

If the blocks do disintegrate upon impact, it is likely that the residue will join a slurry of dredged material and be incorporated into a thin, dense bottom surge (e.g. Proni, 1982) that contains almost all of the dredged sediment released except for that contained in the surviving blocks. Over a flat bottom, the sediment is deposited within a few hundred yards of the point of release. This has been documented under a wide range of conditions (Bokuniewicz et al., 1978). Discharges of muddy sediment from a hopper dredge in water 18 m deep in Lake Erie were monitored to show that the surge did not carry material farther than about 200 m (220 yards) from the impact point over a flat disposal area (Bokuniewicz et al., 1978). At this same site later more than 70% of the dredged sediment was found within about 250 m (273 yards) of the designated discharge point (Danek et al., 1977); some of the missing material (an unspecified amount) was not found on the site because it had been released at another location. During a disposal operation in Long Island Sound 80% of the 1.2 million cubic meters (1.6 million cubic yards) of muddy dredged sediment that was discharged from scows in about 20 m (66 feet) of water was deposited within 30 m (33 yards) of the center of the discharge location and 90% within 120 m (131 yards) (Gordon, 1974). At each of three sites in Long Island Sound studied by Morton (1983), 90%, 95%, and 95% of the material discharged was found within 200 m (220 yards) of each discharge point.

Direct observations of spread of bottom surges were also made in a borrow pit in New York Harbor (Bokuniewicz, 1985). The disposal operation was done with barges. Although much of the dredged sediment was released as cohesive blocks, there was enough fluid sediment to produce bottom surges like those described by Bokuniewicz et al., 1978. Forty discharges were monitored. Surges were detected on 33 of these. Only once was a surge detected further than 110 m (121 yards) from the discharge point; that one was seen at a distance of about 175 m (193 yards). The surge was not detected seven times at distances between 70 and 110 m (77 and 121 yards) from the discharge point.

3. Compact, quasi-conical deposits can be built by repeated discharges at the same location. The shape of deposits formed during open-water disposal operations can be forecast in light of available observations. The diameter of potential deposits is limited by the range of the bottom surge that is formed during the disposal operation and very compact deposits can be created by point-dumping (e.g. Bokuniewicz and Gordon, 1980; Morton, 1983). The side slopes of the deposit depend primarily on the character of the material. In principle, clods and coarse sediment could accumulate on the disposal site in a pile with side slope reaching the angle of repose for coarse material, 35 degrees. Clods were found on the surface of a disposal mound in Long Island Sound which had been

formed by the open-water disposal of muddy sediment (Bokuniewicz and Gordon, 1980). The deposit had an average slope of 6 degrees near its peak although locally steeper slopes were seen (Bokuniewicz and Gordon, 1980). Two other deposits have also been created near this same site (Morton, 1983). The larger contains 118,000 cubic meters (154,344 cubic yards) of mud. It has a radius of about 100 m (110 yards) and side slopes as steep as 7 degrees; clods of cohesive sediment were also found on its surface (Morton and Miller, 1980). The smaller deposit consisted of a mound of mud, which contained 26,000 cubic meters (34,008 cubic yards) and had a radius of 100 m (110 yards) and side slopes as steep as 6 degrees, covered with a layer of sand. The combined deposit contained 60,000 cubic meters (78,480 cubic yards). Its radius was about 200 m (220 yards) and the side slopes reached angles as high as 8 degrees. During a discharge operation in Puget Sound, clods were detected leaving the scow and the resulting deposit here had slopes as steep as 2 or 3 degrees (Bokuniewicz et al., 1978). At a disposal site on the Atlantic shelf off the mouth of Chesapeake Bay about 650,000 cubic meters (850,200 cubic yards) of loose silt and very fine sand was discharged to create mounds 3.3 m high (11 feet) with average sideslopes of about 2 degrees (Hands and DeLoach, 1984).

Deposition of fine-grained sediment from a bottom surge produces a dredged sediment deposit with low side slope. Observations of surges in Lake Erie have been used to calculate the maximum slopes for deposits formed in this way (Bokuniewicz and Gordon, 1980). The maximum slope is the slope at which the energy gained by the surge as it runs down the slope is equal to the empirical rate of energy dissipation calculated from observations of spreading surges (Bokuniewicz et al., 1978). At the maximum slope, the surge should travel indefinitely without losing energy and, presumably, without depositing its sediment. The maximum slope has been calculated to be about 3 degrees (Bokuniewicz and Gordon, 1980; Bokuniewicz, 1983). Such low slopes were found on the flanks of a deposit of dredged mud in Long Island Sound (Bokuniewicz and Gordon, 1980). A dredged sediment deposit in Chesapeake Bay was found to have a maxium surface slope of about 0.59 degrees and an average slope of 0.12 degrees (Biggs, 1970). After a disposal operation in Lake Erie, the maximum slope of the deposit's surface was 0.3 degrees (Alther and Wyeth, 1980). During laboratory tank tests to simulate open-water disposals of dredged mud, mounds were formed with slopes on the order of 0.3 degrees (Chase, undated). In all of these cases, it appeared that the sediment had been deposited from a slurry.

The number of studies is relatively small and there is not yet a generalized model that is widely accepted and available to describe all the relevant processes and to predict the form of the deposit. Nevertheless, the available studies may be used as a basis for forecasting the form of deposits of dredged sediment if we assume that point-dumping will be done in relatively shallow (20 m, 66 feet) water. Enough information is at hand to consider four classes of material—cohesive mud, fluid mud, sand, and a mixture of sand and fluid mud. The cohesive mud is likely to have been dredged with a clamshell-bucket dredge and the deposit formed primarily of clods of material. In this case we expect to find a deposit with slopes of less than 30 degrees; but experience has shown that the slopes will probably be 2 to 8 degrees. The central mound of clods will be surrounded by a blanket composed of fine-grained material that had been deposited from a bottom surge formed by ablation of clods, entainment of water during descent, and the disintegration of some clods upon impact. The surface slops of the apron should be less than 3 degrees and experience has shown that they will probably be less than 1 degree. An example of such a deposit was formed in Long Island Sound (Bokuniewicz and Gordon, 1980).

Fine-grained sediment dredged hydraulically will most likely be a very weak and fluid sediment in the hoppers or a very dense slurry. The expected bulk specific gravity of such material would be between 1.1 and 1.3 (Bokuniewicz, 1979). This material will produce a deposit with a minimum radius of about 200 m (220 yards) and side slopes of less than 3 degrees. Experience has shown that actual side slopes will probably be less than 1 degree. An example of such a deposit was created in Lake Erie (Alther and Wyeth, 1980).

There is less experience to draw on to make a forecast for the form of a sandy deposit. If we assume that the sand is sufficiently coarse not to be carried out of the impact area by a bottom surge then a deposit with side slopes less than about 30 degrees and probably less than about 8 degrees will be created. An example of such a deposit was described by Morton (1983). A mixture of dredged sand and mud is likely to segregate during the disposal operation. In this case we might expect to find a deposit with a central mound of coarse-grained material having side slopes of about 8 degrees surrounded by an apron of fine-grained sediment with side slopes of about 1 degree, similar in shape to that formed by the discharge of cohesive mud.

This information was used to predict the implacement of a submerged sand ridge in New York Harbor (Bokuniewicz, 1982). The ridge was constructed in December 1981 by the hopper dredge Goethals using sand from Ambrose Channel. The deposit that was created by the Goethals was in a form that was very close to the predicted form (Bokuniewicz, 1982). The average water depth over the ridge crest was 39 feet (11.9 m); the predicted value was 37 feet (11.3 m). The 50-ft contour was displaed about 270 yards (247 m) to the north as predicted and the location of the lowest points along the ridge crest were to the east and west of the center as predicted. The predicted side slopes were about 1.6 degrees and the actual slopes were later found to average 1.0 degrees.

4. At the disposal site, bottom bathymetry with slopes of a few degrees or more will substantially limit the spread of dredged material during the discharge process. There are two lines of evidence for this

conclusion. The first is an empirical calculation based on observations the behavior of the spread of dredged sediment over a flat disposal site floor. The other is the direct observation of the effects of slopes on the spread of material.

If the bottom surge must run up a slope, the distance it can travel must be less than it could travel over a flat sea floor. In the barge, the dredged sediment is characterized by a specific amount of potential energy. During the discharge process, potential energy is converted to kinetic energy and dissipated through friction. When all its initial energy has been dissipated the sediment comes to rest on the sea floor. All other things being equal, a surge that is travelling up a slope uses up energy more quickly than one running over a flat sea floor since, in addition to all the frictional mechanisms of dissipation, work must also be done to raise its center of mass continually. As a result, it depletes its energy more quickly and comes to rest sooner before it can travel as far. Investigators in the Duwanish River concluded that "relatively shallow depressions with steep side slopes appear to significantly reduce the outward surge of sumped cohesive dredged material" (Sumeri, 1984).

For the design of a disposal operation, the losses of energy must be quantified. This has been done for a unique and extensive set of data collected under the U.S. Army Corps of Engineers Dredged Material Research Program. Observations of about 30 discharges of muddy sediment from a hopper dredge were made with current meters, tranmissometers, pumped water samples and echo sounders. The details of this study are given by Bokuniewicz et al. (1978) and the energy calcuations are discussed by Bokuniewicz (1985). In the former report the size, shape, position, mass, and energy of the bottom surge were presented at various times after discharge. Some of this data is shown in Figure 1. In this figure the dots show the total energy of the surge as it moves away from the discharge point along a flat disposal site floor. The line labeled H in Figure 1 helps to show the general trend of decreasing energy as the surge moves outward. The amount of energy used in rising a unit volume of the surge a height h is $(\rho - \rho_o)\, g\, h$ where ρ is the bulk density, ρ_o is the density of water and g is the acceleration of gravity. If the surge is climbing a slope of angle α, the additional energy required to cover a distance R is $(\rho - \rho_o)\, g\, R \tan \alpha$. The curves superimposed on Figure 1 indicate the amount of work required to lift the surge up various slopes calculated in this way. These curves are not straight lines because the mass of the surge is decreasing, as well as its energy, as it moves outward. Where the curved lines cross the line "H" the energy in the surge spreading horizontally is just equal to that needed to climb the indicated slope at the specified distance from the discharge point. If the surge had been climbing such a slope the additional energy requirement would have required all its energy at that distance and the spread would have stopped. For example, the curve indicating the energy needed to climb a slope of 3 degrees crosses line

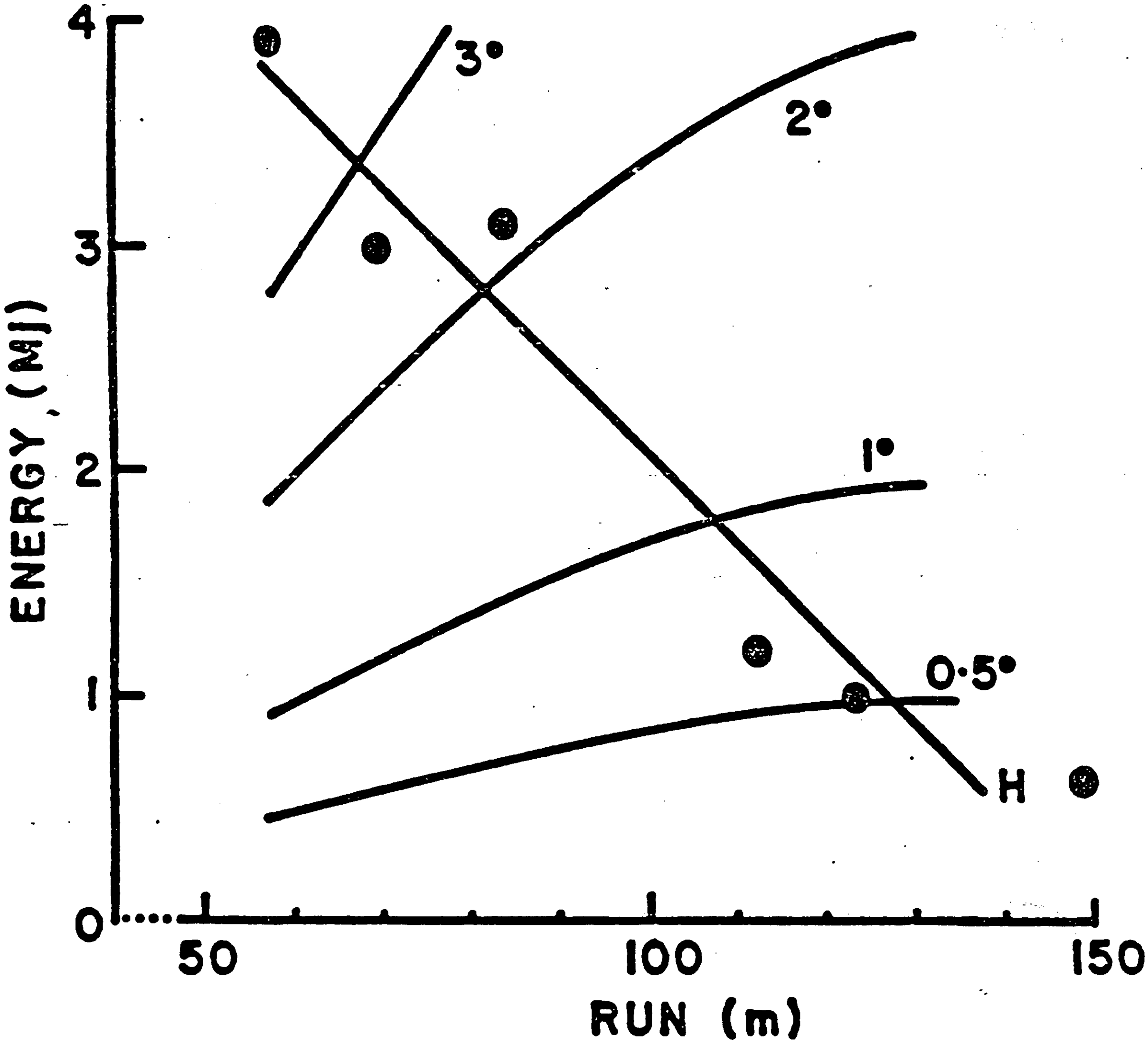

Figure 1. Total energy H in the surge measured as a function of the position of the surge front. The curved lines (labeled 0.5°, 1°, 2° and 3°) represent the work required to move the surge up the indicated slope. The intersection of a curve with H marks the maximum travel of the surge up that slope.

"u" at a distance of about 65 m (72 yards) from the discharge point. If : surge had been climbing a slope of 3 degrees all its energy would have been required to reach this point and it would spread no further. Actually it would stop before it reached this point because a correction has not been made to account for a more rapid decrease of the surge's mass as it slows more quickly moving up the slope. Nevertheless, the calculations show that even low slopes can substantially limit the spread of the surge; a slope of 3 degrees in the example reduces the distance the surge can travel to 72 yards (66 m)or by about 30% of its run over a flat disposal site floor.

Regardless of the slope, at any point in the travel of the surge, we can calculate how high it would have to rise in order to come to rest. For example, soon after impact on the disposal site the surge had an energy density of 150 Joules/m^3 and a bulk specific gravity of 1.004 (Bokuniewicz et al. 1978). If I ignore all other forms of energy dissipation, such as frictional losses, I find that raising a unit volume a height of 4.3 m (14.2 feet) would require all of its 150 Joules. Regardless of the slope the surge could not rise higher than 4.3 m (14.2 feet). When the head of the surge had reached a distance of 112 m (123 yards) from the point of impact, much of its energy had been dissipated. Its energy density here was about 20 Joules/m^3 and its effective specific gravity was about 1.0015 at this location a rise of 1.3 m (4.3 feet) would bring the surge to rest. This prediction has been supported by observations of a disposal operation near the Duwanish Waterway in Seattle, Washington (Sumeri, 1984). During this operation, it was dredged with a clamshell dredge and discharged in 20 m (66 feet) of water over a depression in the river floor that measured about 30 m (33 yards) wide, 140 m (153 yards) long and up to 2.4 m (8 feet) deep below the ambient sea floor. The side slopes of this depression were as steep as 11 to 20 degrees. Even though the depression was relatively shallow, the side slopes significantly reduced the outward surge of the discharged material so that nearly all of the released sediment was deposited in the depression (Sumeri, 1984).

During the disposal operation in New York Harbor that was described earlier, two discharges were monitored at the wall of a pit (Bokuniewicz, 1985). During the first, the barge was 83 m from the rim of the pit and the pit floor under the scow was about 7 m lower than the ambient sea floor. The wall slope was about 5 degrees. About 2 minutes after the dredged sediment was released a surge 3 m (10 feet) thick was seen on the fathometer record at a distance of 18 m (20 feet) upslope from the discharging point. This surge was moving relatively slowly up the slope. A second observation boat over the rim of the pit did not detect the surge; the surge did not escape from the pit as might have been anticipated from the preceding energy calculations.

In the second discharge that was monitored at the pit wall the barge was 55 m (60 yards) from the rim of the pit and the pit floor under the barge was 7 m (23 feet) lower than the ambient sea floor. slope here was about 9 degrees. A surge 6.1 m (20 feet) thick was ected 43 seconds after the discharge at a distance of 11 m from the discharge point. A second observation boat was 11 m (36 feet) farther upslope and detected the surge 13 seconds later. The surge was spreading at a rate of 0.9 m/s (3 feet/s) upslope. At this time, I have estimated that the energy density of the surge was about 480 j/m^3. This is higher than the initial energy density calculated by Bokuniewicz et al. (1978) probably because the measurements in New York Harbor were made relatively close to the discharge point; the surge had not spread far and, as a result, the surge energy was still concentrated in a relatively small volume. The subsequent spread of these surges, however, was the same as that observed by Bokuniewicz et al. (1978) so, after an initial rapid dilution of energy, the energy densities, and the energy dissipation rates were likely the same. The surge arrived at the rim of the pit about 3 minutes after discharge. In climbing the pit wall it had raised its center of mass about 4.9 m (16 feet) with an estimated total energy demand of 430 j/m^3. It appears therefore that the surge had spent nearly all of its energy in climbing the slope.

SIZE OF THE DISPOSAL SITE

The minimum conditions for an acceptable pit may now be specified based on the following conditions:

1. Clods of dredged material will be deposited at the discharge point and the bottom surge generated will not spread more than 220 yards (200 m) from the point of impact. This is its limit over a flat disposal site and the presence of sloping walls will limit its spread even further.

2. The initial energy density of the bottom surge at the discharge point will be about 500 $joules/m^3$. This is slightly more than the highest estimated value based on the observations.

3. Subsequent to impact, the energy levels and dissipation rates will be approximately as described by Bokuniewicz et al., 1978. This is the only available data and the spread of the surges observed in New York Harbor and the sizes of deposits at other locations are consistent with this empirical model.

With these results, a range of pit radii, wall slopes and depths can be specified to prevent the escape of the bottom surge of dredged sediment from the pit. For example:

If the side slopes are less than 1 degree, the radius must be at ıst 220 yards (200 m).

2. If the side slopes are greater than 1 degree, (a) the pit floor must be at least 5 feet (1.5 m) below the ambient sea floor and (b) the pit must be wide enough so that discharges can occur at least 123 yards (113 m) from the bathymetric contour that is 5 feet (1.5 m) below the ambient sea floor. For side slopes of 1 degree within 5 feet (1.5 m) of the ambient sea floor this gives the pit a radius of 220 yards (200 m). The radius will be less for steeper slopes but since the angle of repose of sand is about 30 degrees it will never be less than about 125 yards (114 m) unless the pit is deeper.

3. Pits of minimum radius must have floors at least 45 feet (13.7 m) below the ambient sea floor. (This is the rise needed to absorb 500 Joules/m^3). For side slopes of 7 degrees the minimum radius would be about 123 yards (113 m). At the angle of repose for sand, in principle the radius would only need to be 26 yards (24 m) but such small pits obviously are beyond the physical limits of the equipment to be used.

It is my opinion that the most useful practical criterion is that the pit floor must be deeper than 5 feet (1.5 m) below the ambient sea floor everywhere within 123 yards (113 m) of the discharge point. The intended discharge point can be marked with a taut-wire buoy with a watch circle radius of about 5% of the water depth but the usual marker will have a watch circle about equal to twice the water depth. In a refully controlled operation the actual discharge point may be expected to be within one and a half barge lengths of the intended point or within about 100 yards (91 m) from the buoy. If we assume that the ambient water depth is sufficient for the barges to reach the pit from any direction, the pit must be deeper than 23 feet (7 m) over an area with a radius of about 250 yards (229 m). The side slopes should be as steep as possible outside of this area to minimize the area covered by the pit. For sand the maximum slope is about 30 degrees. In principle, there is no reason why the pit could not be created in mud. In digging the pit, however, sand may be useful for beach nourishment, construction fill, or aggregate. Either sand or mud could be used for capping material, but if mud was not used for capping, the excavated mud would have to be disposed at another site.

EROSION POTENTIAL

There is a reasonable understanding of the sediment transport processes involving coarse-grained, noncohesive sediments and some predictive models have recently been developed, (e.g. Freeland, et al. 1983). Progress towards understanding the erosion, transportation, and deposition of fine-grained sediment has been much slower. As a result, there are no widely accepted and tested general models to predict the e· on of a mound of fine-grained dredged sediment by waves and cu..ents. At the present time, we have very little reliable, predictive capability even though much work has been done in this field.

In this section, I will briefly state some of the reasons why this prediction is still difficult in light of recent research and then discuss the type of circumstantial evidence we could amass to estimate the vulnerability of a deposit to erosion even without a general predictive model.

Many of the problems with predicting sediment transport arise because there is not a linear relation between the currents and the movement of sediment. It is often difficult and costly to predict the currents in a specific region, but even if we knew what the currents were to a reasonable accuracy, our models of the transport of sediment would be subject to relatively large uncertainties. The rate of sediment transport, for example, is roughly proportional to the cube of the current velocity. As a result, a small or acceptable uncertainty in the measurement (or prediction) of the currents can make a disproportionately large uncertainty in the calculated rate of sediment transport. These sorts of problems, however, are not necessarily fatal and good progress has been made modelling coarse-grained noncohesive sediments despite this difficulty. Other problems plague the effort to model fine-grained, cohesive sediment transport.

First, there appears to be no single relationship between the ical properties of a cohesive sediment and the current velocity needed to initiate erosion (i.e. the critical erosion velocity). Neither has a general quantitative relationship between the activity of benthic animals and the critical erosion velocity even though many studies have shown the sensitivity of the erosion to benthic activity (e.g. Rhoads et al., 1978; Nowell et al., 1981).

The importance of the roughness of the sediment surface was dramatically realized during monitoring of disposal mounds in Long Island Sound (Morton and Miller, 1980). After the passage of a hurricane over the area, the top of one mound was truncated; a layer of sediment about 2 m (6.6 feet) thick (or about 9,900 cubic meters, 13,000 cubic yards) had been removed and the top surface of the mound which had been rounded in profile with a minimum depth of 17 m (56 feet) was now flat at a depth of about 19 m (62 feet). Two other mounds of dredged sediment were in the near vicinity and had minimum depths of less than 19 m (62 feet) but neither of these two showed evidence of erosion. The difference in behavior between the mound that suffered erosion and these other two was explained through differences in their physical properties. The two mounds that survived unaltered by the hurricane had smooth, fine sand surfaces while the mound that was eroded had a rough surface characterized by clods of cohesive mud. Calculations were presented (Morton and Miller, 1980) to show that the high roughness resulting from the clods of sediment on one mound created a greater f ' shear stress and caused the sediment to erode under the combined el..cts of storm waves and currents while the smoother surface of the other mound resulted in smaller fluid stresses that were not capable of eroding the sediment surface. These investigators, however, point out that the calculation of fluid stresses under the combined effects of waves and currents are extremely complicated; that the mode of failure of cohesive clods under high shear stresses is unknown; and that the partitioning of shear stresses over rough beds under the combined action of waves and currents is likewise unknown.

In addition to the aforementioned difficulties with calculating the critical erosion velocities for fine-grained cohesive sediments, little is known about the rates at which sediment is resuspended once erosion begins. There are several studies available that have measured erosion rates in the laboratory on abiotic sediments; only a few of these were done in salt water (e.g. Mehta et al., 1982). Empirical formulas are available from these studies, but there is no widely accepted general form nor has there been field verification of these relationships. As I have mentioned earlier, some modelling of fine-sediment resuspension transport and deposition is being done by other investigators applying one or another of the empirical expressions for the resuspension rate, but these models must be considered experimental.

In light of these difficulties and uncertainties, mathematical models of sediment transport will be costly, time-consuming, and likely ' produce results with relatively large uncertainty. Some estimate of susceptibility of disposal mound to erosion may be made, however, from available estimates of the depth at which sand is moved by waves in these areas. Such estimates have been made from both bathymetric data and from wave observations coupled with an empirical suspension criteria for sand (Hallermeier, 1981). Along the open coast of New Jersey, extreme waves (those whose heights are only exceeded for 12 hours per year) can disturb sediments down to a depth of 7 m (23 feet). At the more protected sites, say, in the Lower Bay of New York Harbor, the disturbance should be less.

Furthermore, currents in the harbor should not be expected to cause erosion problems for deposits placed in borrow pits. In general, the configuration of the sea floor is in equilibrium with, or at least has an amicable arrangement with, the prevailing currents. For this reason, there is a legitimate concern that mounds of dredged sediment that rise above the level of the ambient sea floor may be reduced by the currents to the ambient, pre-mound levels (Of course, this will not always happen). On the other hand, whenever a subaqueous excavation is dredged there is very rarely, if ever, concern that the prevalent currents will deepen the excavation. The problem is always one of shoaling in the dredged area rather than natural erosion. Dredged pits in the Lower Bay accumulate to fine-grained sediment at a rapid rate. This behavior is to a salinity stratification that establishes itself over the pit and substantially diminishes the strength of the tidal currents within the pit.

In order to examine this behavior, salinity observations were made in two pits in New York Harbor. One of these was about 400 m (437 yards) across and the ambient sea floor is at a depth of about 9 m (30 feet). Measurements of salinity profiles over a tidal cycle show that the halocline occurred at a depth between 7 and 9 m (23 and 30 feet). The stratification developed within the space of 2 m (6.6 feet) at the level of the ambient sea floor. This would suggest that the pit could be filled, at least, to within 2 m (6.6 feet) of the ambient sea floor and still retain its behavior as a sediment trap.

The second pit that was examined was about 800 m (875 yards) across in a direction approximately parallel to the tidal currents. The ambient sea floor here was at a depth of about 3.5 m (12.5 feet). Measurements of the salinity profile showed that on the floor tide the halocline formed between 2.5 and 5 m (8 and 15 feet) and, on the ebb tide, between about 5 and 7.5 m (16 and 25 feet). The stratification here appears to develop within the space of 2.5 m (8 feet) but may be up to 4 m (13 feet) below the ambient sea floor.

To generalize these observations, the aspect ratio might be used. The aspect ratio is the ratio of the pit's relief (or depth below the ambient sea floor) to the pit diameter; this particular parameter is usually used to describe the behavior of devices to trap sediment. For one pit, stratification should develop at an aspect ratio of at most 2 m/400 m or 0.005. This is an upper limit because the salinity measurements could only resolve a change withn a 2 m interval. For the other pit, the aspect ratio would be at most 4 m/800 m, or again, 0.005. An empirical rule for pits under conditions like those in New York Harbor would be that, for salinity stratification to develop and hence for the trapping of fine-grained sediment, the aspect ratio should be at least 0.005.

Based on these considerations the top of the fine-grained deposit in pits in New York Harbor should be approximately 23 feet (7 m) below sea level and about 6 feet (1.8 m) below the ambient sea floor. Within the uncertainties in these values, they are essentially the same as the depth limits placed on the project by the operational criteria. The final sand cap should be about 3 feet (0.9 m) thick (Bokuniewicz, Cerrato and Mitchell, 1983) so the pit floor must initially be deeper than 21 feet (19 m) in the interior. The capacity of the pit depends upon how much the actual depths exceed these limits. For a pit of the minimum radius the capacity inceases by about 200,000 cubic yards (153,000 cubic meters) for every 3 feet (0.9 m) of additional depth.

OTHER CONSIDERATIONS

Given a choice among potential sites that meet the minimum criteria other considerations could be used to establish preferences. Briefly, these other criteria may be:

1. More protected sites would be preferable to less protected sites.

2. Sites with larger capacity would probably be preferable to sites with smaller capacity.

3. Deeper sites with smaller areas would be preferable to shallower sites with larger areas in order to minimize the area of the sea floor committed to the disposal site and the volume of cap material required.

4. Existing sites or sites that do not require modifications would be preferable to other areas in order to minimize the initial costs.

5. Pits with steeper side slopes are preferable to those with shallower slopes.

CONCLUSIONS

Our experience with disposal operations in nearshore waters is sufficient to design criteria for borrow-pit disposal sites. Suitable pits must be more than 5 feet (1.5 m) below the ambient sea floor over an area greater than 500 yards (457 m) in diameter. Significant limitations are due to the operating requirements of the equipment rather than to the physical processes by which dredged material is placed on the sea floor. As a result careful control of the disposal operation is essential.

REFERENCES

Alther, G.R. and R.K. Wyeth. 1980. A test utilizing sediment traps, survey rods and radiographs to monitor sediment accumulation from a dredging disposal operation. Enviromen. Geol. 3:97-105.

Biggs, R.B. 1970. Geology and hydrography. Pp. 7-15, In: Gross Physical and Biological Effects of Overboard Spoil Disposal in Upper Chesapeake Bay. Spec. Rpt. No. 3, Natural Resources Inst. Chesapeake Biological Lab., Univ. of Maryland, Solomons, MD.

Bokuniewicz, H.J. 1979. The stability and fate of dredged sediment. Pp. 1-23, In: Proceedings of the 11th Annual Dredging Seminar Center for Dredging Studies, Texas A&M Univ., College Station, TX.

Bokuniewicz, H.J. 1982. Burial of dredged sediment beneath the floor of New York Harbor. Proceedings Oceans' 82 Conf., Mar. Tech. Soc. and Inst. of Electrical and Electronics Engineers, Council of Ocean Engineering, Washington D.C., 1016-1020.

Bokuniewicz, H.J. 1983. Submarine borrow pits as containment sites for dredged sediments. Pp. 215-227, In: Wastes in the Ocean, Vol. II: Dredged material disposal in the ocean. D.R. Kester, B.H. Ketchum, I.W. Duedall and P.K. Park, editors. John Wiley and Sons, Inc., NY.

Bokuniewicz, H.J. 1985. Energetics of dredged material disposal. Pp. 305-317, In: B.H. Ketchum, J. Capuzzo, W. Burt, P.K. Park, D.R. Kester, I.W. Duedall, eds. Part IV, Physical Processes, Nearshore Waste Disposal, Vol. 6 of Wastes in the Ocean.

Bokuniewicz, H.J. and R.B. Gordon. 1980. Deposition of dredged sediment at open water sites. Est. Coast. Mar. Sci. 10:289-303.

Bokuniewicz, H.J. and J.T. Liu. 1981. Stability of layered dredged sediment deposits at subaqueous sites. Oceans 81 Conf. Record, Vol. 2. Inst. of Electrical and Electronics Engineers, Inc., NY: 752-754.

Bokuniewicz, H., R. Cerrato and A. Mitchell. 1983. Criteria for caps on subaqueous disposal sites. Proceedings of "Dredging and Related Problems in the Mid-Atlantic Region." Sponsored by The Maryland Chapter of the National Association of Envir. Prof. and The Eastern Chapter of the Western Dredging Association, Baltimore, MD (1981):1-7.

Bokuniewicz, H.J., J.A. Gebert, R.B. Gordon, J.L. Higgins, P. Kaminsky, C.C. Pilbeam, M.W. Reed, and C.B. Tuttle. 1978. Field study of the mechanics of the placement of dredged material at open-water disposal sites. Tech. Rpt. D-78-F, Vol. I. U.S. Army Corps of Engineers Waterways Experiment Station, Environmental Effects Lab., Vicksburg, MS. 94 p. and appendices.

Brandsma, M.G. and D.J. Divoky. 1976. Development of models for prediction of short-term fate of dredged material in the estuarine environment. Dredged Material Research Program, Rpt. CR-D-74-8. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS:

Brannon, J.M., R.E. Hoeppel and D. Gunnison. 1984. Efficiency of capping contaminated dredged material. Pp. 664-673, In: Dredging and Dredged Material Disposal, Vol. 2, R.L. Montgomery and J..W. Leach, eds. Amer. Soc. Civil Engineers, NY.

Chase, G.L. Undated ms. Summary: Laboratory simulation of open-water disposal. U.S. Army Corps of Engineers, New England District, Waltham, MA. Unpublished manuscript.

Conner, W.G., D. Aurand, M. Leslie, J. Slaughter, A. Amr, and F.I. Ravenscroft. 1979. Disposal of dredged material within the New York District: Volume 1, Present practices and candidate alternatives. Mitre Tech. Rpt., MTR-7808. The Mitre Corp., McLean, VA.:178 pp.

Danek, L.J., G.R. Alther, P.P. Paily, R.G. Johnson, F. de Libero, J.F. Yohn, and F.T. Lovorn. 1977. Aquatic disposal field investigation of the hydraulic regime and physical nature of bottom sedimentation. Tech. Rpt. D-77-42, U.S. Army Corps of Engineers, Dredged Material Research Program. Waterways Experiment Station, Vicksburg, MS. 115 p.

Demars, K.R., R.P. Long, S. Stanton and W. Charleton. 1984. Settlement and stability of ocean disposal mounds. Pp. 1040-1049, In: Dredging and Dredged Material Disposal, Vol. 2. R.L. Montgomery and J.W. Leach, eds. Amer. Soc. Civil Engineers, NY.

Freeland, G.L., R.A. Young, G. Drapeau, T.L. Clarke, and B.L. Bengnio, 1983. Sediment cap stability study New York Dredged Material Dumpsite. National Oceanic and Atmospheric Admin., A.H. Ocean and Meterol. Lab. Final Report under support agreement No. NYD-80-124(c), NY Dist. U.S. Army Corps of Engineers.

Gordon, R.B. 1974. Dispersion of dredged spoil dumped in near-shore waters. Est. Coast. Mar. Sci. 2: 349-358.

Hallermeier, R.J. 1981. A profile zonation for seasonal sand beaches from wave climate, Coastal Eng. 4: 253-277.

Hands, E.B. and S.R. DeLoach. 1984. An offshore mound constructed of dredged material. Pp. 1030-1039, In: R.L. Montgomery and J.W. Leach, eds., Dredging and Dredged Material Disposal, Vol. 2, Proc. Conf. Dredging '84. Amer. Soc. Civil Engineers, NY.

Holiday, B.W., B.H. Johnson and W.A. Thomas. 1978. Predicting and monitoring dredged material movement. Dredged Material Research Program Synthesis Report TR-DS-78-3. U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS. 44 p.

Mehta, A.J., T.M. Pachure, T.G. Dixit, and R. Ariathura. 1982. Resuspension potential of desposited cohesive sediment beds. In: Estuarine Comparisons. V.S. Kennedy ed. Academic Press, N.Y. 591-610.

Morton, R.W. 1983. Precision bathymetric study of dredged material capping experiment in Long Island Sound. Pp. 99-122, In: D.R. Kester, B.H. Ketchum, I.W. Duedall and P.K. Park, eds. Dredged material disposal in the ocean, Vol. II of Wastes in the Ocean. John Wiley and Sons, NY.

Morton, R.W. and M.C. Miller. 1980. Stamford-New Hven disposal operation monitoring survey report #7. Science Applications, Inc., Newport, RI. 23 p.

Nowell, A.R.M., P.A. Jumars, and J.E. Eckman. 1981. Effects of biological activity on the entrainment of marine sediments. Mar. Geol. 42:133-152.

O'Connor, J. 1982. Evaluation of capping operations at the experimental Mud Dump Site, NY Bight Apex 1980. Final Rpt. on contract No. DACW39-82-2544. U.S. Army Corps of Engineers, NY District. 70 p.

Proni, J. 1982. Fate of fine sediments/stability of sediment cap on dredged spoils in New York Mud Dump. Oceans 82 Conf. Record. Marine Technical Society, Institute of Electrical and Electronics Engineers, and the Council on Ocean Engineering. Washington, D.C. Oral report.

Rhoads, D.C., J.Y. Yingst, and W. Ullman. 1978. Sea floor stability in central Long Island Sound. Part I. Temporal changes in erodability of fine-grained sediments in Estuarine Interaction. M.L. Wiley ed. Academic Press, NY: 221-224.

umeri, A. 1984. Capped in-water disposal of contaminated dredged material. Pp. 644-653, In: R.L. Montgomery and J.W. Leach, eds. Dredging and Dredged Material Disposal, Vol. 2. Proc. Conf. Dredging '84. Amer. Soc. Civil Engineers, NY.

Sustar, C. and T. Wakeman. 1977. Dredge disposal study. San Francisco Bay and Estuary. Main Report. U.S. Army Corps of Engineers. San Francisco, CA. 130 p.

Tavolaro, J. 1984. A sediment budget study of clamshell dredging and ocean disposal activities in the New York Bight. Environ. Geol. Water Sci. 6(3): 133-140.

APPENDIX D

Management Plan for the Use of a Borrow Pit Disposal Site

Management Plan D-2

DRAFT BORROW PIT DREDGED MATERIAL DISPOSAL SITE MANAGEMENT GUIDELINES

These management guidelines for a subaqueous borrow pit dredged material disposal site have been developed primarily from Irish and Bokuniewicz (1988), and Bokuniewicz et al. (1986). Incorporated in the guidelines is a detailed monitoring program to ensure that dredged materials disposed into borrow pits will be suitably contained and will not have adverse environmental impacts. These guidelines should not be construed as being prescriptive in all aspects of site management, but instead lay out general guidance that should be followed when detailing a monitoring and management program for borrow pit disposal.

The first consideration for the management guidelines is developing a monitoring program. The monitoring program would be comprised of physical and biological monitoring and would require initial surveys and investigations before the disposal site would become operational (these are discussed below).

I. PRELIMINARY WORK NEEDED PRIOR TO INITIALIZATION OF AN OPERATIONAL PROGRAM

A. A detailed bathymetric survey of the site should be done to determine hydrographic characteristics, volume capacity and configuration of the pit.

B. Bottom samples will be taken to characterize the initial sediment type and benthic communities in and adjacent to the site. In the case of a new borrow pit site, geotechnical samples will be taken to determine the economic feasibility of recovery of the material for sand and gravel mining.

C. A taut-moored or similar disposal buoy should be set in the center of the disposal site. This should not be within 250 yards of a bathymetric contour that is 5 feet or less below the ambient sea floor. These considerations are based on Bokuniewicz (1986) and Appendix B in the DSEIS, which developed physical criteria for borrow pit disposal sites.

II. MONITORING OF THE BORROW PIT DISPOSAL SITE

A. Physical Monitoring

1. Equipment to monitor turbidity could be placed near the pit site on the ambient sea floor. In aquatic disposal of dredged material, most of the sediment reaches

the sea floor within minutes and spreads across the bottom in a dense slurry one to two meters thick (Bokuniewicz 1986). By measuring turbidity plumes created by disposal events, one can determine if the dredged material is being contained within the borrow pit disposal site. Irish and Bokuniewicz (1988) describe four possible types of sensors:

a. Transmissometers. Shipboard based transmissometers, which measure light transmission through water/sediment slurries, have been used extensively to detect dredged material surges (Bokuniewicz et al., 1978). In-situ transmissometers have been used to monitor dredged material disposal in Long Island Sound (Bohlen 1982).

b. Nephelometers. These instruments detect turbidity by measuring the scattering of light.

c. Narrow Beam, Horizontal Transducer/Receiver. Shipboard-based transducers, which bounce sound waves off the bottom, have been used to detect dredged material slurries (Bokuniewicz 1985; Proni and Hansen 1981). In-situ transducers are commercially available.

d. Transducer-Receiver Pair. These devices are similar to an "electric eye" in which an acoustic beam would pass from one device to the next in order to monitor the water column between the two instruments. This arrangement has not been field-tested previously.

A further discussion on physical monitoring is contained in Section 2.3.4.2.1. of the DSEIS.

2. The monitoring device should have the following characteristics:

a. The device would consist of the sensor, a power supply, a data logger and a two-way acoustic data link.

b. The device would be self-contained and could be deployed over a minimum period of once a month.

c. The device would be activated by an acoustic signal from a remote source when a discharge was about to occur.

A discussion on how the physical monitoring would be incorporated into the management plan is contained in Section V of this Appendix.

B. Biological Monitoring

Biological monitoring is discussed in Section 2.3.4.2.2 of the DSEIS and will only be briefly discussed here.

1. The purpose of biological monitoring is to determine if contaminants from the dredged material deposited in the pit site are being made available for uptake and accumulation in aquatic organisms, especially the benthic community.

2. As discussed in Section I, an initial large scale benthic survey of the disposal site and adjacent areas would be done to determine the type of community that exists and ambient tissue concentration levels of certain constituents of concern. Bokuniewicz (1988), after reviewing Breteler (ed. 1984) has suggested that copper could be a useful indicator contaminant because of its possible bioaccumulation impact on marine organisms, and because Fitzpatrick (1983) has suggested that copper may be useful in characterizing levels of other metals such as cadmium, nickel and zinc. Other constituents could be used in addition to copper if the need arises.

3. A spatial and temporal sampling regime for benthic organisms should be instituted. Sampling stations would be located from the pit edge outward to approximately 8000 feet from the edge. A similar transect would be set up as a control across an unused pit area. Sampling would be done after the periods of greatest recruitment (spring and fall). The sampling begins before the disposal site becomes operational, continues during the life of the pit and after the final cap is placed on the site.

4. A tiered approach to evaluating the results of the bioaccumulation data is suggested for greater efficiency and brevity. For example, after collecting all samples, a comparison between values for the stations at the extreme end of the transects could be done to determine if a gradient of increased concentration exists in body tissue for constituents of concern. If statistically significant differences are found then the intermediate samples could be analyzed to determine if a trend exists. The incorporation of the biological monitoring program into the management guidelines will be discussed in Section IV.C of this Appendix.

III. SEDIMENT TESTING CRITERIA

The first step in the management guidelines is determining whether a proposed project qualifies for borrow pit disposal. Section 2.1 in the SEIS develops a categorization scheme for sediments based on the ocean dumping testing criteria. Appendix A of the DSEIS contains typical test results for the four categories of material identified. Category I material would be considered for unrestricted ocean disposal and would not qualify for disposal in borrow pits. Category IIA and IIB material would presently be permitted for ocean disposal only if capped, with category IIB material showing more toxicity and bioaccumulation effects than IIA material. These two materials would be candidates for borrow pit disposal. Category III material exceeds toxicity standards based on the testing criteria and would most likely not be allowed for ocean disposal even with capping. Category III material would be eligible for borrow pit disposal but may require an interim cap. (Capping guidelines are discussed in Section IV of this Appendix).

IV. CAPPING PROCEDURES.

The two major management decisions are: 1) The type of cap that would be used and 2) The use of interim caps.

A. Interim Caps

1. Interim caps would be used to minimize loss of contaminants to the water column, and more importantly, decrease the bioavailability potential of the deposited sediment. As discussed in section 2.3.3.1.b of the DSEIS, interim caps after every disposal operation is considered unnecessary.

2. Management Procedures-

a. Category IIa and IIb Sediment - Generally, Category IIa and Category IIb material should not require an interim cap unless the operation occurs during the seasons of active benthic recruitment (spring and fall). If the disposal is to take place during periods of active benthic recruitment, an interim cap will usually be required.

b. Category III Sediment- This sediment would need to be capped expeditiously (within 2 weeks) regardless of the time of the year of disposal. Decisions can be made on a case-by-case situation that could allow capping of Category III sediment within the prescribed time frame by a dredging project that has Category II sediment. In all cases, however, it will be the responsibility of the permit applicant to arrange for suitable cap material and have the final capping plan authorized by the Corps.

B. Cap Characteristics

1. Interim Caps - The most structurally sound cap may be one composed of sand (see sec. 2.3.3.1.c), although it need not be coarse sand. A mud cap containing sediment that is acceptable for unrestricted ocean disposal (Category I sediment) is acceptable because it should have the properties needed to serve as a cap (see sec 2.3.3.1.d). An interim cap of Category II material could be authorized on a case by-case basis during the seasons of low benthic recruitment.

Interim cap thickness will be determined by:

a. Sediment Category

b. Time between disposal operations

c. Amount/category of cap material available

Category III sediment will require very thick caps (approximately 50 cm) to isolate the deposited sediments from the deepest burrowing organisms (Brannon 1985, 1986). WES (1988) has been developing a new technique to determine cap thickness to protect against different sediment types. The results of this research will be evaluated to see if it could be incorporated into the management guidelines. If it is determined that there will be a long period of time (3-4 months) between disposal events at the pit disposal site, and especially if that time interval will include one of the periods of high benthic recruitment, a thicker cap than normal may be required.

2. Final Cap - The final cap on the pit site should consist of sediment that is similar to the ambient sediment around the pit site. The cap should be approximately 3 feet thick to ensure more than adequate protection from even the deepest burrowing organisms and provide a stable long-term barrier to penetration and bioaccumulation , as well as help reduce loss of contaminants. Sections 2.3.3.1.g and h of the DSEIS give further information on the final cap.

IV. OPERATIONAL GUIDELINES

A. Regulatory Program.

Prospective applicants requiring permits or authorization from the Department of Army for the ocean disposal of dredged material will be required to perform the regular series of tests on sediment and water samples outlined by the ocean dumping testing criteria. If test results show that the proposed dredged material would be unsuitable for unrestricted ocean disposal, the project sediment would be a candidate for disposal in the pit site. The applicant may be instructed to run a geotechnical series of tests (porosity, shear strength and permeability consolidation coefficients) on the project sediment. The permeability and consolidation coefficients will be used to calculate the settlement of the final deposit for each project and for determination of sediment mass and other physical parameters.

The regulatory process will proceed as usual with the public comment and resource agency review period leading to the Department of Army permit decision. If the permit is issued, the applicant will have to comply with several permit conditions, including the possible requirement of interim caps, data reporting requirements, and dredging restrictions.

B. Borrow Pit Site Management-

1. Role of Site Manager- The manager's responsibility will be:

a. Ensuring that only eligible projects are disposed into the pit site

b. The regulation and enforcement of restrictions on time and location of discharges

c. Review of monitoring data (see Section II of this Appendix) to ensure that no adverse environmental impacts will occur in the area surrounding the pit site.

2. Data Requirements

a. Discharge Volumes - The data would be provided by the dredging contractor each day of the dredging project in the form of barge-loads discharged, volume per discharge and mass per discharge.

b. Discharge Location and Time - The data would be provided daily by the dredging contractor.

c. Turbidity Monitor Readings- These daily data would be received by the inspector (a Corps employee) on board the barge. The site manager would review all the daily data to determine if discharges are occurring within an acceptable distance from the disposal buoy and to see if the turbidity sensor has detected any overtopping of the pit wall by the discharged material. The discharged volumes will be used to determine if the critical volume for the project has been reached which may result in the movement of the discharge buoy (see Sect. 2.3.4.2 for explanation of "critical volume").

d. Testing Results of the Dredged Material- This data, which would be obtained from the testing results submitted by the applicant, would be used to determine the level of response in case the surge would escape the pit site, and for the approval of certain project sediments as possible interim caps (see Sect. IV.A of this Appendix).

e. Form of the Deposit - This estimate is made by the site manager before the dredging project begins. The form of the deposit is an approximation of the shape and extent of the project sediment after it is deposited in the pit site. Bokuniewicz et al. (1986) has developed guidelines for the configuration of existing mounds of dredged sediment in open water sites. These criteria have been used to develop a relationship between the elevation of mounds of dredged material in an aquatic medium and various disposal volumes. Using this relationship, Bokuniewicz et al. (1986) has developed a "bathymetric criteria" to mitigate against the possible escape of the dredged material surge from the pit during disposal operations:

i. The apex of the final mound cannot come within 3 feet of the elevation of the sea floor surrounding the pit;

ii. The surface of the deposit where it intersects the pit walls cannot be within 5 feet of the edge of the pit. If the entire project is forecast to exceed the limits established by the criteria the manager can estimate what fraction of the project (the critical volume) can be discharged at the disposal buoy's present location. At this point discharges would be allowed to begin.

f. Data from Biological Monitoring- The manager will need to compare organism tissue concentration data from the preliminary survey to later series of data from the pit locations to determine if there is a statistically significant trend of increased bioaccumulation that could be attributed to the deposited sediment.

g. Data on Cap Stability- After the final cap is placed on the pit site, precision bathymetric surveys and bottom samples for grain size analysis should be done at varying time intervals from one week to 2 years after the final cap is put in place. This data would be used by the manager to monitor the consolidation of the deposit, estimate the pore water discharge, and to monitor changes in the composition of the cap. Other remote sensing techniques such as side scan sonar and sub-bottom profiling could be used to document the condition of the final cap.

C. MANAGEMENT DECISION FRAMEWORK

Irish and Bokuniewicz (1988) has developed a borrow pit disposal site decision framework (Fig. 1) which incorporates all the elements discussed previously.

1. The framework begins with a suitable disposal project and the appropriate monitoring regimes in place with the disposal buoy on-line.

2. The site manager estimates the form of the deposit (see Sect. IV.B.2.e of this appendix) based on the previous condition bathymetric survey. The condition survey should be done after approximately 100,000 cubic yards of material is deposited in the pit site. The precision survey should consist of at least two tract lines that are

perpendicular to each other and pass through the position of the disposal buoy. The site manager should use the survey data to refine and correct initial estimates of the deposit's configuration. A critical volume is determined for the proposed dredging project. If the project is forecast to exceed the critical volume limits, the manager estimates what fraction of the project can be discharged at the disposal buoy's present location.

3. Discharges of the proposed sediment would begin. The on-site inspector would give the manager the required daily data discussed in sec. of this Appendix. The manager must be aware of the following events:

a. The reaching of the critical volume criterion for that sector of the disposal site.

b. Reaching a cumulative volume of approximately 100,000 cubic yards since the last condition survey.

c. Evidence from the physical monitoring instruments indicating escape of the surge from the pit site.

If condition a) or b) occur, the disposal operations may be suspended or diverted to the mud dump (if the material is not Category III) while a condition survey is run. Disposal of the material at the Mud Dump would require that arrangements for expeditiously capping the material would need to be made.

If there is evidence that the sediment surge is escaping the pit, the manager must first be certain that the monitoring equipment is not malfunctioning. If it is a malfunction, the operation must be diverted to the mud dump (if appropriate) while the malfunction is corrected. If the equipment is not malfunctioning, the manager must determine if the disposal barge is in the correct position during the disposal events. If the barge is determined to be in the correct position, the buoy may be too close to the wall of the pit. The barge towing contractor would be directed to discharge the material on another side of the buoy which is further away from the rim of the pit, and the that quadrant of the pit would be closed.

4. Discharges at the pit disposal site can continue as long as the latest results of the biological monitoring are negative. Specific criteria to determine statistically significant trends in the bioaccumulation data would be developed with the guidance of the Steering Committee. Once the criteria is established, the tiered approach discussed in Sect. III of the appendix would be used to evaluate data. If statistically significant results occur in comparison of the tissue concentration data, disposal operations would have to

be diverted to the mud dump site (if appropriate), or alternative means of disposal would be needed. Mitigating action, such as the capping of the deposit at the pit site, would have to be initiated.

5. When the disposal project is complete, a final condition survey should be done. Some projects may require interim caps based on the results of the sediment testing. The next scheduled project may be allowed to be the cap for the last project unless the time interval between the projects would include a period of heavy benthic recruitment (see Sect 2.3.3.1). If that is the case, a special interim cap might be needed depending on the characteristics of the recently deposited sediment.

REFERENCES CITED

Bohlen, W.F. 1982. In-situ monitoring of sediment resuspension in the vicinity of active of active dredge spoils disposal areas. Proceedings of Oceans 1982. IEEE: 1028-1033.

Bokuniewicz, H., J.A. Gebert, R.B. Gordon, J.L.Hoggins, P. Kaminsky, C.C. Pilbeam, M.W. Reed and C.B. Tuttle, 1978. Field study of the mechanics of the placement of dredged material at open water disposal sites, Vols. I & II. US Army Corps of Engineers Waterways Experiment Station, 316 p.

Bokuniewicz, H.J., R. Cerrato and D. Hirschberg. 1986. Studies in the Lower Bay of New York Harbor associated with the burial of dredged sediment in subaqueous borrow pits., MSRC Special Rpt. No. 74, 67 p.

Brannon, J.M., R.E. Hoepple, T.C. Sturgis, I. Smith, and D. Gunnison, 1985. Effectiveness of capping in isolating contaminated dredged material from biota and the overlying water, WES Tech. Rpt. D-85-10, 32 p.

IBID 1986. Effectiveness of capping in isolating Dutch Kills sediment from biota and overlying water. WES Misc. paper D-86-2, 53 p.

Fitzpatrick, W.P. III, 1983. Seasonal variation of trace metal levels in polychaete worms in New York Harbor, MS Thesis, SUNY, Stonybrook, 96 p.

Irish, J. and H. Bokuniewicz. 1988. Monitoring Discharge Operations at Open Water Disposal Sites. MSRC Rpt. for the NY Dist., 34 p.

Proni, J.R., and D.V. Hansen, 1981. Dispersion of particulates in the ocean studied acoustically: the importance of gradient surfaces in the ocean, IN "Ocean Dumping of Industrial Wastes" B.H. Ketchum et al., eds. Plenum Press, NY.

Waterways Experiment Station, 1986. Fate of dredged material during open disposal, Env. Effects of Dredging Tech. Note EEDP-01-2, 12 p.

APPENDIX E

Consistency Determination Coastal Zone Management (CZM) Policy

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Compliance with applicable NY policies E-17

Mr. John Weingart, Director
Division of Coastal Resources
New Jersey Department of Environmental Protection
CN 401
Trenton, New Jersey 08625

Dear Mr. Weingart:

Based on your department's participation in the Interagency Steering Committee of The Dredged Material Disposal Management Plan, you are aware that the New York District is actively studying the use of sub-aqueous borrow pits for the disposal of dredged material not suitable for unrestricted ocean disposal. The attached (enclosure 1) Final Supplemental Environmental Impact Statement (FSEIS) details our findings and recommendations for the use of this disposal alternative. After careful review of your most recent Coastal Resource and Development Policies (amended February 3, 1986) it is our belief that twenty three could be applicable to the proposed action. We have evaluated our project in light of each of these twenty three policies, and find the proposed action to be consistent with each policy. A listing of these applicable policies, and our finding of consistency (including references to the FSEIS Section that detail the pertinent findings) is attached for your review (enclosure 2).

I request that your office review our findings and transmit to us your formal consistency determination. If you should question any finding or feel some applicable policy has not been included please advise us in writing as soon as possible, with as much detail as you can provide. In order to expedite the formal review process I request that you enumerate the steps involved and the approximate time frames for each. If acceptable to you, my office would be willing to print and mail the consistency findings and FSEIS to those parties that you designate as necessary for the review process, providing you forward a copy of the applicable mailing list.

Should you have any questions on this action call the project manager, Ms Patricia Pechko at (212) 264-5620. If you have any specific questions regarding the FSEIS or consistency findings call the EIS coordinator, Mr. Len Houston, at (212) 264-4662.

Sincerely,

John Hartman
Chief, Operations Division

New Jersey Coastal Resource and Management
Consistency Determination

1. Project: Use of Sub-Aqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey.

2. Applicant: Army Corps of Engineers, New York District

3. Applicable Policies: Based on a review of the latest (February 3, 1986) amended Coastal Resource and Management Policies for New Jersey, twenty three (23) were found to be potentially applicable to the proposed project. These policies are listed in section 5 below.

4. Consistency Determination: Each of the above twenty three applicable policies were evaluated with respect to the project's consistency to their stated goals. The project, as described in the attached final supplemental Environmental Impact Statement (FSEIS), has been found to be consistent with each policy. The specific findings, and references to the FSEIS Sections that discuss each appropriate point, are contained in Section 5 below.

5. List of Applicable Policies and Corresponding Determination of Consistency

7.7E - 3.4 Prime Fishing Areas.

Policy: Permissible uses of Prime Fishing Areas include recreational and commercial fin fishing and shellfishing, as presently regulated by NJDEP Division of Fish, Game, and Wildlife, scuba diving and other water related recreational activities. Prohibited uses include sand or gravel submarine mining which would alter existing bathymetry to a significant degree so as to reduce the high fishery productivity of these areas. Disposal of domestic or industrial waste must meet applicable State and federal effluent limitations and water quality standards.

Determination: Mining to create a new pit would produce a habitat that presently contains the greatest numbers of fish in the Lower Bay Complex (see FSEIS sections 3.4.11; 3.4.2). Filling the new pit would return it to the original bathymetry, with no reduction of long-range productivity. Filling an existing pit would significantly alter the existing bathymetry, but not likely effect the overall productivity of the Bay (4.3.2; 4.7a,b).

7.7E-3.5 Finfish Migratory Pathways

Policy: Development, such as dams, dikes, spillways and intake pipes, which creates a physical barrier to the movement of fish along finfish migratory pathways is prohibited, unless acceptable mitigating measures such as fish ladders, erosion control, or oxygenation are used. Development which lowers water quality to such an extent as to interfere with the movement of fish along finfish migratory pathways or to violate State and Delaware River Basin Commission water quality standards is prohibited.

Mitigating measures are required for any development which would result in: lowering dissolved oxygen levels, releasing toxic chemicals, raising ambient water temperature, impinging or suffocating fish, causing siltation, or raising turbidity levels during migration periods. Waters's edge development which incorporates migration access structures, such as functioning fish ladders, will be conditionally acceptable, provided that the NJDEP, Division of Fish, Game and Wildlife approves the design of the access structure.

The NJDEP Division of Fish, Game and Wildlife is currently evaluating anadromous fish spawning areas for potential enhancement work. This may include building of fish ladders, removal of obstructions, stocking, and other means. A development proposal shall be consistent with these Department efforts.

Determination: Neither the dredging of new pits nor the disposal into new or existing pits will significantly alter oxygen or turbidity, or temperature levels outside a very small immediate area of the dredge/disposal barge, nor result in the release of toxic materials or burial of fish (4.2.1; 4.3.1a,c). Consequently, the proposed action will not adversely impact migrations.

7.7E-3.7 Navigational Channels

Policy: New or maintenance dredging of existing navigation channels is conditionally acceptable providing that he condition under the new or maintenance dredging policy is met (see Section 7:7E-4.10(e) and (F). Development which would cause terrestrial soil and shoreline erosion and siltation in navigation channels shall utilize appropriate mitigation measures. Development which would result in loss of navigability is prohibited.

Determination: No impacts to shoreline erosion nor current/wave environments within the bay system will occur (4.2.2b). If implemented, this action might improve navigational access to some areas, while hindering none.

7.7E-3.13 Shipwrecks and Artificial Reefs

Policy: Acceptable uses of these submerged habitats include recreational and commercial/finfishing and shellfishing, and scuba diving. In addition, construction of new or expanded artificial reefs by the deposition of weighed non-toxic material is conditionally acceptable provided that:

1. It can be demonstrated that the material will not wash ashore and interfere with either navigation as regulated by U.S. Coast Guard or commercial fishing operations, and

2. Placement of the material and ultimate management of the habitat is coordinated with the DEP Division of Fish, Game and Wildlife. Any use, except archaeological research, which would significantly adversely affect the usefulness of these special area as a fisheries resource is prohibited. Persons conducting archaeological research which significantly affects the usefulness of a shipwreck for fisheries purpose must compensate for this loss by creation of an artificial reef of equal habitat valve.

Determination: These structures are not present in existing pits, and a survey to find and avoid such wrecks has been completed as part of the screening process for locating new pits (2.3.2.4). Based on the survey results, areas for new pit construction where selected to avoid targets that might be wrecks (see Figure 32). Should other areas be used, targets present would be examined in detail to determine their potential historical and natural resource value so as to avoid or minimize/mitigate impacts (4.5.1.2e). In the unlikely event that a wreck, sufficiently exposed to serve as a fishery habitat, cannot be avoided, mitigation for its replacement will be developed prior to dredging.

7.7E-3.34 Historic and Archaeological Resources

Policy: 1. Development that detracts from, encroaches upon, damages, or destroys the value of historic and archaeological resources is discouraged.

2. Development that incorporates historic and archaeological resources in sensitive adaptive rescue is encouraged.

3. Scientific recording and/or removal of the historic and archaeological resources or other mitigation measures must take place, if the proposed development would irreversibly and/or adversely effect historic and archaeological resources.

4. New development in undeveloped areas near historic and archaeological resources is conditionally acceptable, provided that the design of the proposed development is compatible with the appearance of the historic or archaeological resource.

5. Commercial salvage of shipwrecks over 50 years old is prohibited. Salvage for research and educational purposes is discouraged, but may be permitted, subject to the following conditions:

(i) The proposed excavation project is in the public interest

(ii) The purpose of the proposed activity is to further archaeological knowledge

(iii) The archaeological knowledge gained will outweigh the loss to future archaeologists and to the public of the preserved shipwreck.

(iv) The applicant has expertise in underwater archeology as outlined by the Federal Requirements (36 CFR66, pursuant to the Archaeological and Historic Preservation Act of 1974 (P.O. 93-291), and through NEPA, the National Historic Preservation Act of 1966, as amended and Executive Order 11593)

(v) A State designated archaeologist will be present on location to supervise excavation

(vi) Recovered artifacts will be preserved and/or restored and made accessible to researchers

(vii) A final report is prepared for DEP giving the following information about the shipwreck and its excavation: historic background description of environment, salvage methodology, artifact analysis description of techniques used in preservation of artifacts, base map, narrative and grid map on artifacts recovered, bibliography, photographs, National or State Historic Register documentation and conclusions.

Determination: No such resources are present in existing pits (3.5.1; 4.5a). Areas for new pit construction have been screened to avoid impacts to these potential resources, and a procedure developed for assessing and mitigating impacts in areas not cleared by the screening (4.5.1.2).

7.7E-3.36 Endangered or Threatened Wildlife or Vegetation Specie habitats.

Policy:Development of this Special Area is prohibited unless it can be demonstrated that Endangered or Threatened Wildlife or Vegetation Species Habitat would not directly or through secondary impacts on the relevant site be adversely affected.

Determination: No endangered or threatened Federal or State species uses the project area (existing pits or new pit sites) as a primary or critical habitat (4.4).

7.7E - 4.11 (F) Dredging - New

Policy: (i) New dredging is conditionally acceptable in all General Water Areas for boat moorings, navigation channels or anchorages (docks) provided that:

(1) There is a demonstrated need that cannot be satisfied by existing facilities,

(2) The facilities served by the new dredging satisfy the location requirements for Special Water's Edge Areas,

(3) The adjacent water areas are currently used for recreational boating, cc.mercial fishing or marine commerce,

(4) The dredged are causes no significant disturbance to Special Water or Water's Edge Areas,

(5) The adverse environmental impacts are minimized to the maximum extent feasible,

(6) Dredging will be accomplished consistent with all conditions described under Dredging - Maintenance (7:7E-4.11(e)2 (i) through (vi), as appropriate to the dredging method.

(7) Dredging will have no adverse impacts on groundwater resources,

(8) An acceptable dredged material disposal site exists,

(9) The dredged area is reduced to the minimum practical,

(10) The maximum depth of the newly dredged are will not exceed that of the connecting access or navigation channel necessary for vessel passage to bay or ocean.

(ii) To mitigate adverse impacts upon Shellfish Beds (7:7E-3.2), Endangered or Threatened Wildlife or Vegetation Species Habitat (7:7E-3.36), Finfish Migratory Pathways (7:7E-3.5), Marine Fish and Fisheries (7:7E-8.2), spawning or wintering areas for finfish, or female blue crab wintering areas, and to prevent reduction of ambient dissolved oxygen below critical levels, or the increase of turbidity or the resuspension of toxic substances above critical levels, seasonal and/or dimensional limitations may be imposed on new dredging.

(iii) New dredging or excavation to create new lagoons for residential development is prohibited in wetlands and discouraged elsewhere.

(iv) New dredging is conditionally acceptable to control siltation in Lakes, Ponds and Reservoirs, provided that an acceptable sedimentation control plan is developed to address re-sedimentation of these water bodies.

Determination: Extensive new dredging would have only been necessary if existing pits 2, 14 or 15 are used; none of them are considered viable alternatives (2.3.1.3). If an access channel is needed to reach areas for new pit construction (also unlikely given the depth criteria), then the applicable condition of this policy ((i) and (ii)) will be adhered too, as well as those general dredging conditions outlined in 7.7E-4.11(e) (1.3e-g; 2.3.4;

4.2.1)

7.7E-4.11(g) Dredged Material Disposal

Policy: (i) Dredged material disposal is prohibited in Tidal Guts, Man-made Harbors, and Medium Rivers, Creeks and Streams.

(ii) Dredged material disposal is discouraged in Open Bays and Semi-Enclosed and Back Bays where the water depth is less than 6 feet.

(iii) Disposal of dredged materials in the ocean and bays deeper than six feet is conditionally acceptable provided that it is in conformance with USEPA guidelines (40 CFR 230, 45 FR 85344, December 24, 1980) established under Section 404(b) of the Clean Water Act. EPA guidelines require that consideration be given to the need for the proposed activity, the availability of alternate sites and methods of disposal that are less damaging to the environment, and applicable water quality standards. They also require that the choice of site minimize harm to municipal water supply intakes, shellfish, fisheries, wildlife, recreation, threatened and endangered species, benthic life, wetland and submerged vegetation, and hat it be confined to the smallest practicable area.

(iv) Overboard disposal (also known as aquatic, open water, side casting, subaqueous, or wet) of uncontaminated sediments into unconfined disposal sites is conditionally acceptable in existing anoxic dredge holes, provided that data on water quality, benthic productivity and seasonal finfish use evidence limited biological value and a submerged elbow or underwater diffuser is used. The hole will not be filled higher than depth of the surrounding waters.

(v) Overboard disposal of sediments less than 75% sand shall be acceptable in unconfined disposal sites when shallow waters preclude removal to an upland or confined site provided that: Shellfish Beds (as defined in N.J.A.C. 7:7E-3.2) are not within 1,000 meters, disposal will not smother or cause condemnation of harvestable shellfish resources (as in 7:7E-3.2.), and sediment characteristics of the spoil and disposal site are similar. If unconfined aquatic disposal can not meet these conditions, then DEP shall impose a seasonal restriction appropriate to the resource of concern.

(vi) Uncontaminated dredge sediments with 75% sand or greater are generally encouraged for beach nourishment on ocean or open bay shores.

(vii) The use of uncontaminated dredged material to create new wetlands or islands in any General Water Area is conditionally acceptable depending upon an evaluation of the biological value of the wetlands gained compared with the biological value of the water area lost.

(viii) Dredged material disposal in Lakes, Ponds and Reservoirs is prohibited.

(ix) Conditions for Dredged Spoil on Land are indicated in Section 7:7E-7.12.

Determination: Only (iii) is applicable to the proposed action, and it is in compliance with USEPA guidelines as far as can be determined in a generic sense (1.3; 2.1; 2.2; 4.0; Appendix B). Once a specific disposal site is finalized and a definite dredging project proposed for disposal, a 404(b) evaluation will be prepared and submitted for approval prior to disposal. Action to minimize impact are outlined in FSEIS Section 2.3.4, as well as being built into the screening criteria (2.3).

7.7E-4.11 (K) Sand and Gravel Extraction

Policy: Sand and gravel extraction is prohibited in Lakes, Ponds and Reservoirs, Man-made Harbors and Tidal Guts unless the water body was created by the extraction process, in which case the use is conditionally acceptable.

This activity is discouraged in all other General Water Areas except the deep Ocean and Rivers, Creeks, and Streams. In these General Water Area types, priority will be given to sand extraction for beach nourishment, and extraction is conditionally acceptable provided that:

(i) Special Areas are not directly or indirectly degraded

(ii) Turbidity and resuspension of toxic materials is controlled throughout the extraction operation consistent with the Department's Surface Water Quality standards (N.J.A.C.7:9-4),

(iii) There is an acceptable disposal site for the waste from washing operations.

(iv) In rivers, creeks and streams, the depth of water at the mining site is atleast six feet MLW, (v) The mining will not increase shoreline erosion, and

(vi) The mining will not create anoxic water conditions.

Determination: Construction of new borrow pits will likely occur as a result of sand mining (2.3.2.1 a) in the deep (over six feet) ocean (South of the NJ/NY marine boundary in Raritan Bay - See definition under 7.7E-4.3). The new site criteria were developed to discourage shoreline erosion and negative water quality impacts (2.3.2.1d,e). Special areas will not be degraded (See above policy determinations under sub-sections 7.7E-3.4, 3.5, 3.7, 2.13, 3.34,and 3.36), and turbidity or resuspension of toxic materials will be minimal (4.1). Parts (iii) and (iv) are not applicable.

7.7E-6.3 Secondary Impacts

Policy: Coastal development that induces further development shall demonstrate, to the maximum extent practicable, that the secondary impacts of the development will satisfy the Coastal Resource and Development Policies. The level of detail and areas of emphasis of the secondary impact analysis are expected to vary depending upon the type of development. Minor projects may not even require such an analysis. Transportation and wastewater treatment systems are the principal types of development that require a secondary impact analysis, but major industrial, energy, commercial, residential, and other projects may also require a rigorous secondary impact analysis.

Secondary impact analysis must include an analysis of the likely geographic extent of induced development, its relationship to the State Development Guide Plan Concept Map, and assessment of likely induced point and non-point air and water quality impacts, and evaluation of the induced development in terms of all applicable Coastal Resource and Development Policies. Models for secondary impact analysis may be found in New Jersey Department of Community Affairs, Division of State and Regional Planning, Secondary Impacts of Regional Sewerage Systems (1975) and in USEPA, Manual for Evaluating Secondary Impacts of Wastewater Treatment Facilities (EPA-600/5-78-003, 1978).

Determination: Secondary impacts could involve filling more than one pit, or digging more than one. Increased dredging of port facilities may also result, but only a very small portion of all such dredged material is currently not dredged because of high contaminant levels. Removing these contaminated sediments from unprotected areas and disposing of them (along with other sediments not so contaminated as to be totally prohibited from the mud dump site) would be very consistent with long-term water quality and habitat improvement goals, by reducing the amount of pollutants available to the NY Bight (4.9.4).

7.7E-8.2 Marine Fish and Fisheries

Policy: Coastal actions are conditionally acceptable to the extent that minimal feasible interference is caused to the natural functioning of marine fish and fisheries, including the reproductive and migratory patterns of estuarine and marine estuarine dependent species of finfish and shellfish.

Determination: Based on the likely role of a borrow pit, and the very localized impacts of dredging and disposal the impact to the marine fishery would be minimal (4.3.2). Measures to mitigate and minimize any impacts would ensure they remain acceptable (2.3.4).

7.7E-8.3 Shellfisheries

Policy: (i) Any development which would result in the destruction of a potentially productive shellfish area is discouraged. (The term destruction is defined in 7:7E-3.2.)

(ii) Any development which would result in the contamination or condemnation of a potentially productive shellfish area is prohibited. Water dependent development which requires new dredging in these areas is discouraged. Maintenance dredging in these areas is conditionally acceptable.

(iii) Any project which would discharge untreated or improperly treated domestic or industrial waste waters or toxic or hazardous substances directly into waters so as to adversely affect a potentially productive shellfishing area is prohibited.

Determination: Existing pits doe not contain shellfish communities of any appreciable size, and are unlikely to in the future, as benthic populations are more sparse and erratic than the shoals (3.4.1). Construction of a new pit has been designed to give low priority to current areas of shellfish use (2.3.3.2.1). If such a pit did disrupt a potentially productive shellfish habitat, it would be recolonized naturally when pit was filled and capped. Shellfish culture is not presently possible in the study area as it is closed to harvesting because of poor water quality.

7.7E-8.4 Water Quality

Policy: Coastal development which would violate the federal Clean Water Act, or State laws, rules and regulations adopted pursuant thereto, is prohibited. In accordance with such rules as may be adopted by the Department concerning the Water Quality Management Planning and Implementation process, coastal development that is inconsistent with an approved Water Quality Management (208) Plan under the New Jersey Water Quality Planning Act, N.J.S.A. 5811A et seq., is prohibited.

Determination: Water quality standards will not be violated by the proposed action, but may be improved long-term by more secure containment of pollutants within sealed pits (See FSEIS Section 4.2.1.; Appendix B).

7 7E - 8.6 Groundwater

Policy: Coastal development shall demonstrate, to the maximum extent practicable, that the anticipated groundwater withdrawal demand of the development, alone and in conjunction with other groundwater diversions proposed or existing in the region, will not cause salinity intrusions into the groundwaters of the zone, will not degrade groundwater quality, will not significantly lower the water table or piezometric surface, or significantly decrease the base flow of adjacent water courses. Groundwater withdrawals shall not exceed the aquifer's safe yield. Coastal developments which use design, processes and fixtures which minimize consumptive water use are encouraged. Development plans are also encouraged to incorporate aquifer recharge techniques.

Coastal development shall conform with all applicable DEP and, in the Delaware River Basin, Delaware River Basin Commission, requirements for groundwater withdrawal and water diversion rights.

Determination: No groundwater withdrawal will occur, and contaminant movement will be minimal due both to a pit's chemically reducing environment, and sediment-pollutant bonding. Any loss is most likely to occur with interstitial water, and move out of the site into the bay, not into an existing aquifer (4.2.1a-f).

7.7E - 8.9 Important Wildlife Habitat

Policy: (i) Coastal development which does not incorporate management techniques which minimize disturbance to important wildlife habitats, on and offsite, is discouraged.

(ii) Development that would significantly restrict the movement of wildlife through the site to adjacent habitats and open space areas is discouraged.

Determination: Site screening criteria are designed to minimize biological impacts (2.3.1.5 and 2.3.2.2) and to avoid problems during and after use (2.3.4). Because of the very localized nature of dredging or disposal impacts no restriction in the movement of wildlife will occur (4.3.5).

7.7E - 8.10 Air Quality

Policy: Coastal development shall conform to all applicable State and federal regulations, standards and guidelines and be consistent with the strategies of New Jersey's State Implementation Plan (SIP). See N.J.A.C. 7:27-2 through 19 and New Jersey SIP for ozone, particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, and visibility.

Determination: No increase in emissions over without project conditions is anticipated. Some decrease in tug emissions could result from reduced transport time (4.6).

7.7E - 8.12 Scenic Resources and Design

Policy: New coastal development is encouraged to be visually compatible with its surroundings in terms of building and site design, and to enhance scenic resources. New coastal development that is not visually compatible with existing scenic resources in terms of large scale elements of building and site design is discouraged.

Determination: All pits will be underwater, and have no impact on existing scenic Bay resources (4.7c).

7.7E - 8.13 Buffers and compatibility of uses

Policy: Development shall be compatible with adjacent land and water uses to the maximum extent practicable.

Development that is likely to adversely affect adjacent areas, particularly Special Areas (7:7E-3.1 through 7:7E-3.45) or residential or recreational uses, is prohibited unless the impact is mitigated by an adequate buffer. The purpose, width and type of the required buffer shall vary depending upon the type and degree of impact and the type of adjacent area to be affected by the development, and shall be determined on a case-by-case basis.

Determination: Constructing borrow pits in the designated areas is compatible with historic and current uses; in an area where channel dredging and sand mining are common. Filling an existing pit could disrupt fishing in the immediate are and, by dispersing fish to surrounding waters, have a negative impact on recreational fishing success at the site. No impact will be felt in any other pit (which are all nearby) and the dispersed fish may improve fishing in the shoals or other pits (depending on where they take up residence). Long-term improvement of water (from better sequestering of pollutants) will also improve future fishing stocks and allowable harvests, thereby benefiting the area's recreational fishermen in the long run (4.3.2). No impacts to bathing beaches are anticipated (4.7c,d)

7.7E - 8.15 Energy Conservation

Policy: 1. Coastal development shall incorporate energy conservation techniques and alternative sources of energy, including passive and active solar power and wind turbines, to the maximum extent practicable.

2. For all high rise construction (as defined at 7:7E-7.14) and for commercial and industrial construction costing $1 million or more, the technical and economic feasibility of employing such measures shall be evaluated in an energy audit prepared by the applicant. An accompanying plan shall specify the energy conservation techniques and alternative sources of energy to be utilized as well as anticipated energy requirements for space heating, cooling, ventilation and lighting, industrial processes and other uses.

3. New buildings shall be situated and designed so that they do not block solar access to existing solar collectors more than 20 percent of the time from 9 a.m. to 3 p.m. between December 21 and February 2.

4. This policy will not be applied in municipalities which have energy conservation ordinances consistent with New Jersey Department of Energy standards.

Determination: Energy consumption will be reduced by decreasing barge transport time from the mud dump site, where most sediments requiring capping are now disposed.

7.7E - 8.20

Policy: Noise levels must conform with the standards established in N.J.A.C. 7:29-1.1 et seq. and administered by the Office of Noise Control in the Division of Environmental Quality.

Determination: All work will occur sufficiently offshore of recreational or residential areas as to have no impact on them. Dredging will be by hydraulic, hopper, or clam shell operations, all of which are common to the area.

7.7E - 3.37 Critical Wildlife Habitats

Policy: Development that would directly or through secondary impacts on the relevant site adversely affect Critical Wildlife Habitats is discouraged, unless:

(i) minimal feasible interference with the habitat can be demonstrated.

(ii) there is no prudent or feasible alternative location for the development.

(iii) the proposal includes appropriate mitigation measures.

DEP will review proposals on a case by case basis.

Determination: Though used by more fish than surrounding shallows and channels, existing borrow pits have been determined not to be critical habitats to any of the fish or benthic species found there, a finding that is concurred with by NMFS and NJDEP (3.4.1; 3.4.2; 4.3.2a-f).

7.7E - 4.3 Ocean

Policy: See Table 1

Determination: See acceptable conditions for applicable uses under 7.7E -4.11.

7.7E - 4.4 Open Bay

Policy: See Table 1

Determination: See acceptable conditions for applicable uses under 7.7E -4.11.

George Stafford
New York Coastal Management Program
New York Department of State
162 Washington Avenue
Albany, NY 13211

Dear Mr. Stafford:

Based on your department's participation in the Interagency Steering Committee of the Dredged Material Disposal Management Plan, You are aware that the New York District is actively studying the use of sub-aqueous borrow pits for the disposal of dredged material not suitable for unrestricted ocean disposal. the attached (enclosure 1) Final Supplement Environmental Impact Statement (FSEIS) details our findings and recommendations for the use of this disposal alternative. After careful review of your most recent coastal Management Program polices (August, 1982) it is our belief that fifteen could be applicable to the proposed action. In addition, two of the policies of the New York City Management plan may be applicable. We have evaluated our project in light of each of these seventeen policies, and find the proposed action to be consistent with each policy. A listing of these applicable policies and our finding of consistency (including references to the FSEIS sections that detail the pertinent findings) is attached for your review (enclosure 2)

I request that your office review these findings and formally transmit to us your consistency determination. If you should question any finding or feel some applicable policy has not been included please advise us in writing, as soon as possible, with as much detail as you can provide. In order to expedite the formal review process your office forwarded a list of recipients of the consistency determination. If still acceptable to you, my office would be willing to print and mail the FSEIS, with our appended consistency determination, to those parties that you designated as necessary for the review process, providing you provide us with an applicable mailing list.

Should you have any question on this action call the project manager, Ms. Patricia Pechko (212) 264-5620. If you have any specific questions regarding the FSEIS or draft consistency findings call the EIS coordinator, Mr. Len Houston, at (212) 264-4662.

Sincerely,

John Hartman
Chief, Operations Division New

New York Coastal Management Program
Consistency Determination

1. Project: Use of Sub-Aqueous Borrow Pits for the Disposal of Dredged Material form the Port of New York - New Jersey.

2. Applicant: Army Corps of Engineers, New York District

3. Applicable Policies: Based on a review of the latest (August, 1982) Coastal Management program policies for New York (including New York City) seventeen (17) were found to be potentially applicable to the proposed project. These policies are listed in section 5 below.

4. Consistency Determination: Each of the above seventeen applicable policies were evaluated with respect to the project's consistency with their stated goals. The project, as described in the attached draft supplemental. Environmental Impact Statement (FSEIS) has been found to be consistent with each policy. The specific findings, and references to the FSEIS sections that discuss each appropriate point, are contained in section 5 below.

5. List of Applicable Policies and Corresponding Determination of Consistency:

a. Applicable New York State Coastal Management Policies

Policy 3: Further develop the State's major ports of Albany, Buffalo, New York, Ogdensburg and Oswego as centers of commerce and industry, and encourage the siting, in these ports areas, including those under the jurisdiction of State public authorities, of land use and development which is essential to, or in support of, the waterborne transportation of cargo and people.

Determination: The need for maintenance dredging in the Port of New York is well documented. This action would allow for the continued viability of the port of New York by ensuring maintenance of those channels containing sediments not deemed suitable for unrestricted ocean disposal (see FSEIS sections 1.3; 1.4; 2.2.3).

Policy 7: Significant coastal fish and wildlife habitats will be protected, preserved, and, where practical, restored so as to maintain their viability as habitats.

Determination: By securing sediment with sufficient levels of tested pollutants to warrant concern, the level of these substances entering the ecosystem (from the dredge site or mud dump) would be reduced, thereby decreasing that part of the degredation of the Bright attributable to this source (4.2.1e,f). In addition, by carefully selecting the disposal site, habitat loss is minimized or even avoided (2.3.1.5; 2.3.2.2). Finally, none of the proposed sites can be shown to be essential to a specie's survival, or support rare or endangered species (4.3.21; 4.4). All such habitats are common in the Lower Bay

Complex and their lose (even if not fully replaced in the long-term) would not adversely effect the fishery (4.3.2) or wildlife (4.3.5).

Policy 8: Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bioaccumulate in the food chain or which cause significant sublethal or lethal effect on those resources.

Determination: The sediments that this action is concerned with are just those that have a potential for harmful bioaccumulation (2.1i-1). By removing these unwanted substances from their present areas of accumulation, and by placing them into a containment facility more secure than the presently used mud dump site, the presence of this portion of such materials would be reduced, and their role in degredation of the Bight fisheries diminished (2.2.3; 4.2.1a-f; 4.3.2h-j).

Policy 12: Activities or development in the coastal area will be undertaken so as to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands and bluffs.

Determination: No such features will be impacted by the proposed action. Any new pit constructed in a shoal area will be located to minimize or reduce shore erosion (2.3.1.4a; 2.3.2.1d,e; 4.2.2b,d,e).

Policy 15: Mining, excavation or dredging in coastal waters shall not significantly interfere with the natural coastal processes which supply beach materials to land adjacent to such waters and shall be undertaken in a manner which will not cause an increase in erosion of such land.

Determination: FSEIS Section 4.2.2 discusses hydrology impacts and section 4.2.3 discusses sediment impacts. The site Screening criteria were developed to discourage the use of sites that could actively increase shore erosion (2.3.1.4 and 2.3.2.1). New pits in Romer Shoal or Flynn's Knoll are avoided because of a potential negative impact on Staten Island. In any event, since the pits would be filled, the impact is only temporary (albeit for 10 years or more). No such impacts are anticipated from filling an existing pit.

Policy 16: Municipal, industrial, and commercial discharge of pollutants, including but not limited to, toxic and hazardous substances, into coastal waters will conform to State and National water quality standards.

Determination: Each dredging and disposal operation will require a separate water quality certification from New York State Department of Environmental Conservation, and a 404(b) approval by the U.S. Environmental Protection Agency. Any and all such conditions as those certifications may require will be followed. Each disposal event will be very localized and result in at least 95% (and most often closer to 100%) of the material being contained within the pit (4.1a,b), which itself will serve as a more secure containment facility for contaminants than the mud dump (4.2.1e).

Policy 18: To safeguard the vital economic, social and environmental interests of the State and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards which the State has established to protect valuable coastal resource areas.

Determination: The proposed action would provide a means of ensuring the viability of the Port of New York while providing an environmentally sound means of disposing of dredged material from the port. The site Screening criteria were designed to minimize biological (2.3.1.5 and 2.3.2.2) and physical (2.3.1.4 and 2.3.2.1) impacts to these resources, and a monitoring program has been proposed (2.3.4.2) to ensure that it is carried out accordingly. The impacts of the action on these resources is fully evaluated in FSEIS Section 4.0, and was found to be acceptable and consistent with this policy (See FSEIS Section 2.2 for detailed comparisons of alternatives).

Policy 21: Water dependent and water enhanced recreation will be encouraged and facilitated, and will be given priority over non-water related uses along he coast.

Determination: The proposed action is designed to maintain water-dependent Port activities. The concern over fishery impacts is in a large part due to recreational fishing, and this resource will not be significantly impacted by the proposed action (4.7a,b).

Policy 23: Protect, enhance and restore structures, districts, areas or sites that are of significance in the history, architecture, archeology or culture of the State, its communities, or the Nation.

Determination: The initial cultural assessment determined that no significant cultural resources still existed in the existing pits (3.5.1; 4.5a), a finding that both NY and NJ SHPO concurred with. Potential areas for new pit construction have been surveyed for potential cultural resources, and specific sites identified that would avoid any potentially significant targets (3.5.2; 4.5.1.2d). If these sites could not be used, the remaining targets within the surveyed area would have to be examined in detail to determine their cultural significance, and prepare appropriate mitigation plans if their would be negatively impacted (4.5.1.2e)

Policy 25: Protect, restore or enhance natural and man-made resources which are not identified as being of statewide significance, but which contribute to the overall scenic quality of the coastal area.

Determination: The proposed action includes only underwater disposal, and will have no impact on the scenic quality of the Lower Bay Complex.

Policy 35: Dredging and dredge spoil disposal in coastal waters will be undertaken in a manner that meets existing State dredging permit requirements, and protects significant fish and wildlife habitats, scenic resources, natural protective features, important agricultural lands, and wetlands.

Determination: The dredged material disposal will be undertaken in a manner consistent with current allowable practices at the mud dump site, and with appropriate safeguards to ensure minimal loss outside the containment pit (2.3.3.3). No significant fish and wildlife habitats will be impacted (3.4), and sites will be chosen to minimize impacts on existing use (2.3.1.5 and 2.3.2.2.) and improve the long-term Bight environment of these habitats (2.2.3; 2.3.5). No scenic resources, wetlands, or agricultural lands are present, nor will the action impact any nearby. Protective features whose loss may increase shoreline erosion will be avoided to the extent practicable, and returned to the existing bathymetry upon project completion (2.3.2.1; 4.2.2).

Policy 37: Best management practices will be utilized to minimize the non-point discharge of excess nutrients, organics and eroded soils into coastal waters.

Determination: All studies to date have shown no significant elevation of nutrients, organics, and suspended sediment occurs during or after open water disposal of dredged material (FSEIS Section 4.2.1). As a capped borrow pit would offer greater protection from off-site loss of these materials (as well as pollutants) the long term impact would be beneficial, compared to current ocean disposal practices (FSEIS Section 4.2.1e,f).

Policy 38: The quality and quantity of surface water and groundwater supplies, will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.

Determination: The proposed actions will have no impact on surface or groundwaters supplies. Any loss of pollutants would be minor (because of the site's state of chemical reduction, and sediment-pollutant bonding) and occur into the Bay (with the interstitial water), not into aquifers (See FSEIS Sections 4.2.1; 4.8).

Policy 41: Land use or development in the coastal area will not cause National or State air quality standards to be violated.

Determination: Long-term use of the proposed disposal site will likely result in reduced emissions as a result of shorter transport time than now needed to reach the mud dump site (4.6).

Policy 44: Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas.

Determination: No wetlands will be impacted by the proposed action (4.4).

b. New York City Management Plan

Policy B: IMPROVE CHANNELS AS NECESSARY TO MAINTAIN AND STIMULATE ECONOMIC DEVELOPMENT.

Determination: Implementation of the proposed action will allow maintenance and improvement of channels whose sediments fail current ocean disposal testing criteria (1.3; 2.2.3).

Policy G: MAINTAIN AND PROTECT NEW YORK CITY BEACHES TO THE FULLEST EXTENT POSSIBLE.

Determination: By placing the most polluted sediments into the securest containment site, the proposed action reduces the chance of site failure and subsequent disposition of such sediments into area beaches (FSEIS Section 4.2.1e,f).

Appendix F

Pertinent Correspondence

Cooperating Agencies...........FC-2
EIS Scoping & SC/PICG Review...FC-16
DSEIS Distribution & Hearings..FC-91
Jamaica Bay & Monitoring.......FC-116
SHPO Coordination..............FC-132

Cooperating Agencies

WILL/jh/4662

December 23, 1985

Environmental Analysis Branch

Mr. James F. Douglas, Jr.
Regional Director
National Marine Fisheries Service
14 Elm Street
Federal Building
Glouchester, Massachusetts 01930

Dear Mr. Douglas:

The New York District is preparing an Environmental Impact Statement for the disposal of dredged material in subaqueous borrow pits in the Lower Bay of New York and adjacent areas. Messers. Stan Gorski and Michael Ludwig of your agency are familiar with this project through their involvement with the New York District's Dredged Material Management Plan Steering Committee.

We request that your agency become a cooperating agency in the preparation of this EIS, and that you respond to this letter by January 10, 1985.

Thank you for your cooperation.

Sincerely,

Samuel P. Tosi, P.E.
Chief, Planning Division

cc: Mr. Stan Gorski
National Marine Fisheries Service
Sandy Hook Biological Laboratory
Highlands, New Jersey 07732

Mr. Michael Ludwig
National Marine Fisheries Service
Marine Biological Laboratory
Milford, Conneticutt 06460

cf: Hook
Tosi/Maraldo

HOOK
MARALDO
TOSI

WILL/jh/4662

December 23, 1985

Environmental Analysis Branch

Mr. James Morton
State of New York
Department of State
Coastal Zone Management Program
162 Washington Street
Albany, New York 12231

Dear Mr. Morton:

The New York District is preparing an Environmental Impact Statement for the disposal of dredged material in subaqueous borrow pits in the Lower Bay of New York and adjacent areas.

We request that your agency become a cooperating agency in the preparation of this EIS, and that you respond to this letter by January 10, 1985.

Thank you for your cooperation.

Sincerely,

Samuel P. Tosi, P.E.
Chief, Planning Division

cf: Hook
Tosi/Maraldo

HOOK

TAVOLARO

ZAMMIT

MARALDO

TOSI

WILL/jh/4662

December 23, 1985

Environmental Analysis Branch

Ms. Barbara Rinaldi
Regional Permit Administrator
Region II
State of New York
Department of Environmental Conservation
Room 6126
2 World Trade Center
New York, New York 10047

Dear Ms. Rinaldi:

The New York District is preparing an Environmental Impact Statement for the disposal of dredged material in subaqueous borrow pits in the Lower Bay of New York and adjacent areas.

We request that your agency become a cooperating agency in the preparation of this EIS, and that you respond to this letter by January [illegible].

Thank you for your cooperation.

Sincerely,

Samuel P. Tosi, P.E.
Chief, Planning Division

cf: Hook
Tosi/Maraldo

HOC

TAVOLAF

ZAMMI

MARALI

TO:

WILL/jh/4662

December 23, 1985

Environmental Analysis Branch

Mr. Larry Schmidt, Director
Planning Group
State of New Jersey
Department of Environmental Protection
CN 402
Trenton, New Jersey 08625

Dear Mr. Schmidt:

The New York District is preparing an Environmental Impact Statement for the disposal of dredged material in subaqueous borrow pits in the Lower Bay of New York and adjacent areas.

We request that your agency become a cooperating agency in the preparation of this EIS, and that you respond to this letter by January 10, 1985.

Thank you for your cooperation.

Sincerely,

Samuel P. Tosi, P.E.
Chief, Planning Division

cf: Hook
Tosi/Maraldo

HOOK
TAVOLARO
ZAMMIT
MARALDO
TOSI

WILL/jh/4662

December 23, 1985

Environmental Analysis Branch

Mr. Howard Larson
Regional Director
U.S. Fish and Wildlife Service
1 Gateway Center
Suite 700
Newton Corners, Massachusetts 02158

Dear Mr. Larson:

The New York District is preparing an Environmental Impact Statement for the disposal of dredged material in subaqueous borrow pits in the Lower Bay of New York and adjacent areas. Mr. Thomas Sperry and Mr. Robin Burr of your agency are familiar with this project through their involvement with the New York District's Dredged Material Management Plan Steering Committee.

We request that your agency become a cooperating agency in the preparation of this EIS, and that you respond to this letter by January 10, 1985.

Thank you for your cooperation.

Sincerely,

Samuel P. Tosi, P.E.
Chief, Planning Division

cc: Mr. Thomas Sperry
U.S. Fish and Wildlife Service
Brookhaven National Lab
Bldg. 134
Upton, New York 11973

Mr. Robin Burr
U.S. Fish and Wildlife Service
P.O. Box 534
705 White Horse Pike
Absecon, New Jersey 08201

cf: Hook
Tosi/Maraldo

HOOK
TAVOLARO
ZAMMIT
MARALDO
TOSI

New York State Department of Environmental Conservation
2 World Trade Center, Rm. 6126, New York, N.Y. 10047
(212) 488-2758/9

Henry G. Williams
Commissioner

January 7, 1986

Mr. Samuel P. Tosi, P.E.
Chief, Planning Division
Department of the Army
Corps of Engineer, NY District
26 Federal Plaza
New York, New York 10278

Dear Mr. Tosi:

This is in response to your recent request that the Department of Environmental Conservation become a cooperating agency under NEPA for the proposed siting of a subaqueous dredged material disposal area in the Lower Bay of New York Harbor. Although we will continue to participate in the scoping process for the environmental impact statement and to work closely with your staff as the document is prepared, we are unable to become a formal cooperating agency for this project.

If you wish to discuss this matter further, please feel free to call me.

Very truly yours,

Barbara B. Rinaldi

Barbara B. Rinaldi
Regional Permit Administrator

BBR: am

cc: Carol Ash
Gordon Colvin
Roberta Weisbrod
Jim Morton

National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Branch
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

JAN 24 1985

Mr. Samuel P. Tosi
Chief, Planning Division
New York District
Army Corps of Engineers
26 Federal Plaza
New York, New York 10278

Dear Mr. Tosi:

We received your letter of December 23, 1985 requesting assistance in the preparation of an Environmental Impact Statement (EIS) for the disposal of dredged material in subaqueous borrow pits in the lower bay of New York Harbor. As active participants in the Dredged Material Management Plan Steering Committee, we accept the responsibility of aiding in the development of such a document and will, within the limits of our manpower and funding, provide whatever assistance is required of a cooperating agency to insure that the topic is adequately addressed. *

Sincerely,

Stanley W. Gorski

Stanley W. Gorski
Assistant Branch Chief

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

FEB 05 1986

Mr. Samuel P. Tosi, Chief
Planning Division
Department of Army
Corps of Engineers, New York District
26 Federal Plaza
New York, N.Y. 10278 - 0090

Dear Mr. Tosi:

The Environmental Protection Agency (EPA) has reviewed the notice of intent to prepare an environmental impact statement (EIS) for the Disposal of Dredged Material in Subaqueous Borrow Pits in Lower New York Bay and Adjacent Areas, and your request of December 23, 1985, for EPA participation as a cooperating agency in the development of this EIS. The project involves the development of a program to dispose of dredged material that has not satisfied EPA's testing criteria for unrestricted ocean disposal in existing and/or new subaqueous borrow pits. Based on information provided in the notice, we offer the following comments.

The use of subaqueous borrow pits as dredged material disposal sites was originally addressed in the 1983 programmatic EIS prepared by the Corps of Engineers (COE) on the Disposal of Dredged Material from the Port of New York and New Jersey. In that EIS, the COE concluded that the use of subaqueous borrow pits offered an attractive disposal alternative, but that additional study of this option was needed. EPA strongly supports the COE's proposal to implement an operational program using subaqueous borrow pits. However, we believe that the focus of this EIS should be on the technical/environmental aspects of utilizing borrow pits, and should not serve to reopen the broader policy issues (which we believe were adequately addressed in the 1983 EIS) regarding selection of the borrow pit alternative for dredged material disposal. Accordingly, we strongly recommend that this EIS be issued as a supplement to the original 1983 EIS action, and/or as a tiered EIS (as defined under the November 29, 1978, Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act).

With respect to your request for EPA participation as a cooperating agency, we are interested in participating through the review of technical data (such as bioassay and sediment testing, etc.), and of preliminary sections of the draft EIS. Because of EPA's regulatory interest in this project, and our participation on the Dredged Material Management Steering Committee, we would like to formalize our role as a cooperating agency through a Memorandum of Understanding (MOU) between our agencies.

STATE OF NEW YORK
DEPARTMENT OF STATE
ALBANY, N.Y. 12231

GAIL S. SHAFFER
SECRETARY OF STATE

March 26, 1986

Mr. Samuel P. Tosi, P.E.
Chief, Planning Division
U.S. Army Corps of Engineers
New York District
26 Federal Plaza, 19th Floor
New York, New York 10278-0090

Dear Mr. Tosi:

In response to your letter of January 2, 1986, the Department of State will be pleased to serve as a cooperating agency in the preparation of the EIS on disposal of dredged material in subaqueous borrow pits.

Mr. Larry Enoch of our Coastal Management Program staff will work on the project. Please feel free to contact him at (518) 474-3642.

Sincerely,

George R. Stafford
Coastal Programs Administrator

GRS:LR:hm

Houston/lh/4662

April 29, 1986

Environmental Analysis Branch

Larry Schmidt, Director
Planning Group
New Jersey Department of Environmental Protection
CN 402
Trenton, New Jersey 08625

Dear Mr. Schmidt:

Reference your letter of January 7, 1986 in which you agreed to have your agency serve as a cooperating agency in the preparation of a Supplemental Environmental Impact Statement (SEIS) on the use of sub-aqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey. Your assistance will be most helpful in reviewing the preliminary draft of the SEIS, and providing technical and policy comments related to your agency's expertise and responsibility. A draft should be available for your review this summer, at which time we would expect a timely response from your agency. To facilitate your planning, we will contact your office in advance of transmitting the review document. I thank you for your interest in this project, and your willingness to assist the New York District in the preparation of the SEIS. Should you have any questions regarding your anticipated role, or progress on the draft SEIS please contact the SEIS coordinator Mr. Ken Houston, at 212-264-4662.

Sincerely,

Samuel P. Tosi
Chief, Planning Division

Hook/NANPL-E

Tavelaro/NANCP-

Maraldo/NANPL

Tosi/NANPL

Houston/lh/4662

April 29, 1986

Environmental Analysis Branch

Stanley Gorski, Assistant Branch Chief
Habitat Conservation Branch
National Marine Fisheries Service
Sandy Hook Marine Laboratory
Highlands, New Jersey 07732

Dear Mr. Gorski:

Reference your letter of January 24, 1986 in which you agreed to have your agency serve as a cooperating agency in the preparation of a Supplemental Environmental Impact Statement (SEIS) on the use of sub-aqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey. Your assistance will be most helpful in reviewing the preliminary draft of the SEIS, and providing technical and policy comments related to your agency's expertise and responsibility. A draft should be available for your review this summer, at which time we would expect a timely response from your agency. To facilitate your planning, we will contact your office in advance of transmitting the review document. I thank you for your interest in this project, and your willingness to assist the New York District in its preparation of the SEIS. Should you have any questions regarding your anticipated role, or progress on the draft SEIS please contact the SEIS coordinator Mr. Len Houston, at 212-264-4662.

Sincerely,

Samuel P. Tosi
Chief, Planning Division

Hook/NANPL-E

Tavolaro/NANOP-RQ

Maraldo/NANPL-B

Tosi/NANPL

Houston/lh/4662

April 29, 1986

Environmental Analysis Branch

Barbara Pastalove
Environmental Impacts Branch
U. S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Dear Ms. Pastalove:

Reference your letter of February 5, 1986 in which you agreed to have your agency serve as a cooperating agency in the preparation of a Supplemental Environmental Impact Statement (SEIS) on the use of sub-aqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey. Your assistance will be most helpful in reviewing the preliminary draft of the SEIS, and providing technical and policy comments related to your agency's expertise and responsibility. A draft should be available for your review this summer, at which time we would expect a timely response from your agency. To facilitate your planning, we will contact your office in advance of transmitting the review document. I thank you for your interest in this project, and your willingness to assist the New York District in its preparation of the SEIS. Should you have any questions regarding your anticipated role, or progress on the draft SEIS please contact the SEIS coordinator Mr. Len Houston, at 212-264-4662.

Sincerely,

Samuel P. Tosi
Chief, Planning Division

Hook/NANPL-E

Tavelaro/NANOP-RQ

Maraldo/NANPL

Tosi/NANPL

Houston/lh/4662

April 29, 1986

Environmental Analysis Branch

Larry Enoch
State of New York
Department of State
Coastal Zone Management Program
162 Washington Street
Albany, New York 12231

Dear Mr. Enoch:

Reference your agency's letter of January 24, 1986 in which they agreed to serve as a cooperating agency in the preparation of a Supplemental Environmental Impact Statement (SEIS) on the use of sub-aqueous borrow pits for the disposal of dredged material from the Port of New York and New Jersey. Your assistance will be most helpful in reviewing the preliminary draft of the SEIS, and providing technical and policy comments related to your agency's expertise and responsibility. A draft should be available for your review this summer, at which time we would expect a timely response from your agency. To facilitate your planning, we will contact your office in advance of transmitting the review document. I thank you for your interest in this project, and your willingness to assist the New York District in its preparation of the SEIS. Should you have any questions regarding your anticipated role, or progress on the draft SEIS please contact the SEIS coordinator Mr. Len Houston, at 212-264-4662.

Sincerely,

Samuel P. Tosi
Chief, Planning Division

Hook/NANPL-E

Tavolaro/NANOP-RQ

Maraldo/NANPL

Tosi/NANPL

EIS/SEIS Scoping and

SC/PICG Review & Coordination

that membership is be   sed in terms of the functions to be pe   med.

Linda M. Lawson,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

December 9, 1985.

[FR Doc. 85-29450 Filed 12-11-84; 8:45 am]

BILLING CODE 3810-01-M

Department of the Air Force

USAF Scientific Advisory Board; Meeting

December 4, 1985.

The USAF Scientific Advisory Board Ad Hoc Committee on Monitoring Underground Nuclear Testing in the late 1990s will meet at Patrick Air Force Base, Florida, on January 16–17, 1985, 8:30 a.m. to 5:00 p.m. on both days.

The purpose of the meeting will be to review current technology in the nuclear testing field and Air Force Technical Applications Center mission requirements.

The meeting concerns matters listed in section 552b(c) of Title 5, United States Code, specifically subparagraph (1) thereof, and accordingly, will be closed to the public.

For further information, contact the Scientific Advisory Board Secretariat at 202-697-8845.

Patsy J. Conner,

Air Force Federal Register Liaision Officer.

[FR Doc. 85-29428 Filed 12-11-85; 8:45 am]

BILLING CODE 3910-01-M

Corps of Engineers; Department of the Army

Intent To Prepare a Draft Environmental Impact Statement (DEIS); Ice Related Flood Control Project, Delaware River at Port Jervis, New York Area

AGENCY: Philadelphia District, U.S. Army Corps of Engineers, DOD.

ACTION: Notice of Intent to prepare a Draft Environmental Impact Statement (DEIS).

SUMMARY: 1. The proposed action is an outcome of a Congressionally authorized study, "Delaware River Basin Ice Jams Study", completed in March 1985. That basinwide planning study screened potential damage areas from ice-related flooding. Various alternative methods were investigated to see if Federal participation was warranted. Alternatives considered included:

Dikes/floodwalls
Channel improvements
In-river detention structures
Ice booms
Diversion channels
Dusting
Blasting
Mechanical removal
Floodproofing

Based on technical and economic feasibility that study concluded that only the Port Jervis Area warranted further study and this study should be undertaken under Section 205 of the Corps of Engineers' Continuing Authorities Program. The recommended plan consisted of a diversion channel at Mashipacong Island, N.J. and two removable ice-booms upstream of Port Jervis, N.Y.

2. As a result of the above recommendations, detailed studies under Section 205 were undertaken. Environmental and technical analysis were conducted to refine and assess the previous recommended solution. Based on ice data collected by the Corps of Engineers' Cold Regions Engineering and Research Laboratory and subsequent analysis the ice boom portion was eliminated leaving the diversion channel as the only remaining viable solution.

3. The diversion channel consists of three alternatives involving clearing along a bottomland forested back channel of Mashipacong Island, Delaware River. Ice jams would not be prevented under this alternative, but ice and flows would be diverted around the river blockage thereby preventing damages in the communities of Port Jervis, Matamoris, and Westfall Township. Alternatives being considered in this detailed project phase of this study include:

Variations in tree clearing width
Partial tree clearing
Channel realignment
Entrance modification (excavation)

The project would not impact normal river flows.

4. Several meetings have been held with agency participation from the National Park Service, the U.S. Fish and Wildlife Service, the New Jersey Department of Environmental Protection, Pennsylvania Department of Environmental Resources, New York Department of Environmental Conservation, and the Delaware River Basin Commission. Significant areas to be addressed in the EIS include:

Flooding
Vegetation and wetlands
Fish & Wildlife
Recreation
Cultural Resources
Mitigation

5. It is anticipated that further scoping meetings will be unnecessary.

6. The DEIS is scheduled to be released for public comment in December 1985.

ADDRESS: Questions about the proposed action and DEIS can be answered by: Mr. William Mueller (Telephone No. 215-597-4833), Environmental Resources Branch, U.S. Army Corps of Engineers, Philadelphia District, Custom House, 2d & Chestnut Streets, Philadephia, Pennsylvania 19106-2991.

John O. Roach II,

Department of the Liaison Officer with the Federal Register.

[FR Doc. 85-29473 Filed 12-11-85; 8:45 am]

BILLING CODE 3710-GR-M

Intent To Prepare an Environmental Impact Statement; New York and New Jersey

SUMMARY: 1. Description of Proposed Action. Operational Program to dispose of dredged material in existing or new subaqueous borrow pits. The source of the dredged material is navigation projects in the Port of New York and New Jersey. This disposal action is primarily intended for disposal of material which has not satisfied EPA's testing criteria for unrestricted ocean disposal. Existing pits and potential areas for the excavation of new pits are located primarily in Lower New York Harbor.

2. Reasonable Alternatives.

(a) Alternative borrow pit sites:

(1) Selection of one or more suitable existing pit(s)
(2) Excavation of new pits

(b) Alternative methods of filling pit(s):

(1) Fill completely
(2) Fill incomplete so that same depression remains
(3) Capping alternative (sand vs. mud vs. no cap)

(c) Alternative methods of dredged material disposal:

(1) Ocean disposal
(2) Wetlands creation
(3) Containment islands and areas (lan extensions)
(4) Upland disposal
(5) Sanitary landfill cover

3. Scoping Process.

(a) Public Involvement. A public meeting will be held on Monday, December 16, 1985, in room 2038, 26 Federal Plaza, N.Y., N.Y. 10278-0090 at 10 a.m. The public is encouraged to attend and submit their verbal and/or written comments on the proposed EIS. Scoping comments should be received by January 15, 1986. The draft and fina EIS will be distributed for comment to

US Army Corps of Engineers
New York District

PUBLIC INFORMATION ANNOUNCEMENT

The New York District of the Corps of Engineers proposes to implement an operational program to dispose of dredged material in existing and/or new subaqueous borrow pits. Borrow pits are underwater depressions which remain when sand and gravel are mined for construction purposes. It is an option that has been studied by the New York District since 1980 and has been used successfully by other Corps districts.

The source of the dredged material would be navigation projects in the Port of New York and New Jersey; the first material to be considered is material from the Newtown Creek Federal Navigation Project.

Disposal in subaqueous borrow pits is an option that is part of the Dredged Material Disposal Management Plan for the Port of New York and New Jersey. It is intended for dredged material which has not satisfied the U.S. Environmental Protection Agency's testing criteria for unrestricted ocean disposal. For the purpose of this option, the New York District will consider all existing borrow pits and all potential areas suited for the excavation of new pits in the Lower New York Bay and adjacent areas. Based upon our preliminary surveys and extensive past research, it appears that existing borrow pits are the most favorable alternative. (See attached Preliminary Scope of Work)

As part of the regulatory requirements needed for the authorization of the project, a Federal Draft Environmental Impact Statement (DEIS) will be prepared. Enclosed is a preliminary Scope of Work for the Draft EIS, along with maps showing existing and proposed borrow pits in Lower New York Bay and adjacent areas. A public scoping meeting to determine relevant issues that will be included in the DEIS will be held on Monday, December 16, 1985 at 10 A.M. in Room 2038, 26 Federal Plaza, New York, New York; all are invited to attend. A notice announcing this meeting has been published in the Federal Register. If you prefer, you may send written comments about the Scope of Work to the address shown below; these comments must be received by January 16, 1986.

If you know of any person interested in this project who did not receive a copy of this Announcement, please pass along this information. If you have any questions concerning the project or the public scoping meeting, call the project manager, Mario Paula, at (212) 264-5622.

WATER QUALITY COMPLIANCE SECTION
US ARMY CORPS OF ENGINEERS
26 FEDERAL PLAZA, ROOM 1937
NEW YORK, NEW YORK 10278-0090

2.2. <u>Alternative Borrow Pit Sites</u>:

2.2.1. Existing Borrow Pits
2.2.1.1. CAC Pit
2.2.1.2. "Large" Pit
2.2.1.3. Large East Bank Pit
2.2.1.4. Gravesend Bay Pit
2.2.1.5. "Hoffman-Swinburne" Pits
2.2.1.6. Other East Bank Pits
2.2.1.7. Jamaica Bay Pits
2.2.1.8. Rockaway Pits
2.2.2. New Borrow Pits
2.2.2.1. Raritan Reach Pit
2.2.2.2. Sandy Hook Channel Pit
2.2.2.3. Ambrose Channel Pit
2.2.2.4. East Bank Pit Area
2.2.2.5. OGS Sand Mining Areas
2.2.2.6. Other New Pits

2.3. <u>Alternate Methods of Filling Pits</u>:
2.3.1. Filling Completely
2.3.2. Filling Partially
2.3.3. Capping Alternatives
1) grain size 2) thickness 3) intermediate caps 4) monitoring strategies

2.4. <u>Alternative Methods of Dredged Material Disposal</u>

2.4.1. Ocean Disposal
2.4.2. Wetlands Creation
2.4.3. Containment Islands and Areas (land extensions)
2.4.4. Upland Disposal
2.4.5. Sanitary Landfill Cover

2.5. <u>No Action</u>

2.6. <u>Mitigation</u>

3. <u>Affected Environment</u>:

3.1. General Environment
3.2. Physical Oceanography
3.2.1. Tides
3.2.2. Waves & Beach Erosion
3.2.3. Circulation
3.3. Meteorology
3.4. Sediments
3.5. Water Quality
3.5.1. Surface Water
3.5.2. Ground water
3.6. Fisheries
3.6.1. Recreational Fisheries
3.6.2. Commercial Fisheries

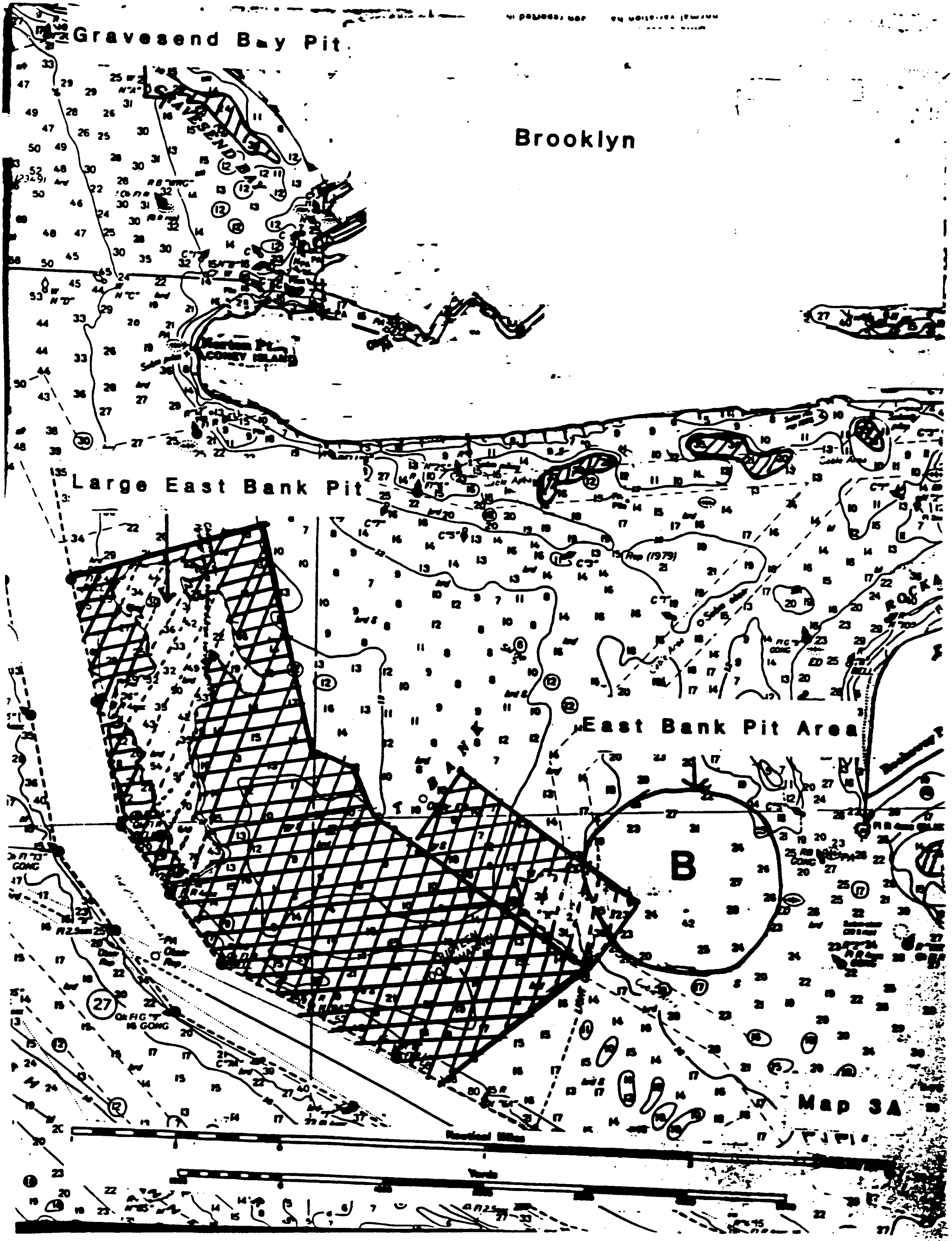
6.2. Cooperating Agencies
6.3. List of Parties to whom the Draft EIS has been sent.

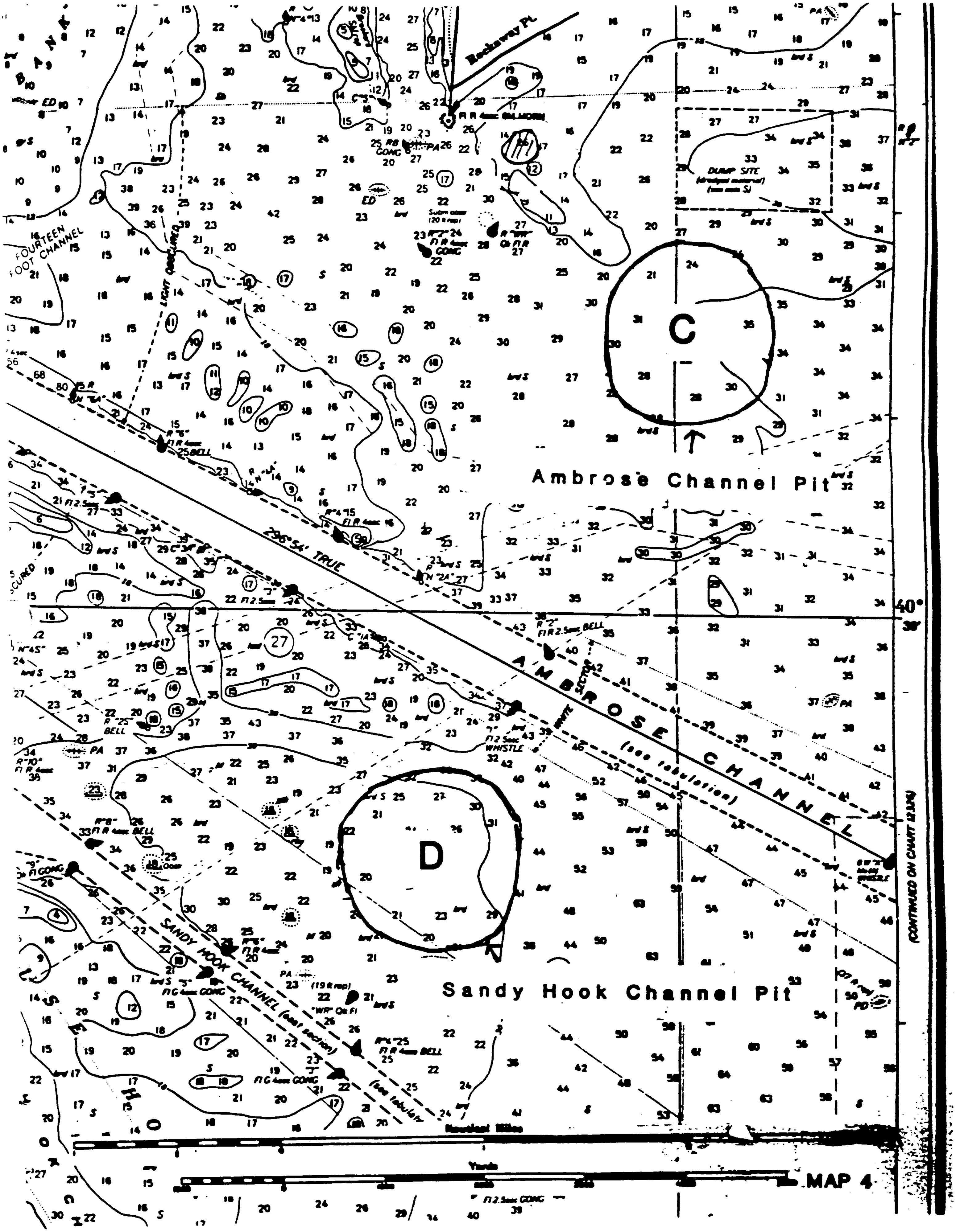
Key for Maps 2-5

Existing Borrow Pits

Proposed New York State Sand Mining Areas

A, B, C, D, Proposed New Borrow Pit Locations


Gravesend Bay Pit
Brooklyn
Large East Bank Pit
East Bank Pit Area
B
Map 3A



Rockaway Pt.
FOURTEEN FOOT CHANNEL
LIGHT OBSCURED
DUMP SITE
C
Ambrose Channel Pit
296°56' TRUE
AMBROSE CHANNEL
(see tabulation)
40°
30'
D
SANDY HOOK CHANNEL (east section)
Sandy Hook Channel Pit
(CONTINUED ON CHART 12326)
Nautical Miles
Yards

MAP 4

JOHN C. EGAN
COMMISSIONER

STATE OF NEW YORK
EXECUTIVE DEPARTMENT
OFFICE OF GENERAL SERVICES
MAYOR ERASTUS CORNING 2ND TOWER
THE GOVERNOR NELSON A. ROCKEFELLER EMPIRE STATE PLAZA
ALBANY, N.Y. 12242

JAMES M. GALLAGHER
DIRECTOR
REAL PROPERTY PLANNING
AND UTILIZATION GROUP
JOSEPH F. STELLATO
DIRECTOR OF
DIVISION OF LAND
UTILIZATION

December 12, 1985

Mario Paula, Project Manager
Water Quality Compliance Section
U.S. Army Corps of Engineers
26 Federal Plaza, Room 1937
New York, New York 10278-0090

Dear Mr. Paula:

The Office of General Services has reviewed the public information announcement regarding the operational program to dispose of dredged material in subaqueous borrow pits in the New York Bight.

In light of the current sand mining proposal (and preparation of the DEIS) by this office we request that the large area identified as "Large East Bank Pit" (2.2.1.3) be eliminated from the scope of work. Our reasons are twofold:

- The pit has not been addressed in the original OGS discussion for re-use, and thus would add yet another element to the already complex issues in our sand mining program.

- The risk of contamination, by the disposal of the contaminated dredge material, may adversely affect the resources in the areas adjacent to the site and will certainly adversely impact the marketability of the existing recoverable resource, removing the site from the dwindling list of construction material sources for the NY/NJ Metropolitan areas.

For these reasons, we request that the large East Bank Pit be removed from the scope, and not be considered as a potential disposal site.

Sincerely,

Lawrence F. Kinney
Chief, Bureau of Land Management

PRB/cam

cc: Barbara Rinaldi, DEC
Joseph Pane DEC
Kevin Cross DOS

18 DEC 1985

MONMOUTH COUNTY PLANNING BOARD

COUNTY OF MONMOUTH • NEW JERSEY

ENVIRONMENTAL COUNCIL

SALLY MOLLICA
CHAIRMAN

NONA C. PLANGERE
VICE-CHAIRMAN

BRIAN WALTERS
STAFF ADVISOR

HALL OF RECORDS ANNEX
POST OFFICE BOX 1255
FREEHOLD, NEW JERSEY 07728-1255
TELEPHONE 201-431-7460

ROBERT W. CLARK, P.P.
DIRECTOR

January 9, 1986

Mario Paula, Project Manager
Water Quality Compliance Section
U.S. Army Corps of Engineers
26 Federal Plaza, Room 1937
New York, New York 10278-0090

RE: Environmental Impact Statement for Disposal of
Dredged Material in Subaqueous Borrow Pits

Dear Mr. Paula:

The Monmouth County Environmental Council, an advisory group to the Monmouth County Planning Board, has reviewed the scope of work for the Environmental Impact Statement (EIS) for disposal of dredged material in subaqueous borrow pits and would like to offer the following comments.

1. Since bay areas are unique, water column monitoring should be undertaken during the dumping and capping process to help insure the safety of the neighboring shoreline and estuaries.

2. Disposal sites should be evaluated on a case-by-case basis. Considerations should include the potential for cap erosion, prevailing water circulation and ability of substrate to support the dredged material.

3. The identification of and potential impacts to aquifer outcrops which extend into the bay areas and which may exist underneath existing or new pits should be addressed. Aquifer outcrops may currently be exposed in existing pits. If contaminated dredged material is placed in a borrow pit with an exposed aquifer outcrop, contamination of a groundwater supply could occur.

4. Disposal should be monitored by some responsible party to insure the accurate placement of the dredged material and cap.

5. Adequate capping material should be identified and be available before the dredging project begins. Once the dredged material is dumped into a borrow pit, it should be covered in a timely fashion.

10 JAN 1986

United States Department of the Interior

NATIONAL PARK SERVICE

Gateway National Recreation Area
Headquarters Building 69
Floyd Bennett Field
Brooklyn, N.Y. 11234

BREEZY POINT UNIT, N.Y.
JAMAICA BAY UNIT, N.Y.
STATEN ISLAND UNIT, N.Y.
SANDY HOOK UNIT, N.J.

IN REPLY REFER TO:

N22 (GATE-PS)

JAN 14 1986

Mr. Mario Paula
Project Manager
Subaqueous Borrow Pit Project
Water Quality Compliance Section
U.S. Army Corps of Engineers
26 Federal Plaza, Room 1937
New York, New York 10278-0090

Dear Mr. Paula:

This is in response to the Scope of Work outline distributed for comments regarding the proposed implementation of an operational program to dispose of dredged materials in existing and/or new subaqueous borrow pits within the confines of New York Harbor. Please be advised that these comments are provided by the National Park Service, as they may impact upon those properties or waters associated with Gateway National Recreation Area, and do not preclude additional comment(s) from the U.S. Fish and Wildlife Service; the official spokesperson for the U.S. Department of the Interior. These comments and/or concerns should be considered adjunct to any comments provided by the U.S. Fish and Wildlife Service, and copy of this letter will be forwarded to them for record purposes.

These comments and/or concerns are provided:

1. It is understandable that due to required N.E.P.A. and other applicable regulatory environmental compliance review procedures, all possible alternative borrow pit sites, whether existing or potentially developed, must be adequately addressed for their feasibility and prudency. In this regard, however, consideration of those borrow pit sites within, or in close proximity to beaches, wetlands, marshes, and other critical contiguous wildlife habitat (i.e., Jamaica Bay Wildlife Refuge) associated with this unit of the National Park Service would significantly compromise our legislative mandates and conservation policies. Disposal of contaminated dredged spoils, even with conserted efforts to provide capping with "suitable" materials, would pose potential environmental contaminant transport scenarios that are untenable with those recreational goals and objectives of Gateway National Recreation Area.

SAVE OUR PORT

PLEASE REPLY TO:
SAVE OUR PORT
J.B. WILEY, JR., P.E., CHAIRMAN
c/o KUPPER ASSOCIATES
15 STELTON ROAD
PISCATAWAY, NJ 08854

January 17, 1986

Col. F. H. Griffis
District Engineer
New York District
Corps of Engineers
26 Federal Plaza
New York, NY 10278-0090

Dear Col. Griffis:

We support the Corps of Engineers' Dredged Material Disposal Management Plan and we appreciate the extensive efforts of the Corps to deal with the issue of disposal of those dredged materials categorized as "contaminated". The Corps' program appears to offer the best hope of identifying new disposal alternatives for such "contaminated" dredge material; material which does not meet the present criteria for unrestricted ocean disposal. We support the Corps' efforts to minimize the environmental and economic impacts of dealing with these dredged materials. We applaud the comprehensiveness of the Corps' research on the subject and the conscious efforts to provide the public with full information as the research takes place.

From a recent Public Information Announcement, we learn that the Corps proposes to implement an operational program to dispose of "contaminated" dredged material in existing and/or new subaqueous borrow pits. We recognize the difficulty in implementing such an operational program with key institutional issues yet to be resolved. We do encourage the use of subaqueous borrow pits as a disposal option for dredged material which does not meet the criteria for unrestricted ocean disposal.

Our concern is for the continued economic viability of the Port of NY & NJ. It can't be economically viable unless it can accommodate modern deep draft vessels. That requires dredging; and dredging can only be done if there is a place to dispose of the dredged materials.

Accordingly, since your studies and research have concluded that it is time to carry out disposal in subaqueous borrow pits, we urge that the project be carried out without delay.

CITY OF NEW YORK
DEPARTMENT OF PORTS AND TERMINALS
Battery Maritime Building, New York, N.Y. 10004
Telephone: 212-806-6859

SUSAN FRANK
COMMISSIONER

January 31, 1986

Col. F.H. Griffis
District Engineer
New York District
Corps of Engineers
26 Federal Plaza
New York, NY 10278-0090

Dear Col. Griffis:

The New York City Department of Ports and Terminals supports the New York District's efforts in developing a dredged material disposal program which includes the use of subaqueous borrow pits for the disposal of dredged material which does not meet the criteria for unrestricted ocean disposal.

Dredging is an important aspect of the Port's ability to remain competitive and to accommodate larger vessels. Without disposal options, materials from channels that required dredging, but did not meet the unrestricted criteria, could not be dredged, thereby creating a situation where the Port could not keep up with the changing times.

The use of subaqueous borrow pits appears to be a reasonable option for the disposal of dredged material that does not meet the requirements for unrestricted ocean disposal. We urge that the project be implemented as quickly as possible to enable dredging to proceed without delay.

Sincerely yours,

Edward M. Weinstein, R.A.
Assistant Commissioner

cc: James Kirk (PA NY/NJ)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

FEB 0 5 1986

Mr. Samuel P. Tosi, Chief
Planning Division
Department of Army
Corps of Engineers, New York District
26 Federal Plaza
New York, N.Y. 10278 - 0090

Dear Mr. Tosi:

The Environmental Protection Agency (EPA) has reviewed the notice of intent to prepare an environmental impact statement (EIS) for the Disposal of Dredged Material in Subaqueous Borrow Pits in Lower New York Bay and Adjacent Areas, and your request of December 23, 1985, for EPA participation as a cooperating agency in the development of this EIS. The project involves the development of a program to dispose of dredged material that has not satisfied EPA's testing criteria for unrestricted ocean disposal in existing and/or new subaqueous borrow pits. Based on information provided in the notice, we offer the following comments.

The use of subaqueous borrow pits as dredged material disposal sites was originally addressed in the 1983 programmatic EIS prepared by the Corps of Engineers (COE) on the Disposal of Dredged Material from the Port of New York and New Jersey. In that EIS, the COE concluded that the use of subaqueous borrow pits offered an attractive disposal alternative, but that additional study of this option was needed. EPA strongly supports the COE's proposal to implement an operational program using subaqueous borrow pits. However, we believe that the focus of this EIS should be on the technical/environmental aspects of utilizing borrow pits, and should not serve to reopen the broader policy issues (which we believe were adequately addressed in the 1983 EIS) regarding selection of the borrow pit alternative for dredged material disposal. Accordingly, we strongly recommend that this EIS be issued as a supplement to the original 1983 EIS action, and/or as a tiered EIS (as defined under the November 29, 1978, Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act).

With respect to your request for EPA participation as a cooperating agency, we are interested in participating through the review of technical data (such as bioassay and sediment testing, etc.), and of preliminary sections of the draft EIS. Because of EPA's regulatory interest in this project, and our participation on the Dredged Material Management Steering Committee, we would like to formalize our role as a cooperating agency through a Memorandum of Understanding (MOU) between our agencies.

LEAGUE OF WOMEN VOTERS
OF MONMOUTH COUNTY, N. J.

934 Navesink River Road
Locust, NJ 07760

January 5, 1986

U. S. Army Corps of Engineers
Water Quality Compliance Section
26 Federal Plaza, Room 1937
New York, NY 10278-0090

Re: Dredged Material Disposal Plan

The League of Women Voters of Monmouth County is not in favor of the use of borrow pits for disposal of highly contaminated dredge spoils, which makes commenting at this time without a full EIS difficult. We will, briefly, state our reasons for concern about this practice only so that answers can be included in the EIS.

1. We disapprove of the use of any estuarine area for disposal of contaminated material because of its sensitivity and its potential for a high level of marine life productivity. For years we disposed of garbage and other refuse in New York Bay under the conception that it was doing no harm. To start at this point to repeat this process - with some changes - seems highly questionable. One change - more hazardous material.

2. We understand from previous testimony that some of the borrow pits are attractive to lobsters and other valued marine life.

3. We also understand that aquifers beneath both New Jersey and Long Island run under the bay. Consequently, we feel that new dredging should be avoided where possible and carefully monitored with advance borings where it is felt imperative.

4. We have also been informed that clean material (sand) is not always available to cover the spoils immediately after they are deposited, thus permitting possible mixing of contaminated material into the water column.

5. We are aware that dumping of the polluted material is supposedly carefully controlled, but it is inevitable that spilling will occur resulting in mixing in the water column.

6. Disposal of such material in near-shore waters which are inevitably used by the public of a highly congested urban area for recreation and by commercial fishermen to some degree would appear to be inviting eventual trouble for the sake of inexpensive disposal.

As far as making any reasonable selection of a disposal site goes, it seems to us totally impossible without a full environmental study. Our only comment at this time, therefore, is that we are thankful most of the sites are offshore of New York and not New Jersey!

9 JAN 1986

Brooklyn Chamber of Commerce
333 ATLANTIC AVENUE • BROOKLYN, NEW YORK 11201-5895 (718) 875-1000

February 6th, 1986

Colonel F. H. Griffis
District Engineer
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10007

Dear Col. Griffis:

On behalf of the Brooklyn Chamber of Commerce, I would like to express continued support and interest for the Corps' "Dredged Material Disposal Management Plan". We believe that the Corps' interest and efforts in addressing this issue of contaminated dredge material has brought about a significant awareness of the problems.

We stress the importance of the use of Subaqueous Borrow Pits as a disposal option for dredge material, which does not meet the criteria for unrestricted ocean disposal. However, this is one option that is environmentally sound and economically feasible.

Our main concern now, is the implemention and forward movement of this project. The Corps must be urged to continue its efforts and avoid further delays.

Sincerely,

J. P. French

Joseph F. French
President, Brooklyn Chamber of Commerce

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
100 Grange Place
Room 202
Cortland, New York 13045

February 13, 1986

Mr. Robert Will, Borrow Pit EIS Coordinator
Environmental Analysis Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Will:

The U.S. Fish and Wildlife Service has reviewed the notice of "Intent To Prepare an Environmental Impact Statement; New York and New Jersey" in the December 12, 1985, issue of the Federal Register (Vol. 50, No. 239). The following comments represent technical assistance only and should not be construed as the official comments of the Department of the Interior.

This notice briefly summarizes the outline advertised by the New York District in the Public Information Announcement sent out in early December 1985. This outline was quite extensive and covered all topics of concern from the standpoint of fish and wildlife resources. We therefore believe that our concerns should be adequately addressed in the environmental impact statement if this outline is followed and each topic is covered in detail.

Thank you for your continued cooperation on this project.

Sincerely yours,

Paul P. Hamilton

Paul P. Hamilton
Field Supervisor

cc: DEC, Albany
DEC, New York
DEC, Stony Brook
EPA
NJDEP
NMFS, Gloucester
NMFS, Milford
NMFS, Sandy Hook
NPS, Boston
NPS, Gateway
REO, Boston
FWS, Absecon
FWS, State College
FWS/EC, Wash., D.C. re 86/64
NYCE, Mario Paula, Attn NANOP-RQ

Scientific Advisory Board Secretariat at 202–697–8404.

Patsy J. Conner,

Air Force Federal Register Liaison Officer.

[FR Doc. 86–7982 Filed 4–9–86; 8:45 am]

BILLING CODE 3910–01–M

USAF Scientific Advisory Board; Meeting

April 3, 1986.

The USAF Scientific Advisory Board Ad Hoc Committee on Appropriate Air Force Technology efforts to Complement the Strategic Defense Initiative Program will meet at Hanscom AFB, MA on April 28, 1986, from 8:30 a.m. to 5:00 p.m.

The purpose of the meeting will be for the Battle Management/C³ Subpanel to review Air Force communications and computer architecture programs supporting space requirements, evaluate their completeness, and assess gaps/overlaps in meeting total Air Force space requirements.

The meeting concerns matters listed in section 552b(c) of Title 5, United States Code, specifically subparagraph (1) thereof, and accordingly, will be closed to the public.

For further information, contact the Scientific Advisory Board Secretariat at, 202–697–8404.

Patsy J. Conner,

Air Force Federal Register Liaison Officer.

[FR Doc. 86–7975 Filed 4–9–86; 8:45 am]

BILLING CODE 3910–01–M

USAF Scientific Advisory Board; Meeting

April 2, 1986.

The USAF Scientific Advisory Board Ad Hoc Committee on Appropriate Air Force Technology Efforts to Complement the SDI Program will meet at Kirtland AFB, NM on April 28, 1986 from 1:30 pm to 5:00 pm and on April 29 1986 from 8:00 am to 4:30 pm.

The purpose of the meeting will be for the DEW panel to review Air Force DEW programs for completeness and ability to satisfy AF space requirements.

The meeting concerns matters listed in section 552b(c) of Title 5, United States Code, specifically subparagraph (1) thereof, and accordingly, will be closed to the public.

For further information, contact the Scientific Advisory Board Secretariat at 202–697–8404.

Patsy J. Conner,

Air Force Federal Register Liaison Officer.

[FR Doc. 86–7976 Filed 4–9–86; 8:45 am]

BILLING CODE 3910–01–M

Corps of Engineers; Department of the Army

Intent To Prepare a Draft Supplemental Environmental Impact Statement for a Proposed Use of Sub-Aqueous Borrow Pits as a Site for Disposal of Dredged Material From the Port of New York and New Jersey

AGENCY: Army Corps of Engineers, DOD.

ACTION: Notice of intent to prepare a draft supplemental environmental impact statement. This notice supersedes one printed in Vol. 50, No. 239, pp 50827 of the Dec. 12, 1985 Federal Register that announced the intention to prepare an EIS. Instead, the document will be prepared as a supplement to the generic EIS on the Disposal of Dredged material from the Port of New York and New Jersey (finalized and filed with EPA in March, 1983).

SUMMARY:

1. Description of Proposed Action

Operational program to dispose of dredged material in existing or new subaqueous borrow pits. The source of the dredged material is navigation projects in the Port of New York and New Jersey. This disposal action is primarily intended for disposal of material which has not satisfied EPA's testing criteria for unrestricted ocean disposal. Existing pits and potential areas for the excavation of new pits are located primarily in Lower New York Harbor.

2. Reasonable Alternatives

(a) Alternative borrow pit sites:

(1) Selection of one or more suitable existing pit(s).

(2) Excavation of new pits.

(b) Alternative methods of filling pit(s):

(1) Fill completely.

(2) Fill incomplete so that some depression remains.

(3) Capping alternative (sand vs. mud vs. no cap).

(c) Alternative methods of dredged material disposal:

(1) Ocean disposal.

(2) Containment islands and areas (land extensions).

(3) Upland disposal.

3. Scoping Process

a. Public Involvement

(1) Public Meeting held Dec. 1985 (announced in Dec. 12 1985 Federal Register).

(2) Public Information Coordination Group formed to discuss this and other disposal alternatives (ongoing process).

(3) Draft and Final SEIS will be circulated to all known interested parties and agencies.

(4) Additional Public Meetings will be held as necessary (most likely as a means of soliciting comments to draft SEIS).

b. Significant Issues Requiring in-Depth Analysis

(1) The impact of filling pits to fisheries, benthos and water quality in N.Y. Harbor.

(2) The impact of filling pits on present and future sand mining operations.

(3) Site selection criteria (including the use of existing vs. new pits).

c. Assignments

Agencies having jurisdiction under law will be asked to be cooperating agencies.

d. Environmental review and consultation

Appropriate concerned agencies and the Dredged Material Management Plan Steering Committee and Public Involvement Coordinating Group will be consulted during EIS preparation. Comments or questions should be addressed to Len Houston, Borrow Pit EIS Coordinator, at (212) 264–4662 or Environmental Analysis Branch, U.S. Army Corps of Engineers, New York District, 26 Federal Plaza, N.Y., NY 10278–0090.

4. Scoping Meeting will not be held.

5. Estimated date of statement availability June, 1986.

Address: Project Manager: Mario Paula, ATTN:NANOP-RQ, Tel No. (212) 264–5622, FTS 264–5622; EIS Coordinator: Len Houston, ATTN:NANPL-E, Tel No. (212) 264–4662, FTS 264–4662; U.S. Army Engineer District, New York, 26 Federal Plaza, New York, N.Y. 10278–0090.

Dated: March 18 1986.

Samuel P. Tosi,

Chief, Planning Division.

[FR Doc. 86–8032 Filed 4–9–86; 8:45 am]

BILLING CODE 3710–06–M

DEPARTMENT OF EDUCATION

Notice of Proposed Information Collection Requests

AGENCY: Department of Education.

ACTION: Notice of proposed information collection requests.

SUMMARY: The Director, Information Resources Management Service invites comments on the proposed information that, for salinity stratification to develop and hence for the trapping of fine-grained sediment, the aspect ratio should be 0.005 or, in other words, the relief of the pit must be greater than the pit's diameter divided by 200.

There are three notes of caution:

1. The salinity data are sparse and their resolution is limited; as a result, this "rule" is only a little better than an education guess.

2. This empirical rule should only be applied to areas that have similar tidal currents and salinity ranges as those found on the West Bank where the observations were made.

3. The size of pits that develop salinity stratification and trap fine-grained sediment may be irrelevant to forecasting the sizes of pits that attract fish, even though the two types of behavior occur simultaneously on the West Bank.

Best regards,

Henry

Henry Bokuniewicz

HB/mjh

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

FEB 12 1987

Mr. Samuel P. Tosi, Chief
Planning Division
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278

Dear Mr. Tosi:

The Environmental Protection Agency (EPA) has reviewed the working draft environmental impact statement (EIS) for the Disposal of Dredged Material in Subaqueous Borrow Pits in Lower New York Bay and Adjacent Areas. The project involves the development of a program to dispose of dredged material that has not satisfied EPA's testing criteria for unrestricted ocean disposal in existing and/or new subaqueous borrow pits. This review was conducted at your request, and pursuant to our February 5, 1986 scoping letter in which we offered to be a cooperating agency. Based on the information provided in the working draft EIS, we offer the following comments.

Appendix b of the draft EIS indicates that up to 5 percent of the dredged sediment may disperse during the disposal operation. However, the appendix does not provide any information regarding the dispersion and/or leaching of pollutants that may be present in the dredged sediment. The EIS should include information on this.

Section 2.1 of the document delineates the sediment testing procedures currently used to determine whether dredged material is suitable for unrestricted ocean disposal. Paragraph D on page 2-2 describes the manner in which bioaccumulation results are interpreted. Although the paragraph states that the tissue levels of test and reference organisms are compared to a matrix level which reflects ambient levels in the New York Bight, the concept of the matrix is not adequately discussed. A paragraph should be added describing how the matrix was formulated so that the reader will understand why unrestricted ocean disposal cannot be allowed if the matrix value is exceeded.

Paragraph D should also discuss why a petroleum hydrocarbon matrix has not yet been developed, and the problems inherent with petroleum hydrocarbon testing (i.e., existing tests for petroleum hydrocarbons cannot distinguish between the hydrocarbons and naturally occurring body lipids, and there are currently no FDA limits for petroleum hydrocarbons). In addition, the report should mention that a statistically significant difference in petroleum hydrocarbons does not generally require the placement of a clean cap on top of the dredged materials.

Great Lakes
D[illegible]dge & Dock
[illegible]pany

2122 YORK ROAD
OAK BROOK IL 60521
312 920-3000
TELEX 254441
GRATLAK CGO

May 15. 1987

Mr. John F. Tavalaro
Chief, Water Quality Compliance Branch
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, N.Y. 10278-0090

Dear Mr. Tavalaro:

Great Lakes Dredge and Dock Company supports the creation of borrow pits in the Lower New York Bay area and their use for the disposal, as proposed in the New York District, Corps of Engineers' Dredged Material Management Program. For this company the proposal will provide a source of construction grade sand for the development needs of the region while at the same time providing an economic depository for dredged material. The plan also provides sand mining royalties for the two states, and disposal facilities at no cost to the federal or local government. To have this plan work properly, it is essential, however, that dredging companies such as ours participate in the site selection process.

It is our understanding that the borrow pit concept with capping enjoys widespread concensus among both environmental and developmental interests. We therefore urge that it be progressed as quickly as possible, and would be pleased to assist in what manner we can to make this possible.

Sincerely,

Brion E. Lindholm
Senior Vice-President

BEL/jm

THE PORT AUTHORITY OF NY & NJ

One World Trade Center
New York, N.Y. 10048

(212) 466-7000
(201) 622-6600

June 9, 1987

Mr. John Tavolaro
Chief, Water Quality Compliance Branch
Department of the Army
US Army Engineer District, NY
26 Federal Plaza
New York, NY 10278-0090

Mr. John Buzzi
Kupper Associates
15 Stelton Road
Piscataway, NJ 08854

Gentlemen:

Attached you will find the written responses to our survey dated April 8, 1987, of the Government Agencies Group of the Public Involvement Coordination Group concerning the use of Borrow Pits as a concept and an operational program for dredged material as outlined in the January 1987 PICG UPDATE. Written responses were sent by:

Joseph Burdulia	-	Woodbridge, NJ Department of Planning and Development
Robert Nuzzi	-	County of Suffolk Department of Health Services
Noel J. Pachta	-	US Department of the Interior National Park Service
Jeff Leslie		
Peter A. Isaacson	-	State of New York Department of Public Service
Alan I Mytelka	-	Interstate Sanitation Commission
Joseph F. Stellato	-	State of New York Office of General Services
Brian Ross	-	Monmouth County Planning Board

Writer's direct dial telephone (212) 466-8010

Woodbridge, New Jersey

PHILIP M. CERRIA, MAYOR

Department of Planning and Development
Office of the Director

1 Main Street
Zip Code 07095
(201) 634-4500

May 19, 1987

Mr. David Berkovits
Port Authority of New York and New Jersey
One World Trade Center - Room 64S
New York, New York 10048
(212) 466-8010

Dear Mr. Berkovits:

We have received your memo on PICG Management Plan in which you refer to a draft of the complete EIS. Please send us a copy of the final EIS as soon as possible.

Sincerely,

Joseph Burdulia
Director
Department of Planning & Development

JB/dc

United States Department of the Interior

NATIONAL PARK SERVICE

Fire Island National Seashore
120 Laurel Street
Patchogue, New York 11772

IN REPLY REFER TO:

May 26, 1987

L7619

Mr. David Berkovits
Port Authority of New York & New Jersey
One World Trade Center - Room 64S
New York, New York 10048

Dear Mr. Berkovits:

Thank you for your memorandum on Subaqueous Borrow Pit Disposal.

We are interested in all information you may have on this subject and will comment in the future.

Sincerely,

Noel J. Pachta
Superintendent

elevation, use different types of material and where possible, raise the cover around the surrounding elevation. Fish will orient to just about any vertical surface (I know because I asked ~~them~~).

Diversity ~~of habitat~~ material ⇒ diversity of habitat ⇒ species diversity ⇒ healthier environment to support fish.

J. Leslie.

INTERSTATE SANITATION COMMISSION

A TRI-STATE ENVIRONMENTAL AGENCY
311 WEST 43rd STREET • NEW YORK, N.Y. 10036
212-582-0380

May 1, 1987

Mr. John Tavolaro, Chief
Water Quality Compliance Branch
Department of the Army
New York District
Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Tavolaro:

The Commission has reviewed the excerpts made available to us from Chapter 2 of the Borrow Pit Draft Supplemental Impact Statement and offer comments thereon as follows:

The Commission supports the alternative of the use of subaqueous borrow pits for dredged material disposal compared to other disposal options studied during the Dredged Material Disposal Management Plan for the Port of New York and New Jersey. The Commission recognizes issues raised by those opposed to utilization of this disposal option at existing pits which include erosion of the Staten Island and/or Brooklyn shoreline, impacting or destroyng existing productive recreational fishing areas, proximity of waterfront communities to the disposal site, and proximity of the disposal site to a navigable channel.

The disposal option for using existing subaqueous borrow pits is likely to lead to litigation and negate today's feasible solution for years. The need to develop and implement disposal options is of paramount interest to the Port and viability of the Region. To this end, the Commission supports the disposal option of excavating new pits in a less productive area with a useful life span of a minimum of 10 years. Revenues from the mining outputs could be used to offset dredge and disposal costs enabling this feasible option to be implemented.

Very truly yours,

Alan I. Mytelka, Ph.D.
Director & Chief Engineer

AIM:mlg

MONMOUTH COUNTY PLANNING BOARD

COUNTY OF MONMOUTH • NEW JERSEY

ENVIRONMENTAL COUNCIL
Nona Plangere
CHAIRMAN
Kathie Wheaton
VICE CHAIRMAN
Brian Ross
STAFF ADVISOR

HALL OF RECORDS ANNEX
POST OFFICE BOX 1255
FREEHOLD, NEW JERSEY 07728-1255
TELEPHONE 201-431-7460

ROBERT W. CLARK, P.P.
DIRECTOR

May 6, 1987

Mr. David Berkovits
Port Authority of New York and New Jersey
One World Trade Center - Room 64S
New York, New York 10048

Mr. Berkovits:

In light of the tentative recommendations of the Army Corp of Engineers to utilize subaqueous borrow pits in the disposal of contaminated dredge spoils, the Monmouth County Environmental Council (MCEC) wishes to relay its positions on dredged spoils disposal to the Public Involvement Coordination Group (PICG). The MCEC recommends that borrow pits be used for the disposal of contaminated dredged spoils only as a last resort, and even then only under the most strict of safety standards. Safety standards which the MCEC members believe are appropriate include the following:

1. Before disposal begins, it must be demonstrated that there will be no effects on any aquifer outcrops in either the borrow pits or within range of drift material. For this reason, borrow pits which lie further from the land mass would be more appropriate than pits close in to land.

2. Before disposal begins, an adequate amount of clean cover must be on hand.

3. Before disposal begins, specific guidelines concerning time frame of the disposal process and the depth of clean cover material must be set.

4. Before disposal begins, provisions must be made for long term monitoring of the sediment.

The MCEC believes that the disposal of any contaminated material should not include the use of uncertain or high risk techniques. The ramifications of borrow pit use for the disposal of contaminated dredge spoils are uncertain. The long term risks, in particular, are not understood and make risk analysis problematic. For this reason, the use of borrow pits for the disposal of contaminated dredged material must only be a last resort, should only be utilized if the dredging project is for an existing, economically important, and water dependent project, and only with the greatest of caution.

LEAGUE OF WOMEN VOTERS
OF MONMOUTH COUNTY, N. J.

934 Navesink River Road
Locust, NJ 07760

April 26, 1987

Mr. David Berkovits
Port Authority of New York and New Jersey
One World Trade Center - Room 64S
New York, New York, 10048

Re: Subaqueous Borrow Pit Disposal of Dredged Material

The League of Women Voters of Monmouth County is looking forward to receipt of the draft EIS on the above subject. Our problem all along with this proposal has been that we have felt a certain lack of complete information. We hope this apparent lack will be overcome by the full EIS.

One subject that we feel has received inadequate attention is the relation of the borrow pits to the aquifer outcrop areas beneath and in the bay. To be sure the pits have long been dug and based on most reports no harm has been done to date. In fact, based on the types of fish found in the bottom of the pits, they may be cleaner and safer (as well as colder) than much of the surrounding bay. However, use by fish is hardly the equivalent of filling the pits with highly polluted dredge spoils. It seems to us that over a period of time, there will always be the possibility of infiltration of an aquifer. Given the groundwater situation on land where gross overuse has occurred, this could be a serious irreversible situation.

Our second concern is maintaining adequate clean cover over the spoils - this for two reasons. One, we understand that, as a rule, adequate amounts of clean cover may be difficult to produce at the time when they are most needed after dumping. We believe this, too, could present a serious pollution problem in the bay itself.

A connected problem would be the necessity to monitor overruns of the pits and avoidance of storm- or other induced turbulense at the site.

In short, it seems unfortunate at a time when serious efforts led by the Clean Water Act are about to be made to improve the quality of the water of the bay that deliberate dumping of highly toxic dredge spoils should be considered as a preferred solution to a difficult disposal problem. We do not feel that we can support this choice at this time, but appreciate your seeking our opinion.

Very truly yours,

Kathleen H. Rippere,
Natural Resources Chairman

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

Water Quality Compliance Branch SEP 3 1987

SUBJECT: Working Draft of the Borrow Pit Supplemental EIS

SEE DISTRIBUTION

Attached for your review you will find the preliminary working draft of the subaqueous borrow pit supplemental EIS. The document is in two parts: Volume I contains the text, tables and figures, Volume II contains the technical appendices.

The draft EIS will be briefly discussed during the September 9, 1987 Steering Committee and PICG meetings. Additional copies of the draft EIS will be available at the September 9 meeting. The comment period for the document will end on October 16, 1987. It is anticipated that further meetings with the Steering Committee and constituency groups within the PICG will be scheduled during the comment period of the draft EIS.

If you have any questions regarding the draft EIS, contact Mario Paula at 212-264-9268.

Carol A. Coch

CAROL A. COCH
Acting Chief,
Water Quality
Compliance Branch

Enclosure

DISTRIBUTION

BARTLETT	BECKLES	BENNETT	BERKOVITS	BRAMUCCI
BUZZI	CURLL	DEL VICARIO	ENOCH	FIGURELLI
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PANARELLO	RINALDI	SATTLER	SCHMIDT	SPERRY
TORRUSIO	WEISBROD	ZIPF		

page 2-11, paragraph c

While it is true that pits and artificial reefs are both attractants to finfish, they function differently. It may be inappropriate to imply that one can compensate for the other.

2.2.2.2.2 Creation of New Pits

page 2-11

If sand mining, as a method to create new pits, becomes an established enterprise, will the demand for sand exceed the demand for creation of borrow pits? If so, what happens?

2.3 Alternatives for Implementing the Use of Subaqueous Borrow Pits

2.3.1 Use of Existing Borrow Pits

2.3.1.4 Biological Constraints in Selecting an Existing Pit

page 2-19

It should be noted that attracting fish to deep pits may not necessarily be a good thing. Anoxic conditions in the summer resulting from anaerobic sediments may initiate a localized fish kill. On the other hand, deeper pits may retain warmer water in the late fall and early winter, attracting fish which may normally migrate offshore. However, a severe and prolonged winter cold snap could drop temperatures enough to stun and kill fish through cold shock.

page 2-21, paragraph d

Sentence number 3 makes no sense unless "were" reads "where".

2.3.4 Minimizing Impacts from the Use of Borrow Pit Alternatives

2.3.4.1 Mitigation

Again, artificial reefs may be neither practical nor desireable as a mitigation attempt in this area. If so, there is no point in doing it just for the sake of "doing something."

4.0 Environmental Impacts

4.3 Impacts To Biological Resources

4.3.2 Impacts From the Use of Sub-aqueous Borrow Pits

page 4-12

It should be noted that the pits which are filling up naturally with fine-grained sediments will not provide attractant habitat over a long-term basis.

Thank you for the opportunity to comment. Should you have any questions, please contact me (FTS 342-8237 or 201-872-0200) or Mike Ludwig (FTS 642-5213 or 203-783-4228).

Sincerely yours,

Stanley W. Gorski
Assistant Branch Chief

Mr. Mario Paula
October 23, 1987
Page 2

If you have any questions on these comments, please call me at (518) 474-3642.

Sincerely,

Larry S. Enoch
Environmental Analyst
Coastal Management Program

LSE:hm
cc: Barbara Rinaldi - NYS DEC, Region II

Specific Comments

Paragraph 1.3d on page 1-3 states that the Service wishes to implement the borrow pit alternative for disposal of contaminated dredged material. This statement is not accurate. The Service, as an active participant on the Ocean Dumping Steering Committee, believes the borrow pit alternative is a feasible option. We may endorse implementation of this option after thorough investigation of specifically selected sites.

Section 2.1 describes the sediment testing process for dredged material proposed to be disposed of at designated ocean disposal sites. To facilitate public review, this section should explain the terms biomagnification and bioaccumulation. In addition, current ocean dumping testing practices may soon be modified and additional contaminants (i.e. dioxin) may soon be tested for regularly. This information should be included in the document to give the public a better view of existing and future trends in dredged material sediment testing.

Paragraph 2.3.1.3 a(6) lists planned uses as a physical constraint associated with borrow pit use. We view this as more of an institutional constraint. Decisions at the October 8, 1987 meeting included changing this section to "nonbiological constraints." The Service concurs with this change.

Paragraph 3.4.2f on page 3-12 states that the pits do not serve as havens distinct from surrounding areas for fish. It is obvious that the pits are not selective for certain species, but they may play an important role in lower bay ecology by providing resting habitat outside used channel areas. Although "haven" may not be the appropriate word, pit importance should not be dismissed based on circumstantial evidence.

The discussion of impacts in Section 4 should include specific examples of mitigation to be presented in the final report when a specific site is selected. A discussion of various measures to offset impacts, including construction of new pits, seasonal constraints, artificial reefs and monitoring, should be discussed in greater detail.

Summary Comments

The Service continues to see the disposal of contaminated dredged material in subaqueous borrow pits as a feasible alternative. It is possible that with the proper site-specific information, mitigation, regulation and monitoring, the Service would not object to the implementation of this proposal.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK NEW YORK 10278

DEC 04 1987

Ms. Carol A. Coch, Acting Chief
Water Quality Compliance Branch
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Ms. Coch:

The Environmental Protection Agency (EPA) has reviewed the preliminary draft supplemental environmental impact statement (PDSEIS) for the Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York-New Jersey. The project involves the development of a program to dispose of dredged material that has not satisfied EPA's testing criteria for unrestricted ocean disposal in existing and/or new subaqueous borrow pits. This review was conducted at your request, and pursuant to our February 5, 1986 scoping letter in which we offered to be a cooperating agency. Based on our review, we offer the following comments.

1. In regard to Section 2.1 concerning sediment testing, the following items should be revised:

   a. Section c should be reworded because it does not clearly express the intent of the document concerning the piggybacking of new analyses on the results of previous biological testing and can be misconstrued.

   b. Section d discusses the functionings of bioassays, but it should also be specified that bioassays examine acute toxicity. The same holds true for Section e which discusses how bioaccumulation tests are used, but should mention that they are measuring chronic toxicity. In addition, Sections d and e should state that specific indicator organisms will be used in these tests.

   c. The analysis in Section f concerning the criteria for the capping of ocean disposed sediments should stress that although the need for capping will be determined by the number of organisms which display toxicity, each determination must be made on a case-by-case basis.

2. Section 2.2.21, Page 2-8 includes mud dump/capping as a feasible alternate. However, with the passage of the Water Resources Development Act of 1986, this is no longer true. Therefore, page 2-8 should be modified accordingly.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF THE COMMISSIONER
CN 402
TRENTON, NJ 08625
609-292-2885

Received
15 DEC 87
M.P.

December 4, 1987

Mr. John Tavolaro, Chief
Water Quality Compliance Branch
New York District Corps of Engineers
26 Federal Plaza
New York, NY 10278

Dear Mr. Tavolaro:

Re: DSEIS: Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey.

The New Jersey Department of Environmental Protection has concluded its review of the Draft Supplemental Environmental Impact Statement: Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey. The Department supports the idea of using subaqueous borrow pits for dredged material containment as a viable alternative to ocean disposal. Although only a small fraction of the total volume of material dredged from the Port of NY-NJ could be placed in subaqueous borrow pits, this method would appear to sequester contaminants better than any other current disposal option.

The Department also recognizes the emerging technology associated with using subaqueous borrow pits in the New York Harbor complex and strongly suggests that the New York District of the Corps of Engineers improve the proposed comprehensive monitoring program for the first pit filled to insure an accurate analysis of the ecological impacts and benefits of this practice. We offer the following comments directed towards the comprehensive monitoring program and toxicity studies:

a) Benthic communities at proposed sampling locations should be tested for contaminants before disposal operations begin to establish background levels as create a fishery impact. If this is not the intent of the author, the paragraph should be re-worded.

Sec. 2.3.1.4: It would aid the reader if the operation dates for each of the existing pits were listed together in a table.

Another biological factor which could be used for pit selection is the species richness and productivity of the surrounding sand flat community. Recruitment of benthos at the cap surface maybe better where the adjacent communities display high species richness and diversity.

Sec. 2.3.3.1: The EIS states that material used for a final cap could match the surrounding sands of the bay floor. If it is structurally feasible, restoration and enhancement of the cap surface should be included in any operational plan to allow some enhanced benthal characteristics, such as varying topography and material composition (muds to coarse grain sands), and compliment the natural bottom configuration of the site.

Sec. 3.4.1 - An additional analysis benthic fauna structure versus age of pits and sedimentation rate in pits, would help the reader better understand the ecology of the pits.

Sec. 4.3.2.i: Again, as in the Sec. 2.2.2.2.2.a. comments, this paragraph is confusing to the reader. The apparent logic reads this way: Digging a new pit will minimize impacts on fishery productivity because the existing pits which attract fish are preserved. Alternatively, filling in an existing pit (which attracts fish) will minimize impacts on fisheries by preserving the benthic community essential for fish food which would be destroyed by a new pit. This cannot be both ways.

Sec. 4.3.3.b: Construction of a containment island would eliminate approximately 500 acres of estuarine water column. The primary and secondary productivity of planktonic resources within that water column would be eliminated. These resources are also important to fisheries and should be discussed here.

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT. CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

FEB 8 1988

REPLY TO ATTENTION OF
Water Quality Compliance Branch

SUBJECT: Delay in the Issuance of the Draft Borrow Pit Supplemental EIS

SEE DISTRIBUTION

As was discussed briefly at the Steering Committee/ PICG meeting on January 27, 1988, there has been a delay in the publishing of the official draft SEIS for the subaqueous borrow pit disposal program, originally scheduled for release in early January 1988.

During the comment period of the preliminary draft SEIS, the New York District had retained a contractor to conduct the cultural resources survey of the two proposed new borrow pit sites. The survey is required to comply with Federal regulations and guidelines regarding the protection of cultural and archaeological resources. It was previously decided that the results of the cultural resources survey should be included in the draft SEIS to allow for full public review and comment during this important phase in the EIS process. The survey, which consists of the use of magnetometers, sub-bottom profilers and side-scan sonar to evaluate the two proposed new pit sites, is very labor-intensive and it was estimated that it would take a total of 10-12 weeks for the receipt of a completed report.

The survey was scheduled to begin no later than the middle of September 1987, which would have given ample time for the completion of the survey and its inclusion into the draft SEIS for January 1988 publication. However, difficulties arose from the beginning which served to disrupt the schedule. Problems in the administrative process of committing the contract funds delayed the start of the survey by 2-3 weeks. At the beginning of the field work, difficulties were encountered by the contractor in using his existing positioning equipment on the East Bank site, apparently due to electrical interference in that location. This problem resulted in delays while the contractor upgraded his positioning equipment to be able to filter out the interference. Further equipment problems and the onset of the late fall- early winter inclement weather has resulted in numerous blowout days. These problems have greatly delayed the completion of the cultural resources survey, and in turn has delayed the publication of the draft SEIS. We anticipate that the cultural resources survey and corresponding data

NATURAL RESOURCES PROTECTIVE ASSN.
OF STATEN ISLAND, INC.

P.O. BOX 306 GREAT KILLS
STATEN ISLAND, NEW YORK 10308
PRES. L. FIGURELLI
TEL. (212) 967-0410

FEB./ 18/ 88

DEPT. OF THE ARMY
N.Y. DIST. CORPS. OF ENGINEERS
JACOB JAVITS BLDG.
FEDERAL BRANCH N.Y.C.
N.Y. 10278-0090

MR. JOHN TAVOLARO ALSO MR.PETER SATTLER ALSO MS. E FLATOW
CHEIF W.Q.C.B. CHAIRMAN P.I.C.G. N.Y.BIGHT RESTORATION GROUP

TO ALL MEMBERS OF THE P.I.C.G.

I HAVE REVIEWED THE PRESENT SURVEY DATED 2/8/88 ON THE PRESENT BORROW PITS AND THE PROPOSED CONSTRUCTION OF NEW SUBAQUEOUS PITS FOR THE DISPOSAL OF HIGHLY CONTAMINATED DREDGE SPOILS.

WE OF THE N.R.P.A. AND MYSELF HAVE NEVER OPPOSED THE USE OF PROPERLY CONSTRUCTED,PROPERLY LOCATED AND ISOLATED SUBAQUEOUS PITS, FOR DREDGE DISPOSAL. WE HAVE ALWAYS CONSIDERED THIS OPTION TO BE THE BEST VIABLE ALTERNATIVE TO LAND DISPOSAL AND OCEAN DUMPING.

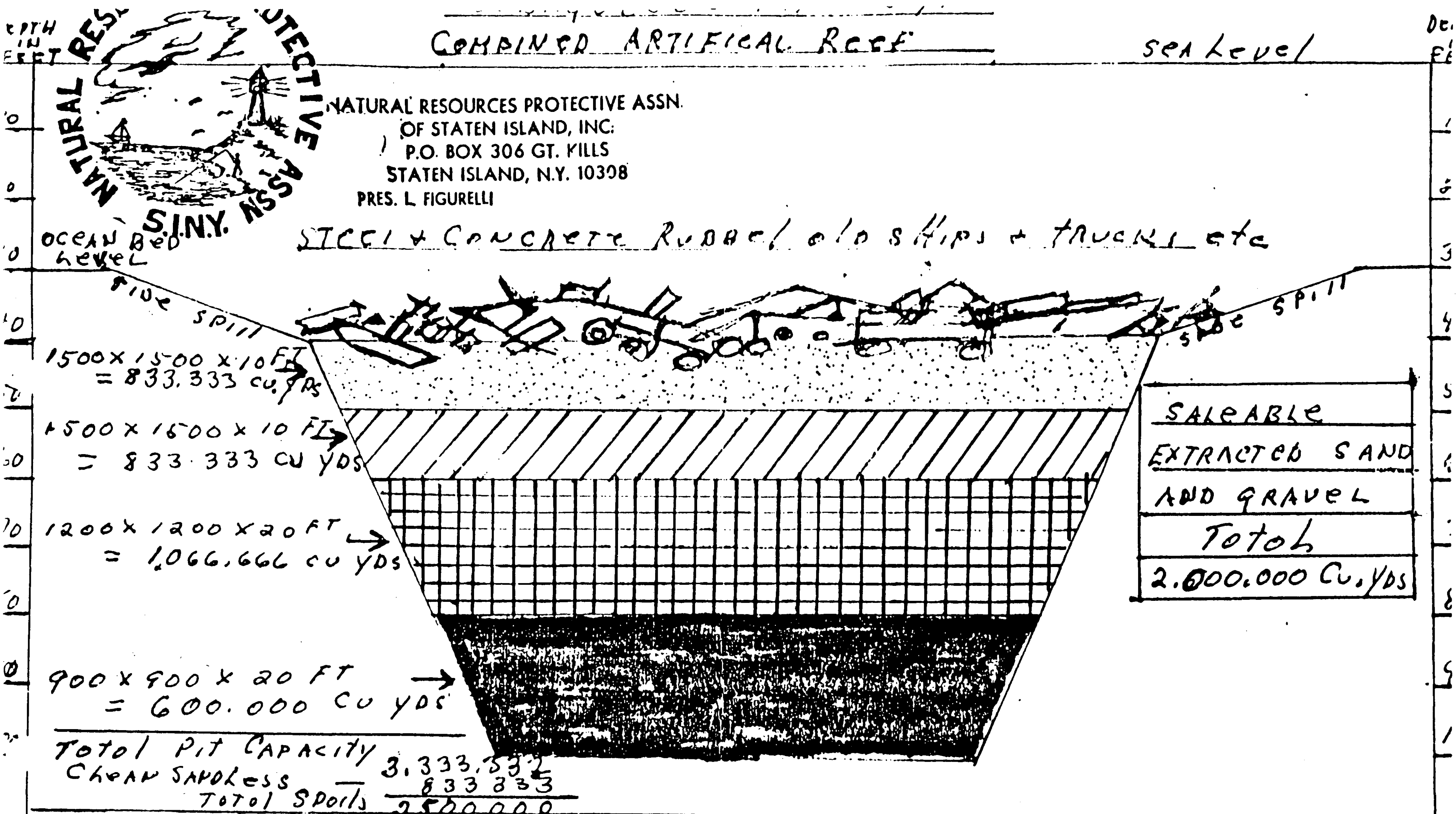
WE HAVE CONTINIOUSLY OPPOSED THE USE OF THE CAC 7 BORROW PIT AS A DREDGE DISPOSAL SITE ,WHICH WAS JUSTIFIED BY A COURT ACTION TO SUPPORT OUR OPPOSITION.

SHOULD THE P.I.C.G. THE STEERING COMMITEE, THE C.O.E. OR THE N.Y.S. DEPT. OF CONSERVATION ATTEMPT TO AGAIN USE THIS LOCATION FOR A DISPOSAL SITE, WE WILL AGAIN REENTER THE COURTS FOR RELEIF ON THE SAME GROUNDS.

SINCE 1980 IT HAS BEEN OUR CONSTANT SUGGESTION TO CONSTRUCT A NEW SUBAQUEOUS PIT IN AN AREA OF LOW PRUDUCTIVITY, AWAY FROM HIGHLY USED RECREATION FISHING AREAS, AWAY FROM CONSTANTLY USED NAVIGABLE SHIP CHANNELS, DUG TO A DEPTH OF FROM 90 TO 100 FEET TO AFFORD COMPLETE ISOLATION, WITH A SMALL SURFACE AREA. WE ALSO SUGGESTED TO SELL THE GRAVEL AND THE SAND REMOVED TO CONSTRUCT THE PIT TO BE SOLD TO PAY FOR THE CONSTRUCTION OF THE PIT. MODERATLY CONTAMINATED CHANNEL DREDGINGS WHICH COULD BE LEGALLY DUMPED IN THE OCEAN WITHOUT CAPPING COULD BE USED AS AN INTERMIDIATE CAP AND WITH A SUBSTANTIAL CAP OF CLEAN SAND ON TOP. WE ALSO SUGGEST TO AVOID THE POSSIBILITY OF ANY SAND MINING OF THE AREA IN THE FUTURE THAT THE FINAL CAP BE SLIGHTLY DEPRESSED AND COVERED WITH A REEF OF OLD SHIPS, DISCARDED RUBBER TIRES (PROPERLY CONTAINED),HEAVY CONSTRUCTION DEBRIS SUCH AS CONCRETE, AND STEEL GIRDERS, OLD TRUCKS AND CARS, THIS WOULD ALSO ATTRACT A SIZABLE MARINE LIFE POPULATION. ((ENCLOSED PIT SCETCH BY N.R.P.A. ATTACHMENT NO. (I)).

OF THE 4 SITES SUBMITTED BY THE N.Y. BIGHT WORKING GROUP , SITES (A) (B) (C) (D) TO BE STUDIED FOR NEW PIT CONSTRUTION,SITE D WAS EXCLUDED FROM THE STUDY. IF STUDIES HAD BEEN CONDUCTED AT THIS SITE AS WE HAD REQUESTED, YOU WOULD HAVE FOUND IT TO BE THE IDEAL LOCATION TO CONSTRUCT A NEW PIT.

(CONTINUED PAGE2)



Chean Sand Capacity 833.333 Cu yards

50% Sand or Better Capacity 833.333 Cu yards

Moderately Contaminated Dredge Spoils Capacity Approximate 1.066.666 Cu Yard

Highly Contaminated Toxic Dreo e Spoils Capacity 600.000 Cu yards

SCALE
1/2" = 10 Feet in Depth
1" = 300 Feet in Length.
Totol Pit Depression 10 Ft Below Sea Bed when Completed using Sand Side Spill For Chean Sand Cover.

Design By Lou Figurelli 6/1/84
Pres. Natural Relources S.I.

DSEIS Distribution &

Public Hearings

1988. Contact: James Beaver (406) 585-6815.

EIS No. 880201. Final. BOP. KY. Manchester Federal Correctional Institution Complex. Construction and Operation. Clay County. KY. Due: August 1. 1988. Contact: William J. Patrick (202) 724-3232.

EIS No. 880202. Draft. USA. HI. Helemano Military Reservation. Family Housing Construction Project. Implementation. City and County of Honolulu. Island of Oahu. HI. Due: August 15, 1988. Contact: James E. Maragos (808) 436-2263.

EIS No. 880203. DSuppl. COE. NY. NJ. Port of New York-New Jersey Dredged Material Disposal Project. Use of Subaqueous Barrow Pits for Disposal of Dredged Material. Designation. NY and NJ. Due: August 15. 1988. Contact: Len Houston (212) 264-4662.

EIS No. 880204. Final. BLM. UT. Aptus Industrial and Hazardous Waste Treatment Facility Construction and Operation. Land Exchange. Right-of-Way Grants. Temporary Use Permits and Possible 404 Permit. Tooele County UT. Due: August 1. 1988. Contact: John Stephenson (801) 524-6762.

Amended Notices

EIS No. 880141. DSuppl. NRC. PA. Three Mile Island Nuclear Power Station. Decontamination/Disposal of Radioactive Waste Resulting from the March 28. 1979 Accident. Post Defueling Monitored Storage (PDMS). Londonderry Township. Dauphin County. PA. Due: August 1. 1988. Contact: Micheal Masnik (301) 492-1373.

Published FR 5-5-88—Review period extended.

Dated: June 28. 1988.

William D. Dickerson.

Deputy Director. Office of Federal Activities.

[FR Doc. 88-14866 Filed 6-30-88: 8:45 am]

BILLING CODE 6560-50-M

[FRL-3408-4]

Sediment Criteria Subcommittee of the Environmental Effects, Transport and Fate Committee of the Science Advisory Board; Open Meeting

Under the Federal Advisory Committee Act. Pub. L. 92-463. notice is hereby given that a two-day meeting of the Sediment Criteria Subcommittee of the Enviromental Effects. Transport and Fate Committee of the Science Advisory Board (SAB) will be held on August 8th and 9th. 1988. The meeting will begin at 1:00 p.m. and will be held in the Conference Facilities (14th Floor) of the Environmental Protection Agency. Region 8. 999 18th Street. Denver. Colorado 80202-2405. The meeting will adjourn no later than 5:00 p.m. on Tuesday.

The Subcommittee has been charged by the Office of Water. Criteria and Standards Division. with the scientific review of the approach to be used in the derivation of sediment quality criteria for non-polar organic contaminants. The objective of this meeting is to inform the Subcommittee of Agency activities concerning contaminated sediment. so that they can provide broad-based oversight to EPA's criteria setting approach as it is being developed. Activities and issues that will be presented to the Subcommittee include the national perspective or extent of sediment contamination. as well as regional or specific case studies. including the Great Lakes. and Pudget Sound. and Superfund sites; and methods that may be applied to set criteria or criteria ranges. such as screening level concentrations. the apparent effects threshold method. and the equilibrium partitioning method. In addition. current research activities that are being conducted. for example. methods validation. and future research plans. such as a sediment initiative to begin in 1990. will be described. Finally. the regulatory applications of sediment quality criteria will be detailed. and the various methods for setting criteria will be compared.

The charge to the Subcommittee will be discussed and refined. and plans will be made for the receipt and review of the sediment quality criteria document for non-polar organic contaminants. anticipated in November of 1989. The meeting will be open to the public. Any member of the public who wishes to attend. present information. or receive further details should contact Ms. Janis C. Kurtz. Executive Secretary or Mrs. Lutithia Barbee. Staff Secretary (A-101 F) Science Advisory Board. U.S. EPA. 401 M Street SW.. Washington. DC. Telephone (202) 382-2552 or FTS-8-383-2552. Written comments will be accepted and can be sent to Ms. Kurtz at the address above. Persons interested in making statements before the Subcommittee must contact Ms. Kurtz no later than August 1. 1988. to be assured of space on the agenda.

Donald G. Barnes.

Director. Science Advisory Board.

Date: June 24. 1988.

[FR Doc. 88-14852 Filed 6-30-88: 8:45 am]

BILLING CODE 6560-50-M

[FRL-3408-5]

Environmental Effects, Transport and Fate Committee of the Science Advisory Board; Open Meeting

Under the Federal Advisory Committee Act. Pub. L. 92-463. notice is hereby given that a one-day meeting of the Environmental Effects. Transport and Fate Committee of the Science Advisory Board (SAB) will be held on August 10. 1988. The meeting will begin at 9:00 a.m. and will be held in the Conference Facilities (14th Floor) of the Environmental Protection Agency. Region 8. 999 18th Street. Denver. Colorado 80202-2405. The meeting will adjourn no later than 5:00 p.m.

Several objectives will be accomplished at this meeting. First. the Environmental Effects. Transport and Fate Committee (EET&FC) will be brought up to date on the activities of the various Subcommittees it oversees. including the Municipal Waste Combustion Subcommittee. the Water Quality Advisories Subcommittee. and the Sediment Criteria Subcommittee. The Committee will also be informed of activities ongoing under the Research Strategies Committee. especially regarding ecological effects. the Global Climate Change Subcommittee and the Long-Range Ecological Research Needs Subcommittee. since these activities are related to the mission of the EET&FC.

Next. briefings will be provided from Agency program staff. The Office of Research and Development will describe their activities related to groundwater protection. as will the Office of Water (OW). The committee will also hear plans for updating the OW's Water Quality Guidelines for Developing Criteria. especially as they relate to the WQC for Ammonia. Selenium and Aluminum. Additionally. the activities of the Environmental Risk Assessment Forum especially as they relate to the Agency's requirement to develop research plans toward Reducing Uncertainty in Risk Assessment (RURA) will be detailed. Finally. future planning will take place. including identification of new issues for 1989 and 1990. such as environmental monitoring programs and eco-region concepts; and planning for a Committee workshop on Biological Indicators or Endpoints.

The meeting will be open to the public. Any member of the public who wishes to attend. present information. or receive further details should contact Ms. Janis C. Kurtz. Executive Secretary. or Mrs. Lutithia Barbee. Staff Secretary (A-101 F) Science Advisory Board. U.S. EPA. 401 M Street SW.. Washington.

Draft Supplemental Environmental Impact Statement

Use of Sub-Aqueous Borrow Pits for the Disposal Of Dredged Material from the Port of New York-New Jersey

The Responsible lead agency is U.S.Army District New York.

Abstract: The New York District (NYD) is responsible for regulating disposal of dredged material into waters of the United States. Part of this responsibility entails assessing and limiting the impact of such disposal on the aquatic environment. To determine the potential a given material may have for degrading the environment, the Corps and EPA have developed a testing criteria for unrestricted ocean disposal. Dredged material not passing this criteria can only be disposed of at a designated ocean disposal site (in the New York Bight) if it does not show a determined level of mortality, and is then capped with a layer of clean material to isolate it from the water column and biota. Any material that does show a predetermined level of mortality is not allowed to be disposed of at the ocean site. In order to safely dispose of this latter material, and to minimize any harm that may result from disposing the non-toxic but still somewhat contaminated sediments now capped, the NYD has investigated alternative disposal methods for long-term containment. Four such alternatives have been identified: the current capping procedure, use of sub-aqueous borrow pits, containment structures, upland disposal. After comparing impacts and benefits, the preferred environmental alternative was to use sub-aqueous borrow pits; specifically to fill an existing pit while digging a new one. Screening criteria were developed to identifying existing pits and areas for new pit construction that would result in the least adverse impacts to aquatic resources. Management procedures were developed to maximize pit capacity without jeopardizing its security. A physical and biological monitoring program will be undertaken to ensure there is minimal loss of pollutants during a disposal event, between projects, and after the site is closed for good. If the monitoring results indicate the site's use should not be continued then the new pit will not be filled, thereby providing a replacement of the habitat lost when the existing pit was filled; the filled pit would then replace the shoal habitat lost when the new pit was dug. A Draft 404(b)(1) evaluation has been prepared for the use of a subaqueous borrow pit disposal site, and is included as Appendix B of this DSEIS; it determined that the action does not represent a significant threat of degredation to the aquatic environment.

Send comments to the District Engineer by September 9, 1988

For further information on this document write to the EIS Coordinator, Len Houston (attention CENANPL-E) or call him at (212) 264-4662.

Army Corps of Engineers, NY District
Jacob Javits Federal Building
26 Federal Plaza
New York, New York 10278

Location: Wagner College
Main Hall
Staten Island, N.Y.

See Fig. 2 for location map

3. Third Public Hearing

On: Wednesday, August 24, 1988

Time: 3:30 PM to 5:30 PM (Dinner break)

7:00 PM to end of hearing

Location: Middletown Municipal Building
(Town Hall)
1 Kings Highway
Middletown, Monmouth County, N.J.

See Fig. 3 for location map.

All interested individuals, groups and agencies are invited to be present or be represented at this meeting. Everyone will be given an opportunity to express his/her views and furnish specific data on aspects of the proposed plan. At the public hearing, any person may appear on his own behalf, or may be represented by counsel, or by other representatives.

ALL COMMENTS REGARDING THE DRAFT SEIS MUST BE PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE BEFORE THE EXPIRATION DATE OF THIS NOTICE; otherwise, it will be presumed that there are no objections to the activity.

It should be noted that information submitted by mail is considered just as carefully in the EIS decision process and bears the same weight as that furnished at a public hearing.

This hearing will be conducted in an orderly but expeditious manner. Any person will be permitted to submit oral or written statements concerning the subject matter or the hearing that constitutes new information, not already part of the administrative record; to call witnesses who may present oral statement; or to present recommendations as to an appropriate decision. Any person may present written statements or other additional information prior to the time the comment period is closed to public submission, and may present proposed findings and recommendations. Opportunity for rebuttal during the public hearing will be afforded, but

The comment period to the draft SEIS will remain open until 5 PM, on Friday, September 9, 1988, for the receipt of additional written comments. All comments should be sent to the following address in order to be received prior to the close of the record:

U.S. Army Corps of Engineers
New York District
26 Federal Plaza,
New York, New York 10278-0090
ATTN: Mario A. Paula
Water Quality Compliance Branch

If you require further information regarding the public hearings, or if you would like a copy of the draft SEIS, please call Mario A. Paula, project manager at (212) 264-9268.

This draft SEIS is a supplement to the generic 1983 EIS prepared by the New York District that evaluated all dredged material disposal alternatives for the Port of New York and New Jersey. The role of the SEIS is to evaluate alternative sites for new and existing pits, and to determine which feasible sites are environmentally acceptable.

Marion L. Caldwell, Jr.
Colonel, Corps of Engineers
District Engineer

Enclosures

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

Environmental Analysis Branch

Dear Interested Party:

As you requested, enclosed is a copy of the draft Supplemental Environmental Impact Statement (DSEIS) on the Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York - New Jersey. Written comments to this document are due by September 9, 1988. Three Public Hearings will be held in the project area, at the locations and dates listed below. Each Hearing will have two sessions, beginning at 3:30 PM and again at 7:00 PM. If you have any questions concerning the document or the Hearings, contact the EIS coordinator, Mr. Len Houston, at (212)264-4662.

August 18 - Kingsboro Community College; Brooklyn, NY

August 23 - Wagner College; Staten Island, NY

August 24 - Middletown Municipal Bldg; Middletown, NJ

Sincerely,

Richard Maraldo, P.E.
Acting Chief, Planning Division

Enclosures

ENVIRONMENTAL DEFENSE FUND

257 Park Avenue South
New York, NY 10010
(212) 505-2100

September 19, 1988

Mr. Alex Lechich, Oceanographer
Water Management Division
Marine & Wetland Protection Branch
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Lechich:

Pursuant to our telephone conversation of September 9th, I would like to invite you to attend a meeting at the EDF office, 257 Park Avenue South (between 20th and 21st Street) at 1 p.m. on Wednesday, September 28th to discuss alternative methods of and sites for the disposal of dredged material from the Lower Hudson Estuary and its tributaries.

Enclosed is a copy of "An Alternative Strategy for Disposal of Dredged Materials from the Greater New York Harbor Region: A Citizens' Proposal" draft for public review dated October 1984. We would request that you consider this Citizens' Proposal along with this letter as comments pertaining to the scoping process that you are undertaking to assure compliance with Section 211 of the 1986 Water Resources Development Act.

To explain some recent history, some ten years ago EDF joined the National Wildlife Federation in a lawsuit against the New York District Corps of Engineers pertaining to its failure to consider alternatives to the practice of open ocean disposal of dredged materials at the dumpsite and the manner in which the New York District was applying the Ocean Dumping criteria. The Court concluded that the Corps of Engineers should undertake development of a generic or programmatic EIS to consider and

20

1616 P Street, NW
Washington, DC 20036
(202) 387-3500

1405 Arapahoe Avenue
Boulder, CO 80302
(303) 440-4901

5655 College Avenue
Oakland, CA 94618
(415) 658-8008

1108 East Main Street
Richmond, VA 23219
(804) 780-1297

128 East Hargett Street
Raleigh, NC 27601
(919) 821-7793

the Corps has a much more restrictive view of what portion of the sediments to be dredged would qualify as highly or marginally contaminated. Indeed, the New York District estimate that less than ten percent of the dredged materials would fall under their Categories II and III, the marginally and highly contaminated groups. We estimate, based on what we know about the characteristics of channels, such as Arthur Kill and Kill Van Kull that a third of the dredged materials would qualify as contaminated.

On September 7th, 1988, a number of us who were involved in preparing the Citizens' Proposal met with three officials of the New York District to discuss our concerns. When we inquired why the New York District had not considered our proposed new subaqueous pits C and D, we were advised that those sites fell outside of the Rocky Point/Sandy Hook transect and therefore outside of Corps jurisdiction and within EPA jurisdication under the Marine Protection Research & Sanctuaries Act (the Ocean Dumping Act). This discussion necessarily entailed consideration of the exact location of that transect or baseline. We would appreciate your advising us as to the exact location of the line that separates Corps jurisdiction under the Clean Water Act from EPA jurisdiction under the Ocean Dumping Act over dredged material disposal sites.

The New York District seems to be of a view that it cannot propose the siting of new subaqueous pits outside of the transect as part of its own evaluation process and that only EPA can do that, we need to know whether EPA has a process underway to consider the location of new subaqueous pits outside of the transect at sites C and D or elsewhere. Also at issue is the applicability of Section 211 of the 1986 Water Resources Act to the siting of new subaqueous pits. That Act calls upon EPA to designate alternative sites to the Mud Dumpsite for the disposal of dredged material, except those materials that are "substantially free of pollutants". In addition, Section 211 prescribes that EPA designate such sites at least 20 miles beyond the transect or baseline. While it might appear that the primary concern of Congress in enacting Section 211 was the location of sites for the open ocean disposal of dredged materials similar to the technique used at the Mud Dumpsite, we recognize that the term "ocean disposal sites" could be broadly construed to include subaqueous pits as well. We would like to know whether EPA considers Section 211 to apply to subaqueous pit sites located within its jurisdiction outside the transect and, if so, how the 20 mile restriction could apply.

Conceivably, EPA could be of the view that our sites C and D would be prohibited under Section 211 because they

In summary, we would request input from you or others at EPA with respect to the following:

1. The location of the transect or baseline separating Corps of Engineers Clean Water Act jurisdiction from EPA's Ocean Dumping Act jurisdiction for purposes of the siting of dredged disposal facilities.

2. The applicability of Section 211 of the 1986 Water Resource Development Act to the siting of subaqueous pits.

3. Whether EPA intends to consider the designation of subaqueous pits as alternatives to disposal of dredged material in the Mud Dumpsite.

4. EPA's schedule for the consideration of such alternative

5. EPA's procedures for establishing criteria to distinguish between dredged materials that are and are not substantially free of pollutants.

6. Other actions which EPA has initiated to characterize sediments, such as developing marine sediment standards.

Yours very truly,

James T.B. Tripp
Counsel

Enclosure

cc: Mario DelVaccario
Chief, Environmental Impacts Branch
U.S. EPA - Region II

SITE	MINIMUM DREDGED MATERIAL VOLUME
A	1,049,000 cubic yards
B	983,000 cubic yards
C	934,000 cubic yards
D	1,033,000 cubic yards

Note that if one of the intentions is to restore the bay bottom to its original grain size, a sand cap must be used. If the intent is only to physically isolate the contaminated dredged material, the cap need not be sand. Also note that we have assumed that only a final cap is needed. If it is determined that interim caps are needed, the disposal volume for each pit will decrease accordingly.

Operations at sites B, C and D would have to contend with relatively strong tidal currents, as well as exposure to ocean waves. The equipment could certainly operate under these conditions, but the accurate placement of dredged material may be more difficult. It may be necessary to build a bigger pit and not fill it completely to avoid resuspension, or it may be desirable to delay discharges to avoid the times of maximum tidal currents.

The models of Wong and Wilson (1979, An assessment of the effects of bathymetric changes associated with sand and gravel mining on tidal circulation in the Lower Bay of New York Harbor, Marine Sciences Research Center, Special Report 18, 24 p.) suggest that the tidal range and currents in the Lower Bay are more sensitive to changes in the bathymetry near the transect where the tidal currents are strongest (Sites B, C and D) than they are to bathymetric changes in other areas of the Lower Bay (for example at Site A). The tidal elevations and the currents should be monitored if pits are to be dug, but, of course, any changes should be temporary until the pits are refilled.

c. Regarding the operational schedule for constructing a subaqueous pit, I have estimated that if the dredged material is pumped directly into an on-shore receiving area on a 24 hour per day basis, it would take 1-2 weeks to dig a pit of the size you suggest. If barges are involved, I have assumed filling 3 or 4 4000-cubic yard barges a day, again on a 24 hour per day basis. This would take 2-3 months to complete. These time estimates do not include mobilization or de-mobilization of the dredging equipment, or delays due to bad weather. Also, if work is less than 24 hours per day, or if all the material is not excavated at one time, the time schedule will have to be adjusted accordingly. For the most part, the time required to dig a pit of the size you suggest is not as crucial as the storage capacity of the receiving area and the usage of the stockpile.

The time it would take to fill the pit would depend on the environmental quality of material involved in the filling activity and the availability of acceptable cap material. Currently about 4 million cubic yards of fine-grained dredged material are ocean disposed each year. If all this material were disposed in borrow pits, the four suggested pits would be filled within a year.

FEB 2 4 1989

James T.B. Tripp
Environmental Defense Fund
257 Park Avenue South
New York, NY 10010

Dear Mr. Tripp:

This is in reference to your letters of September 19 and October 7, 1988, requesting our view of your: "An Alternative Strategy for Disposal of Dredged Materials from the New York Harbor Region: A Citizens' Proposal" draft. I am also writing in response to questions you posed in your letters regarding our view of any effects that Section 211 of the Water Resources Development Act of 1986 (WRDA) would have on an evaluation of two sites outside of the confines of New York Harbor that you propose for construction of subaqueous borrow pits for the disposal of dredged material.

Your draft proposal contains many items that range from those that are directly related to borrow pit dredged material disposal to those dealing with the environmental problem of contaminated sediments in general. The main thrust of your proposal, however, appears to center on your view that a feasible alternative for disposal of contaminated dredged material, not suitable for open ocean disposal, is the use of subaqueous borrow pits. To this end, your letters state that two of the sites your study group identified are also identified in the New York District Corps of Engineers' (NYD) draft supplemental Environmental Impact Statement (EIS) on the use of subaqueous borrow pits for disposal of contaminated New York Harbor dredged material. Our Environmental Impacts Branch provides review of NYD's and other Environmental Impact Statements. It has notified NYD of EPA's position on this matter. EPA agrees that subaqueous borrow pits can provide a feasible, environmentally sound alternative for the disposal of some contaminated dredged materials, provided that upland disposal alternatives continue to be evaluated, and that the initial borrow pit disposal operation is carried out as a demonstration project with commensurate, acceptable monitoring to ascertain the environmental effects.

The two other sites identified in your proposal lie outside of the baseline from which the territorial sea is measured, and which separates the territorial sea and ocean waters from inland navigable waters. In response to one of the questions raised in your September 19 letter, the Convention on the Territorial Sea and the Contiguous Zone places this line between the farthest extension of Rockaway Point, New York and Sandy Hook, New Jersey, I trust that the above answers some of your questions forwarded to EPA Region II by your previous letters. Should you have any further questions on these matters, please contact Mr. Mario Del Vicario, Chief of our Marine and Wetlands Protection Branch at (212) 264-5170.

Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

cc: J. Tavolaro, Water Quality Compliance Branch, COE

THE PORT AUTHORITY OF NY & NJ

One World Trade Center
New York, N.Y. 10048

(212) 466-7000
(201) 622-6600

November 20, 1989

Mr. John F. Tavolaro
Chief, Water Quality Compliance Branch
26 Federal Plaza
New York, NY 10278-0090

Dear Mr. Tavolaro:

At the November 15, 1989 PICG meeting, I was concerned to learn of the Corps internal disagreement regarding the use of evaluative criteria to finalize the Draft Supplemental Environmental Impact Statement on the "Use of Subaqueous Borrow Pits for Disposal of Dredged Material from the Port of New York-New Jersey." In particular, others, and I concurred, expressed the opinion that the accessibility question of the Jamaica Bay and Hoffman-Swinburne borrow pits were not commented upon during the review period because it was common belief that these pits would be excluded in the final document.

It is upsetting that the Corps would consider retaining as an option the use of the Hoffman-Swinburne and the Jamaica Bay pits. To implement the use of these pits would require a major federal action which may have grave environmental impacts such as the building of new channels and subsequent generation of more dredged material. The use of Hoffman-Swinburne or Jamaica Bay pits defeats the purpose of the project which was to provide a means for disposal of contaminated dredged material. In addition, use of these pits jeopardizes the economic feasibility of implementing the project.

Finally, I believe the retention of the Jamaica Bay pits as an acceptable option is rather insensitive to the intent of the NEPA process in that the action would take place in the Jamaica Bay Wildlife Refuge and be contrary to the community's expressed wishes.

I request that the Corps consider access as exclusionary criteria and speedily issue the final EIS. I strongly believe any other course of action would be disastrous to the Port of New York and New Jersey, and set back potential harbor water quality improvements.

Sincerely,

David Berkovits

David Berkovits
Vice Chairman, PICG

cc: Dr. Simeon M. Hook
Corps of Engineers

Mr. Peter L. Sattler
Interstate Sanitation Commission

Writer's direct dial telephone (212) 466-8010

New York State Department of Environmental Conservation
47-40 21st Street, Long Island City, New York 11101

Thomas C. Jorling
Commissioner

December 6, 1989

Mr. Thomas M. Creamer
Chief, Operations Division
U.S. Army Corps of Engineers
Jacob K. Javits Federal Bldg.
New York, NY 10278-0090

Dear Mr. Creamer:

This letter is in reference to the Subaqueous Borrow Pit Project, which is investigating an operational program to dispose of dredged material in underwater sand pits in the Lower Bay of New York Harbor. At the last Interagency Steering Committee meeting, November 15, 1989, a presentation was given on the status of the project, specifically about the Environmental Impact Statement (EIS).

Mr. Tavolaro and Mr. Paula of your staff presented an analysis of the issues and comments raised during the Draft EIS stage. Based on the comments, they stated that they believed there were two site screening criteria for existing borrow pits that need to be looked at again. These were the "conflicting uses" criterion and the "limits to access" criterion. Comments received revealed the necessity to emphasize these criteria more than was the case in the Draft EIS. No new criteria were proposed.

The results of reviewing existing borrow pits against these criteria would be the elimination of three additional existing borrow pits from the list of "preferred pits". These would be pit no. 2 (Hoffman Swinburne) and pits nos. 14 and 15 (Jamaica Bay Pits). It was disturbing to find out, however, that this was not the consensus of all involved in the preparation of the EIS. Apparently, the New York District Planning Division who is preparing the document, does not agree with the project managers. The Planning Division representative at the Steering Committee Meeting stated that he believed that the site selection criteria does not need to be modified. This would effectively mean that all of the borrow pits listed in the Draft EIS as "preferred pits" would continue to remain on that list.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Management Division
Habitat Conservation Branch
Sandy Hook Laboratory
Highlands, New Jersey 07732

December 7, 1989

Mr. Bruce Bergmann
Chief, Planning Division
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Bergmann:

At the November 15, 1989 meeting of the Dredged Material Disposal Steering Committee, Mr. Tavolaro and Mr. Houston asked us for guidance on an intra-agency conflict concerning the Jamaica Bay pits and the Hoffman-Swinburne pit; subaqueous borrow pits in the New York Harbor area. Specifically, we discussed whether these pits should be listed in the supplemental environmental impact statement (SEIS) as existing borrow pits available for the disposal of dredged material. After a careful review, we see no way to avoid listing these pits in the SEIS, even though dropping them out may avert considerable outcry from those who claim to fish these pits, or, for some other reason, regard them as worthy of preservation.

Apparently, the Operations Division and the Planning Division disagree on whether the pits should be listed in the SEIS, even though both divisions recognize the unlikelihood of either of these pits ever being used. The question is whether federal NEPA regulations require the inclusion of these pits in the SEIS. The issue may seem moot, but it is difficult to resolve, with compelling arguments from both sides. Undoubtedly, either decision could, and most likely will enrage some aggrieved party. Unless the decision is based on the best available scientific information, as well as on clear and established procedure, the inevitable litigation may frustrate the entire subaqueous borrow pit filling program.

The biological constraints described on page 2-21 of the draft SEIS do not eliminate any of these pits. To date, we have no additional information which would change these conclusions.

Appendix C of the draft SEIS lists the physical criteria for subaqueous borrow pit disposal sites. However, the limiting factors for the Jamaica Bay pits are a need for extensive channel dredging for access, as well as some method for navigating under two low bridges. The Hoffman-Swinburne pit also requires some access dredging, although not as much. As limiting as

2 8 DEC [illegible]

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

LAWRENCE SCHMIDT
Director
Office of Program Coordination

CN 402
Trenton, NJ 08625 0402
(609) 292 2662
Fax (609) 292-0988

December 20, 1989

John F. Tavolaro
Chief, Water Quality Compliance Branch
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Tavolaro:

Subject: Supplemental EIS for the Use of Subaqueous Borrow Pits for the Disposal of Dredged Materials

At the November 15, 1989 meeting of the Steering Committee for the Disposal of Dredged Material in New York-New Jersey Harbor, the committee was made aware of an intra-agency conflict within the ACOE concerning the proper way to address the status of the Jamaica Bay borrow pits in the Final EIS for this disposal option. The committee was also asked to provide input into this matter so that a decision could be made and the conflict resolved.

Given the physical and practical limitations to the use of the Jamaica Bay borrow pits for disposal operations, it is the position of the New Jersey Department of Environmental Protection that the siting criteria should be tightened to eliminate serious consideration of these pits. We recommend that the Jamaica Bay borrow pits be identified as once being considered, but subsequently downgraded based on the identified need for extensive channel dredging and bridge modifications necessary to use the pits. A good case could be made to require a separate detailed environmental analysis of the impacts necessary to utilize the borrow pits.

Thank you for the opportunity to comment on this issue.

Sincerely,

Lawrence Schmidt
Director
Office of Program Coordination

MAR [illegible]

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

LAWRENCE SCHMIDT
Director
Office of Program Coordination

CN 402
Trenton, NJ 08625-0402
(609) 292-2662
Fax (609) 292-0988

March 2, 1990

John F. Tavolaro
Chief, Water Quality Compliance Branch
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

RE: EIS for the Use of Subaqueous Borrow Pits for the Disposal of Dredged Materials

Dear Mr. Tavolaro:

Pursuant to a request made at the January 31, 1989 Steering Committee meeting, the Office of Program Coordination of the New Jersey Department of Environmental Protection has investigated the availability of data concerning the recreational fishing usage of the borrow pits considered in the above referenced Environmental Impact Statement. The Bureau of Marine Fisheries of the Division of Fish, Game and Wildlife has no data which accurately distinguishes recreational use of individual borrow pits in the Lower Bay complex. Enclosed is a copy of "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay and The Shellfish Resources of Raritan Bay and Sandy Hook Bay". However, note that the information in this document is too general in nature to be used to evaluate individual pits and may be biased, in that only New Jersey fishermen were surveyed.

Sincerely,

Lawrence Schmidt
Director
Office of program Coordination

Proposed Conceptual Plan for Monitoring A Sub-Aqueous Borrow Pit (DRAFT STEERING COMMITTEE REVIEW PROPOSAL: March 1990)

Introduction

The purpose of monitoring a sub-aqueous borrow pit is to ensure that the disposal material does not escape from the pit directly, and to ensure that contaminants are not taken up by the biota. At this time it is not appropriate to propose a detailed monitoring scheme, as has been requested by some state agencies responding to the DSEIS. A detailed plan would depend greatly on the specific alternative selected, approved operational methods of use, and existing information available at the time of use, all of which will not be finalized until after this FSEIS is reviewed and permits approved. Instead, what is being described here is an outline for what a monitoring plan will assess, and recommendations for procedures that might best accomplish those goals.

Physical Monitoring

a. There are several goals to a physical monitoring program: to ensure the proper filling of the site, monitor the integrity of the final cap, and determine if sediments are leaving the site during disposal. The first of these goals is straightforward, and can be accomplished through bathymetric surveys and on-site inspection. Periodic surveys would establish both how much capacity remains in the pit and how uniformly the deposits have been placed. The former cannot be inferred by totaling barge loads as some small portion of material will be lost (generally under 5%), consolidation of the deposit may take three months or more, and barges never hold their full volume (too much water with the sediment to allow full compacting). Yet this parameter is important to know if interim caps are employed (they'll be based on volume), as well as for determining remaining capacity and developing subsequent schedules.

b. After an initial detailed bathymetric survey of the pit (using at least 50 foot line spacing) follow-up precision surveys (using at least 150 foot spacing) should be conducted after each operation that disposes at least 35,000 cys, as well as after every 100,000 cys (from several small operations or as part of a very large disposal operation). After 25,000 cys the manager of the site should estimate the probable mound configuration (based on projections of maximum deposit thickness). After 100,000 cys the manager would utilize the available data on porosity and compressibility (based on tests that would be required of all candidate sediments for borrow pit disposal), as well as volume and mass calculations of the discharge, to predict the actual volume of the deposit. Such information is necessary for efficient site management, in order to estimate remaining site capacity, and determine if the disposal buoy should be moved, or the final cap placed. The former would occur if the disposal mound reached to useful in determining if the cap is winnowing away. Increases in grain sizes may indicate the cap is being winnowed, and, if the grain size doesn't stabilize, the cap should likely be supplemented with sand of coarser size (more closely resembling the ambient sediments). As an alternative, a slightly thicker cap might be applied so that the current can winnow out the finer sizes and leave a coarser, sufficiently thick and stable cap behind. Once the site stability (consolidation) has been established, long-term monitoring of the cap could be reduced in frequency to 2,5, and 10 years after closure.

Biological Monitoring

a. The purpose of the biological monitoring is to detect whether contaminants from the disposal site are available for uptake and accumulation in marine organisms. The benthic community provides the best opportunity to detect such losses as they are relatively immobile, and any findings can best be correlated with the disposal site. Use of fish, on the other hand, presents an added concern in that it is never certain that contaminated individuals picked up such material from the borrow pit, or that fish free of such contaminants had only just entered the vicinity and didn't have enough time to accumulate representative levels actually in the environment. Identification of individual test species would not be appropriate, as there would be no way of enduring collection of a sufficient amount of biomass for tissue analysis. Instead, representative genera would be selected, and target species pooled to obtain the needed biomass. The actual genera selected for testing will depend on the communities present in and near the selected pit site. This will be determined from a one-time broad seasonal survey in and around the selected alternative and control pits. A minimum of two genera should be chosen, as alternates are necessary due to sampling uncertainties. The genera should be one whose members likely to repopulate the cap after site closure, with preference for those of a sufficiently long life spans and lipid content to be able to bioaccumulate any contaminants that may become available. If possible, the genera will be selected to represent the two major functional groups of benthos: filter-feeders and deposit feeders.

b. Stations should be sampled just before the pit is first used, in order to determine ambient tissue levels before disposal starts. This survey can also serve to provide baseline data described above, with all samples preserved and tissue analysis later conducted on the selected test genera. Routine sampling would occur during the life of the pit, and following the final cap. The DSEIS initially proposed locating stations along a transect oriented in a line consistent with net tidal movement so as to increase their likelihood of exposure to contaminants leaving the disposal site. However, reviewers of the DSEIS pointed out that such an arrangement did not account for the complex current/tidal patterns common to the lower bay complex. Instead, sampling would occur in quadrants set up around the circumference of a pit. Several such concentric rings might be established at 500, 1,000, 2,000 and even 4,000 feet from

e. The above sampling protocol would occur throughout the operational life of the disposal site. Once the final cap is installed a quadrant will be located on top of the cap, and the overall benthic sampling frequency can be reduced to yearly sampling (spring) at the same long-term frequency that the cap will be physically monitored. Routine collection of samples from inside the pit while it is still being used for disposal is not considered warranted as the habitat will be subjected to continual disturbances. As a precaution however, samples in the pit could be collected and analyzed if a sufficiently long enough time has elapsed between disposal events for repopulation to occur. If there has been no disposal after two sampling periods, then the interim cap inside experimental (as well as the control pit) would be sampled and analyzed, along with the routine outer quadrant stations, during the next scheduled monitoring period.

Chemical Monitoring

Routine testing of water and sediment samples is not warranted, as the water column is heavily influenced by tides, currents, and storms, and is therefore an unreliable indicator of a contaminant's source and levels, especially if measured at one point in time. Only continual monitoring would provide a useful picture, and no established monitoring systems exist to measure the contaminants of concern. Even if they did, it is doubtful that the results would be of any added value to these from the biological monitoring described above. Similarly, sediment testing, while more useful than water column testing, will not add a significantly new component to what will be available from the biological sampling. This is because the benthic organisms concentrate contaminants, thereby being able to identify their presence even though sediment levels may be too low to detect. In addition, the concern with contaminants is their effect on the biological community. The biological monitoring gets to this point directly , instead of the more indirect interpretation of chemical results.

NY/NJ SHOP Coordination

To satisfy the regulatory requirements needed for project authorization, an environmental impact statement is being prepared for the subaqueous borrow pit program. As part of this E.I.S., potential impacts to any significant cultural resources in the borrow pit areas will be assessed. This assessment will consist of a documentary study of (1) the late and post-Pleistocene geological history of Lower New York Bay and (2) the history of vessel utilization of the waters of the Lower New York Bay vicinity for commerce, recreation, and/or military purposes. While it is assumed that the potential for prehistoric sites within any of the borrow pit areas will be found to be remote, previous research has shown that the potential for shipwrecks in the general Lower New York Bay vicinity is quite high.

It is the opinion of Corps staff that no significant cultural resources can be expected to remain within any of the existing borrow pits. However, should an existing borrow pit be selected for use, an access channel may need to be dredged. This would entail a reconsideration of impacts to cultural resources for this project at a later time, since it is impossible to predict now where such an access channel might be located.

Therefore, the in-house documentary study will be used primarily to assess the relative sensitivity for cultural resources of each of the proposed new borrow pit locations. This information will be incorporated into the overall assessment of the borrow pits and will be used in the ranking of all of the borrow pits to be presented in the Draft Environmental Impact Statement. As usual, your office will receive a copy of the Draft E.I.S.

At this time, the New York District would welcome any comments you may have on our approach to cultural resource considerations for this project, as outlined above. We would also welcome any information you may have on known significant cultural resources within the Lower New York Bay vicinity. Please foward any comments to us by February 28, 1986 at the latest so that we may take them into consideration in time for the D.E.I.S.

If you or your staff have any questions, please contact Jan Ferguson of the Environmental Analysis Branch at (212) 264-4662. Thank you for any assistance you may be able to provide us. We look foward to corresponding with you further about this project in the future.

Sincerely,

Samuel P. Tosi, P.E.
Chief, Planning Division

Enclosure

cf: Tosi
Hook
Tavolaro/Paula
Will
Houston

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Sincerely,

Enclosure

Samuel P. Tosi, P.E.
Chief, Planning Division

cf: Tosi
Hook
Tavolaro/Paula
Will
Houston ✓

OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238

March 31, 1986

Mr. Samuel P. Tozi, P.E.
Chief, Planning Division
Department of the Army, Corps
of Engineers
NY District
Federal Plaza
New York, NY 10278-0090

Dear Mr. Tozi:

Re: CORPS
Dredged Material Disposal Management Plan
Borrow Pit Option - Multiple County

The State Historic Preservation Officer (SHPO) recently received and commented on the above referenced project (letter of March 17, 1986). However, based on new information, it is the SHPO's opinion that there is a likelihood of shipwreck remains being located in the area of the new borrow pits. Therefore, it is the opinion of the SHPO that a remote sensing survey would be appropriate for these areas.

This letter supercedes our earlier correspondence. If you have any questions, please contact Bruce Fullem at 518:474-3176.

Sincerely,

Julia S. Stokes
Deputy Commissioner for
Historic Preservation

bb

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

March 22, 1990

Special Projects Section
Environmental Analysis Branch

Ms. Julia S. Stokes
Deputy Commissioner for Historic Preservation
New York State Office of Parks, Recreation
and Historic Preservation
Agency Building 1
Rockefeller Empire State Plaza
Albany, New York 12238

Dear Ms. Stokes:

The New York District, Corps of Engineers is proceeding with the preparation of an Environmental Impact Statement (EIS) for an operational program for the disposal of dredged material in subaqueous borrow pit disposal sites in lower New York Harbor and adjacent areas. We received preliminary comments from your staff at the outset of this effort (Enclosure 1).

All potential borrow pit sites were evaluated for cultural resource sensitivity in the draft EIS transmitted to your office for review on June 24, 1988. The draft EIS selected two new sites, the East Bank Area in New York State and the Lower Bay Area in New York and New Jersey waters, for further environmental review. On the basis of the preliminary assessment prepared by Corps Staff and incorporated into the draft EIS, both areas were surveyed for submerged cultural resources. The results of that study are provided in the enclosed report "Archaeological Survey East Bank and Lower Bay Areas, New York Harbor, New York" (Enclosure 2).

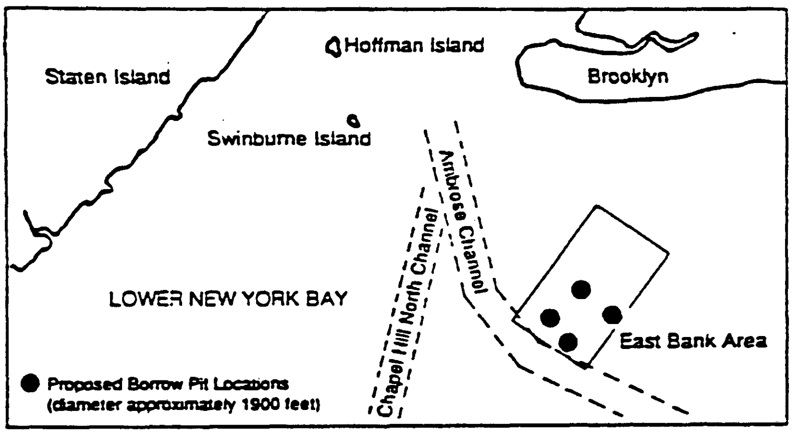
The consultant preparing this report, Ocean Surveys, Inc. (OSI), identified several features in the Lower Bay Area which may represent submerged river channels dating to the post-glacial epoch. It is possible that pre-inundation land surfaces containing evidence of prehistoric ecological adaptations are preserved in sediments associated with the channels. The EIS will indicate that further evaluation of these features is warranted if they are to be subjected to impacts due to borrow pit excavation. No submerged geomorphic features were identified in the East Bank Area and the report concluded that no evidence of prehistoric populations is likely to remain there. The EIS will not require

Borrow Pit Cultural Resources Survey

The Corps received the results of the cultural resources survey of the two proposed new borrow pit sites (the East Bank Area and the Lower Bay Area). The survey was required to comply with existing laws and regulations regarding the protection of archaeological and cultural resources such as shipwrecks. The results of this survey have been incorporated in the borrow pit Environmental Impact Statement which was recently distributed in draft form.

The survey was supervised by Corps archaeologists coordinating with New Jersey and New York State historic preservation offices (SHPO). The survey consisted of the use of magnetometers, sub-bottom profilers and side scan sonar in the evaluation of the two proposed pit sites.

Results showed that there were no areas with prehistoric land surfaces that have remained intact; they have all been inundated. Over two dozen potential shipwrecks were identified within the two proposed new pit sites. The potential wrecks within the East Bank Area are all concentrated in the northern part of the area. There are four locations in the East Bank Area that a new pit, 1900 feet in diameter, could be placed without impacting possible cultural resources (see map). The potential wrecks within the Lower Bay Area were evenly distributed so there was no section within it where a new pit of the size considered above could be placed without additional surveys. It should be stressed that pits larger than the minimum diameter, or pits in sections of the two sites which may contain possible cultural resources, could still be considered, but further field work would be needed to more fully characterize the importance of any possible cultural resources.



Proposed new borrow pit locations based on avoidance of potential cultural resources (map not to scale)

Prepared IAW AR 310-2
Issued by Chief, Water Quality Compliance Branch, New York District

John Tavolaro: *Chief, Water Quality Compliance Branch*
Deborah Freeman: *Editor*
Leslie Blum Design, Inc: *Design*

PICG *Update*
Department of the Army
U.S. Army Engineer District, New York
Jacob K. Javits Federal Building
(26 Federal Plaza)
New York, NY 10278

further pre-construction investigation of prehistoric resources in this Area. However, all dredging activities will be subject to regulations concerning the discovery of unanticipated archaeological resources.

OSI located fifteen remote sensing anomalies in the Lower Bay Area which have a strong potential for being shipwreck sites. The distribution of these anomalies precludes the excavation of a borrow pit, approximately 1900 feet in diameter including a buffer zone perimeter of 200 feet, without impacting one or more of those anomalies. Therefore the EIS will stipulate that additional cultural resource investigations be conducted for any targets in the vicinity of a proposed borrow pit in the Lower Bay Area.

In the East Bank Area, twelve possible shipwreck sites were identified. Their distribution makes it is possible to locate four borrow pits in the southern half of the Area (Enclosure 3) which will not impact any of the targets. The EIS will recommend those locations for the excavation of borrow pits.

In the opinion of the Corps, the excavation of subaqueous borrow pits in any of the four locations shown on Enclosure 4 will have no effect on cultural resources. If other locations are selected, additional studies will be needed to determine if resources eligible for the National Register of Historic Places are present and to assess effect. Please provide us with Section 106 comments for this project as pursuant to 36 CFR Part 800. If you or your staff have any questions or require further information, please contact Roselle Henn at (212) 264-4663. Thank you for your assistance.

Enclosures

Sincerely,

[signature]

for Bruce A. Bergmann
Chief, Planning Division

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238-0001

April 17, 1990

Mr. Bruce A. Bergmann
Chief, Planning Division
Department of the Army
New York District Corps of Engineers
Jacob K. Javits Federal Building
New York, New York 10278-0090

Dear Mr. Bergmann:

Re: CORPS
Dredged Material Disposal Management Plan
New York, New York County
90PR0750

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

The SHPO concurs with the determination of No Effect for four locations in the East Bank area as identified on your enclosure 3 (see attached copy). We understand that other areas warrant additional investigation if selected.

If you have any questions, please call Shirley Dunn at our Project Review Unit at (518) 474-0479.

Sincerely yours,

Julia S. Stokes
Deputy Commissioner for
Historic Preservation

JSS/SD:tr

Enc. "Enclosure 3"