FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
JULY 1992

DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE IN MASSACHUSETTS BAY

PREPARED BY:

U.S. Environmental Protection Agency, Region I
Water Quality Branch
JFK Federal Building
Boston, MA 02203

Julie Belaga

Julie Belaga,
Regional Administrator

July 14, 1992

Date

FINAL ENVIRONMENTAL IMPACT STATEMENT

PROPOSED ACTION:	Designation of an Ocean Dredged Material Disposal Site in Massachusetts Bay
LOCATION:	Massachusetts Bay
DATE:	July 1992
SUMMARY OF ACTION:	FEIS considers the Environmental Acceptability of Alternative Locations for the designation of an Ocean Dredged Material Site in Massachusetts Bay in accordance with the Mitigation Measures set forth within
LEAD AGENCY:	U.S. EPA, Region I JFK Federal Building Boston, MA
COOPERATING AGENCIES:	U.S. Army Corps of Engineers U.S. Fish & Wildlife Service National Marine Fisheries Service
FOR FURTHER INFORMATION AND TO OBTAIN A COPY OF THIS DOCUMENT CONTACT:	Kymberlee Keckler U.S. EPA, Region I JFK Federal Building (WQE-425) Boston, MA 02203-2211
TELEPHONE:	(617) 565-4432 or FTS 835-4432
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LIST OF PREPARERS

U.S. EPA, REGION I

Preparers:

Kymberlee Keckler, BS

Reviewers:

Ronald G. Manfredonia, MS

Gwen S. Ruta, BS

Mark A. Stein, JD

David A. Tomey, MS

U.S. ARMY CORPS OF ENGINEERS

Reviewers:

Thomas J. Fredette, PhD

William A. Hubbard, MS

NATIONAL MARINE FISHERIES SERVICE

Reviewers:

Christopher L. Mantzaris, BS

Michael Ludwig, BS

U.S. FISH AND WILDLIFE SERVICE

Reviewers:

Vernon Lang, BS

Kenneth Carr, MS

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CHAPTER 1. INTRODUCTION AND ORGANIZATION

This Final Environmental Impact Statement ("FEIS") responds to comments on EPA's Draft Environmental Impact Statement ("DEIS") entitled Evaluation of Continued Use of the Massachusetts Bay Dredged Material Disposal Site dated September 1989 and Supplemental Draft Environmental Impact Statement ("SDEIS") entitled Alternative Site Screening dated July 1990, and evaluates new information developed subsequent to the issuance of these EISs. The focus of this FEIS is a response to comments on the draft documents and a reexamination of the analyses, conclusions, and recommendations contained in the DEIS and SDEIS. The reevaluation considers public and agency comments received on these EISs and new information obtained since the publication of these EISs.

Chapter 2 presents a guide to the comments received on the DEIS and the SDEIS, showing how public and agency comments submitted to EPA by mail or during the public hearing held on November 1, 1989 are grouped into comment issue categories. Chapter 3, which represents the heart of this FEIS, is devoted to presenting the comments received on the DEIS and the SDEIS and EPA's responses. The expanded technical evaluations, which address public health, the Industrial Waste Site ("IWS"), impacts on higher level trophic organisms, designation of a new reference site, and a decision-making framework for monitoring, are also discussed throughout the text of Chapter 3. Chapter 4 describes changes to EPA's original proposed MBDS boundary alternative and describes the recommended alternative. Chapter 4 also describes recommended mitigation measures and management of the proposed ocean disposal site. Chapter 5 contains errata, or changes and corrections to specific sections of the DEIS or SDEIS. Comment letters and public hearing transcripts are reproduced in Appendix A. The original contents of the DEIS or SDEIS are not reproduced here and stand as documents of record. This FEIS contains modifications of and additions to the contents of the DEIS or SDEIS where necessary.

The release of this FEIS will be followed by a public comment period similar to that which followed publication of the DEIS and SDEIS. EPA's final decision regarding the boundary for the designation of an ocean dredged material disposal site in Massachusetts Bay will be issued in a Proposed Rulemaking published in the Federal Register after the close of the FEIS comment period. The Final Rulemaking, which follows the Proposed Rulemaking and is also published in the Federal Register, will result in actual site designation.

EPA is currently working with the Massachusetts Coastal Zone Management Office ("MCZMO") to acquire a federal consistency determination on the proposed MBDS designation. EPA's letter to the MCZMO is included in Appendix E. The outcome of this federal consistency review for the MBDS site designation will be discussed in the Proposed and Final Rulemaking packages.

Several comments on the EPA's EISs identified issues, such as previous disposal of low-level radioactive and industrial wastes in Massachusetts Bay and the siting of a containment site for contaminated dredged material, which are currently being addressed by

EPA and other responsible agencies. Although these issues are discussed briefly in Section 3.9, they are not comprehensively addressed in this FEIS because they are not immediately germane to the need for or continued use of an ocean dredged material disposal site in Massachusetts Bay. These issues will be the subject of future studies and documents to be produced by EPA, the COE, and others.

1.1 Summary of Draft Documents

EPA issued a DEIS in September 1989 which evaluated the continued use of the existing MBDS. In Chapter 1 of the DEIS, EPA evaluated the need to formally designate a dredged material disposal site in Massachusetts Bay based on projected disposal needs. Chapter 2 of the DEIS discussed alternatives to the proposed action, including both upland and other disposal site alternatives. EPA succinctly described the affected environment and presented data on the ambient physical, biological, and chemical conditions at the MBDS in Chapter 3 of the DEIS. EPA used this information to predict the environmental consequences of the proposed MBDS designation in Chapter 4 of the DEIS. EPA's detailed analysis of potential environmental effects caused by dredged material disposal included an assessment of the following: biological community effects, physical impacts of burial and isolation, water quality effects, and the potential for sediment movement. An analysis of the management and monitoring undertaken at the MBDS was presented in Chapter 5 of the DEIS. EPA concluded in its DEIS that properly managed dredged material disposal will not cause unacceptable adverse impacts in the environs of the proposed MBDS.

In July 1990, in response to comments received on the DEIS, EPA published a SDEIS which examined alternative ocean disposal sites, including the present MBDS. The SDEIS identified a Zone of Siting Feasibility ("ZSF") -- the area of the ocean located an economically and operationally feasible distance from potential dredging projects. Within the ZSF, EPA identified and evaluated three alternative areas, namely the Northern Massachusetts Bay Area, the Southern Massachusetts Bay Area, and Murray Basin. All three areas were found to comply with the site selection criteria at 40 CFR §§228.5 and 228.6 and were deemed to be suitable to accommodate an ocean disposal site. The Northern Massachusetts Bay area, which includes the present MBDS, was preferred because it had been historically used.

In developing its EISs, EPA received considerable input from the public, regulatory agencies, and the academic community. EPA coordinated with several cooperating agencies during the EIS process in order to harness the special areas of expertise concerning particular environmental issues. This also served to enhance EPA's interdisciplinary capabilities. EPA consulted with the National Marine Fisheries Service (NMFS) for their expertise in marine mammals and reptiles, the U.S. Fish and Wildlife Service for their expertise in migratory birds, and the COE for their expertise in dredged material management and monitoring.

In writing this FEIS, EPA also consulted with the National Oceanic and Atmospheric Administration to discuss the coexistence of the proposed MBDS with the proposed

Stellwagen Bank National Marine Sanctuary, and with the Massachusetts Coastal Zone Management Office to discuss future MBDS management and monitoring. EPA also received public and agency comments either by mail or during the public hearing held on November 1, 1989.

Additionally, in April 1991 EPA and the COE initiated a series of public workshops to discuss dredging and disposal issues in the Massachusetts region. The goal of the workshops is to foster improved communication and understanding of the many complex issues involved in dredging and disposal. These workshops are discussed further in Chapter 3.

CHAPTER 2. COMMENTS

Comments on the DEIS and the SDEIS were received by EPA during the 45 day comment period following the issuance of each document. Written and oral comments were received from government agencies and private individuals and organizations. In order to facilitate public comment, EPA held an informational public meeting in Cambridge on November 1, 1989 at which oral comments on the DEIS were received. EPA also distributed copies of the DEIS and SDEIS to 12 libraries along the coast of Massachusetts (see List of Repositories located before the Table of Contents) and over 200 other parties including state and federal agencies, scientists, and interested individuals. Every comment has been reviewed by EPA and the following is a discussion of EPA's approach to addressing the comments.

In order to be responsive to commentors and address comments in an efficient manner, EPA has conducted a review of all comments received and developed a complete list of issues raised by commentors. From this list, a matrix of issue categories and individual commentors was developed (Figure 2-1). This matrix is intended to be used as a guide for individual commentors to find responses to their comments. Categorizing issues and responses in this manner allows all aspects of an issue to be discussed comprehensively and also allows for a clear presentation of the particular issues of concern. A summary of the comments on each of these issues is presented in Chapter 3 of this FEIS, followed by EPA's detailed response.

Some comments received by EPA were very general, and expressed the writer's opinion without addressing a particular issue. These comments were considered by EPA but did not require a direct response. Copies of all original comment letters and a copy of the public hearing transcript can be found in Appendix A of this FEIS.

Figure 2-1: Matrix of Commentors and Issues Raised

	3.1 Need for Designation	3.2 Alternatives Analysis	3.3 Assessment of Toxics	3.4 Impacts to Biota	3.5 Bioaccumulation in Biota	3.6 Potential for Public Health Impacts	3.7 Sediment Movement	3.8 Final Boundary Configuration	3.9 Management & Monitoring of the Site	3.10 Endangered Species	3.11 Coexistence with National Marine Sanctuary	3.12 Miscellaneous Comments
U.S. Army Corps of Engineers, Waltham, MA		●	●				●	●	●			●
U.S. Fish & Wildlife Service, Concord, NH	●		●	●	●		●		●			●
National Marine Fisheries Service, Gloucester, MA	●	●	●	●	●	●	●		●	●	●	●
National Oceanic & Atmospheric Administration, Rockville, MD	●	●						●	●		●	
National Oceanic & Atmospheric Administration, Washington, DC				●				●			●	●
Massachusetts Coastal Zone Management Office, Boston, MA	●	●	●	●	●	●	●	●	●	●	●	●
Massachusetts Division of Marine Fisheries, Boston, MA	●	●		●		●			●		●	
Massachusetts Department of Public Health, Jamaica Plain, MA	●		●			●					●	●
New England Aquarium, Boston, MA	●		●		●				●		●	
Massachusetts Audubon, Gloucester, MA	●	●	●		●				●			
Conservation Law Foundation, Boston, MA	●	●	●		●	●		●	●			
Center for Marine Conservation, Washington, DC	●		●				●	●	●		●	
Center for Coastal Studies, Provincetown, MA								●	●	●	●	
International Wildlife Coalition, North Falmouth, MA			●				●		●	●	●	
Cetacean Research Unit, Gloucester, MA					●				●	●		
Save the Harbor/Save the Bay, Boston, MA					●				●			
Gloucester Fisherman's Wives Association, Gloucester, MA				●								

CHAPTER 3. RESPONSES TO COMMENTS

The following is a presentation of the comments received on the Draft Environmental Impact Statement ("DEIS") dated September 1989 and the Supplemental Draft Environmental Impact Statement ("SDEIS") dated July 1990, and EPA's response. As discussed in Chapter 2, the comments are grouped into categories of issues. As will become evident, many of the issues overlap, and where this occurs the reader is referred to other appropriate discussions in the text or EISs.

3.1 Need for Designation

3.1.1 Purpose of EPA Action

One commentor was not certain whether the purpose of the DEIS was continued use or "permanent" designation of the Massachusetts Bay Disposal Site ("MBDS").

EPA Response

As discussed in Chapter 2 of the DEIS, the purpose of the analyses presented is to determine the continuing need for and suitability of the MBDS as an available option for dredged material disposal. Final site designation would allow the MBDS to be considered as a disposal option for dredged material when land-based alternatives are not available or sufficient. Therefore, "permanent" designation would allow for continued use when appropriate.

3.1.2 Upland Alternatives

One commentor charged that EPA's review of upland alternatives was not adequate. Several commentors charged that EPA attempted to replace the alternatives site screening for a disposal site with the alternatives analysis undertaken as part of individual permit reviews.

EPA Response

As explained in the DEIS and SDEIS, other alternatives for specific projects, such as upland disposal, confined subaquatic disposal, or use as cover for coastal landfills are considered during the permitting process for each dredging project. To qualify for a marine disposal permit an applicant must conduct an alternatives analysis, as required by the Ocean Dumping Regulations at 40 CFR §227.16(a)(2), which requires that only when there "... are no practicable alternative locations and methods of disposal or recycling available...which have less environmental impact or potential risk to other parts of the environment than ocean dumping..." can authorization for ocean disposal be granted. Thus, a thorough alternatives screening must be conducted for each dredging project prior to selecting ocean disposal as the preferred disposal alternative. Such an analysis must show that ocean dumping is the only practicable alternative for the specific project being proposed. Additionally, the

materials proposed for ocean disposal must be shown to be suitable (40 CFR Part 227) for unrestricted open water disposal at the MBDS (see also Chapter 5 of the DEIS and the response to comment number 3.9.1.2).

EPA has identified a regional need for disposal of dredged material from dredging projects in the Massachusetts Bay area. In the DEIS, SDEIS, and the FEIS, EPA evaluated alternatives for dredged material disposal on the regional scale, including upland disposal, alternative areas for ocean disposal, and continued use of the existing MBDS.

The analysis of upland and other alternatives discussed in Chapter 2 of the DEIS was conducted on a long-term, regional level to determine whether enough practicable alternative capacity existed to negate the need for designating an ocean disposal site. As discussed on pages 12 and 13 of the DEIS, EPA believes that the capacity of available upland disposal sites would only accommodate a fraction of the projected regional disposal needs. As part of the development of this FEIS, EPA further investigated several upland disposal options (for all project sizes) and confirmed that available upland capacity is not sufficient to meet regional disposal needs (SAIC, 1987; Sasaki Associates, 1983; MDPW, 1990). Although many potential upland disposal sites were identified, the volume of dredged material that could be accommodated was far less than the 50 year disposal need of the region (approximately 15 million cubic yards). As a result, EPA and the COE have reaffirmed the need to designate an ocean dredged material disposal site. Comments particular to the alternatives analysis conducted in the SDEIS on other alternative areas for ocean disposal are discussed in the response to comment number 3.2.2.

The analysis EPA performed for the designation process does not replace the project specific alternatives analysis required for each individual permit proposal through the COE permitting process under Section 103 of the MPRSA. As discussed above, final designation simply means that the site would remain available as a disposal option.

3.1.3 Future Use Estimates

Several commentors requested that EPA estimate future use of the proposed MBDS. Others questioned whether there is sufficient capacity at the proposed MBDS location. Some commentors requested that EPA estimate the volumes of dredged material to be generated by future projects and display pre-1976 trends in order to support the perceived need for a site designation.

EPA Response

According to the U.S. Army Corps of Engineers ("COE"), the capacity of the MBDS is large enough to easily accommodate approximately 23 million cubic yards of dredged material, which correlates to regional disposal needs for nearly the next hundred years (COE, 1988). Disposal site capacity is highly dependant on the topography of the seafloor within the boundaries of the site, as well as the depth, size, and location of the site. Since the

proposed MBDS is in deep water, is large in diameter, and has a relatively flat bottom, it can accommodate more dredged material than other sites in New England. The COE correlated the 23 million cubic yards estimate to a one hundred year need by assuming, in part, that past disposal trends will continue. More accurate long-term estimates are difficult to establish, as actual future permit applications will be dependent on factors such as available resources, economic conditions, and construction techniques.

Future needs, as discussed in Chapter 1 of the DEIS, were based in part on historical trends. Trends established prior to 1976 would only be germane to projects which are not dredged frequently. EPA does not believe that analysis of pre-1976 trends would modify use estimates since the DEIS analyzes future use for only the next twenty years. As discussed in the DEIS, the COE has estimated that approximately three million cubic yards of dredged material will be disposed of at the proposed MBDS over the next twelve years.

In 1983, approximately 425,000 cubic yards of material was dredged from President Roads and the Mystic and Chelsea Rivers. The Reserved Channel was last dredged in 1960 and the Main Ship Channel in Boston Harbor was dredged in 1951. For the current proposed Boston Harbor Improvement Dredging, EPA has determined that surface sediments proposed to be dredged from Boston Harbor, the Mystic and Chelsea Rivers, and the Reserved Channel are not acceptable for unrestricted open water disposal at the MBDS. This corresponds to about 720,000 cubic yards or about 32% of the total amount of material proposed to be dredged (see Appendix B for EPA's comment letter on this project). Dredging volume estimates from the federal Boston Harbor navigational improvement project and the Third Harbor Tunnel alignment were not included in future volume projections. Inclusion of these volume projections, as explained in Chapter 1.2 of the DEIS, could have tripled EPA's estimate.

3.1.4 Past Disposal Volumes

One commentor noted that the statement on page 7 of the DEIS that 2.8 million cubic yards of material have been disposed of at MBDS over the past ten years is inaccurate. As the COE's site evaluation document and the DEIS Table 1-2 clearly show, the 2.8 million cubic yards were disposed over 12 years. Clarification of the use of the 10 versus 12 years in calculations throughout the remainder of the EIS should be provided.

EPA Response

EPA concurs. However, such a change will not have a substantial effect upon the needs assessment or analysis of past trends which was presented in the DEIS. This is largely because EPA estimated the projected **twenty** year need for ocean disposal, which would include the twelve year projection (see also the responses to comment numbers 3.1.2, 3.1.3, and 3.1.5). Use of ten years instead of the more accurate twelve year estimate did not affect EPA's analyses and therefore EPA believes that further clarification or revision of the DEIS is unnecessary.

3.1.5 Relationship to Other Disposal Sites

One commentor recommended that EPA discuss whether the Cape Arundel and Portland Disposal Sites have the capacity to meet regional needs.

EPA Response

The Cape Arundel and Portland disposal sites are not suitable to be used for dredging projects in Massachusetts primarily because they are not located within the Zone of Siting Feasibility for these projects. While the DEIS mentions on page 13 that the Portland and Cape Arundel Disposal Sites may be not economically feasible to use for Massachusetts, it does not discuss their site capacity. The capacities of these sites **combined** is far less than half the capacity of the proposed MBDS. In addition, the Cape Arundel and Portland disposal sites are typically used for the regional disposal needs of Maine and New Hampshire and lack sufficient capacity to handle future disposal needs from the greater Boston area. Consequently, EPA concurs that these sites can not accommodate the regional disposal needs of the coastal Massachusetts area.

3.2 Alternatives Analysis

3.2.1 Alternatives Analysis in the DEIS

Several commentors were concerned that EPA did not prepare an adequate alternatives analysis. Other commentors charged that the DEIS failed to meet the environmental review requirements of the National Environmental Policy Act ("NEPA") (42 USC §§4321 et seq.) and the site designation requirements of the Marine Protection, Research, and Sanctuaries Act of 1972 ("MPRSA") (33 USC §§1401 et seq., and 16 USC §§1431 et seq.) including the requirement that all reasonable alternatives, such as the inclusion of alternatives beyond the Continental Shelf and alternative methods of disposal, such as upland sites or containment facilities, be considered.

EPA Response

In response to several comments on the DEIS which urged an expanded consideration of alternative sites to the present MBDS, EPA prepared a SDEIS in July 1990 to greatly extend its evaluation of such alternatives. The DEIS evaluated potential environmental effects resulting from continued use of the site after determining that no feasible upland alternative s existed for regional dredging needs. The SDEIS presented an alternatives analysis which identified areas within Massachusetts Bay that would best accommodate an ocean dredged material disposal site. EPA's SDEIS is effectively the response to these particular comments and through its preparation, EPA has allowed for integrated planning and consideration of all reasonable environmentally protective alternatives. Comments on the alternatives analysis presented in the SDEIS are discussed below.

3.2.2 Alternatives Analysis in the SDEIS

Some commentors charged that EPA's siting decision was based on cost and convenience, not on environmental considerations. Thus, the disposal site was not being sited further offshore because it would be too expensive. Some commentors believed that the alternatives analysis presented in the SDEIS was inadequate. Comparing the existing MBDS to other general areas where an ODMDS could be sited was believed to be inappropriate because of the differences in scale and detail of information known about each site, and that EPA should gather specific information on each site to render such comparisons valid. One commentor believed that the SDEIS should have included charts with bathymetric contours in order to assist in comparing candidate areas.

EPA Response

EPA's primary consideration in siting a disposal area was to locate a site which satisfied the criteria established under MPRSA and promulgated at 40 CFR §§228.5 and 228.6. As explained in the SDEIS, the process for identifying sites for disposal of dredged material begins with the delineation of a Zone of Siting Feasibility ("ZSF"). This zone must be located within an economically and operationally feasible distance from potential dredging projects, but must also exclude environmentally sensitive areas. As explained in the SDEIS, several factors influence the extent of the ZSF, including:

- cost of transporting dredged material;
- navigation restrictions;
- distance to the edge of the Continental Shelf;
- existing political boundaries;
- environmentally sensitive areas; and
- areas of incompatible uses.

From a management perspective, delineation of the ZSF allows EPA to focus studies on areas and candidate sites where disposal of dredged material is practical and may be environmentally acceptable, and to avoid spending limited resources on studies of sites where dredged material disposal is not economically, operationally, or environmentally feasible. In the SDEIS, EPA identified the ZSF as three areas which merited additional analyses to determine their suitability as potential ocean dredged material disposal sites (see page 23 of the SDEIS).

EPA did not simply trade environmental values for cost savings in its site evaluations and comparisons. Cost was a secondary consideration in the evaluation of the proposed disposal site locations. Cost was used to screen and limit a large universe of potential areas to a more manageable ZSF. As discussed in the SDEIS, costs generally increase with increasing distance from shore. The distance between the site to be dredged and the disposal site affects the cost of ocean disposal operations. However, cost of disposal cannot be the only consideration used for locating an ODMDS. Environmental considerations override site

feasibility considerations when they would unduly restrict sites to areas where unacceptable adverse effects would occur. Alternate sites at greater distances from the dredging area must be considered when they offer environmental benefits at reasonable cost increases.

The ODMDS site selection process was governed by the need to ensure that unacceptable adverse impacts would not occur at the selected site. In other words, although short-term impacts resulting from disposal may occur, the evaluation process is aimed at ensuring that any long-term unacceptable adverse impacts are avoided or minimized. This determination was made in accordance with the five general and eleven specific criteria set forth at 40 CFR §§228.5 and 228.6 and presented in the DEIS on pages 13 and 14 and the SDEIS on pages 25 and 26.

The site selection process consisted of three distinct phases. First, the ZSF was demarcated to identify areas which may be suitable to accommodate potential candidate sites. Then, a screening-level analysis, using the general and specific criteria at 40 CFR §§228.5 and 228.6, was conducted for the general areas to identify and evaluate alternative potential disposal sites within the ZSF. These two steps are documented in the SDEIS. Finally, reasonable alternatives remaining after screening (in this case, only the Northern Massachusetts Bay area, which contains the MBDS, remained) were subjected to a detailed analysis in the DEIS. The SDEIS analysis, as summarized in Table 4 of that document, makes it clear that the Northern Massachusetts Bay area, including the existing MBDS, was equal to or better than the other areas for all criteria considered. Therefore, EPA maintains that it was reasonable to screen the other alternatives and focus the detailed analysis on the suitability of the MBDS for continued use. NEPA does not require detailed analyses when more general analyses will reveal sufficient information on which to base a fully informed and reasonable decision.

The MPRSA and its implementing regulations (set forth at 40 CFR §228.5(e)) require the EPA to consider, wherever feasible, designating ocean disposal sites beyond the Continental Shelf. If the edge of the Continental Shelf is within the ZSF, it should be retained as a disposal option. As discussed on pages 11 and 12 of the SDEIS, the edge of the Continental Shelf is approximately 200 miles from Massachusetts Bay. To aid in delineating the ZSF, EPA estimated that Massachusetts Bay dredging projects using the MBDS for disposal would be expected to spend $18.00 to $20.00 per cubic yard. This approximation was based on current equipment rates, after a survey among dredging contractors, and is consistent with the estimates derived from previous studies associated with siting a potential ODMDS in Rhode Island Sound (see also the response to comment number 3.2.5). EPA estimated that transport of dredged material to a site off the edge of the Continental Shelf would cost approximately $120.00 per cubic yard. Since the Continental Shelf is so far away, additional costs such as added crew to change shifts and ocean-going barges and tugs will tend to increase this estimate. Since EPA's ZSF analysis identified potential environmentally acceptable sites closer to shore, EPA concluded that it was not necessary to further consider a potential site off the Continental Shelf. Therefore, sites at the edge of the Shelf and beyond were not included in the ZSF.

EPA believes that enough information was available to allow comparison of the suitability of candidate site locations using the eleven site specific factors at 40 CFR §228.6. Some of the information EPA used in making this determination included, spawning fisheries data from the NMFS, interviews with archaeologists and fishermen, whale migratory route documentation from universities, and NOAA charts for location of shipping lanes. Use of such a screening level analysis showed no advantages of designating other areas, and enabled EPA to assess compliance with the site selection criteria without a more exhaustive and expensive investigation.

Regarding the comment on candidate site depth characterization, EPA believes that the text of the SDEIS adequately describes the bathymetric features of each candidate area. Individuals desiring more detail are welcome to examine navigational charts (13246, 13267, 13270, 13275 and 13278) published by the National Ocean Survey element of the NOAA. EPA examined such charts in preparing the SDEIS, but did not deem it necessary to reproduce them in the SDEIS because the other information included was sufficient.

3.2.3 No Action

One commentor recommended that EPA consider the possibility of "No Action."

EPA Response

The "No Action" alternative would result in sustained interim designation status for the MBDS. This would allow continued disposal at the site (through the COE permitting process described in Chapter 5 of the DEIS), without fulfilling the directive of MPRSA which is to proactively determine the continued suitability of ODMDSs in relation to the site evaluation criteria at 40 CFR §§228.5 and 228.6.

The primary purpose of the NEPA is to disclose the environmental consequences of a proposed action, thus alerting the agency decision-maker and the public to the environmental risks involved. An important and intended consequence is to incorporate a continuing consciousness of environmental considerations into a Federal agency's decision-making process. This, in turn, ensures to the fullest extent possible that the agency directs its policies, plans, and programs toward meeting national environmental goals. The "No Action" alternative would not provide the opportunity for public involvement. Moreover, in this case "No Action" essentially translates to no environmental review, which is clearly not the intent of the NEPA.

3.2.4 Closing of the MBDS

A few commentors recommended that EPA consider closing the existing MBDS as an alternative.

EPA Response

As discussed in more detail in the response to comment number 3.1.1 and in Chapter 1 of the DEIS, the purpose of the DEIS is to determine the continuing need for and suitability of the MBDS as an available option for dredged material disposal. Such an evaluation includes a determination of the appropriateness of the site for dredged material disposal. Therefore, had no need for an ODMDS been established or had continued use of the site been found to be inconsistent with the criteria at 40 CFR §§228.5 and 228.6, closure of the site would have been recommended (see Chapter 2 of the DEIS). However, the need for an ODMDS was established in Chapter 1 of the DEIS and continued use of the MBDS was determined to comply with the criteria.

Closure of the MBDS could cause major disposal problems as it would eliminate an environmentally acceptable alternative for suitable dredged material from an already small catalog of options. EPA therefore believes that the site closure option is unnecessary both environmentally and operationally. EPA recognizes that there is a scarcity of upland or other disposal alternatives in New England and that ocean disposal can be an environmentally suitable option if properly managed (as discussed in Chapter 5 of the DEIS), and is therefore proposing to finally designate the MBDS.

3.2.5 Cost/Benefit Analysis

One commentor suggested that a cost/benefit analysis be performed to weigh the benefits of a site further offshore with environmental benefit and upland disposal costs. One commentor stated that Plymouth and Duxbury are outside the economic limit of MBDS, and that EPA wrongly included them in the $18.00 to $20.00 estimate used for delineating the Economic Zone of Siting Feasibility. Another commentor stated that EPA's estimate of $18.00 to $20.00 per cubic yard of material is a reasonable assessment, but it may make many projects economically unfeasible. One commentor stated that the economics of upland disposal should not be the only factor considered in the alternatives analysis, and that the potential for adverse impacts of other disposal methods must also be evaluated.

EPA Response

EPA selected the final location of the MBDS designation in light of the site selection criteria at 40 CFR §§228.5 and 228.6. The site selection process considers the costs associated with disposal and possible environmental impacts as a result of dredged material disposal at that site (see also the response to comment number 3.2.2). By estimating an average project cost of $18.00 to $20.00 per cubic yard, EPA could include the majority of potential disposal site users. It is important to note that this estimate was only developed to assist EPA in delineating the ZSF and is not a regulatory criterion used in reviewing permit applications. Actual site use is not limited to specific users and is dependent on many factors, including, but not limited to, availability of alternatives, project size, willingness or

ability to pay for the selected disposal option, and compliance with the requirements of the Ocean Dumping Criteria. Actual site use is only allowed when permit standards are met.

EPA did not perform a detailed cost/benefit analysis for the designation of a dredged material disposal site in Massachusetts Bay. Although the MPRSA and NEPA require that specific environmental criteria be met (regardless of cost), they do not require that a cost/benefit analysis be conducted. Cost is considered in the final site selection **only after** the environmental criteria have been met. Additionally, it is difficult to quantify particular environmental benefits for an ocean disposal site designation. Since the proposed MBDS meets the site selection criteria, selection of any further, costlier site would not provide any quantifiable environmental benefits. Therefore, EPA has chosen a site that is relatively inexpensive to use and manage **and** that has satisfied the site selection criteria.

It is important to recognize that each dredging project presents a unique set of opportunities and constraints, causing costs to vary widely. Consequently, many projects will have costs that vary from the $18.00 to $20.00 per cubic yard estimate. As explained in the SDEIS, EPA based its zone of economic feasibility on a fifty-five mile radius from Boston, which aided in site screening. Plymouth and Duxbury are included in this fifty-five mile radius. However, as noted above, EPA recognizes the individual variability among dredging projects. Additionally, different projects may have unique disposal options available to them (see the response to comment number 3.1.2).

3.3 Assessment of Toxics

3.3.1 Water Quality

3.3.1.1 Assessment of Water Quality Impacts

Many commentors were concerned that the water quality in Massachusetts Bay would be degraded as a result of dredged material disposal. They cited the results of analyses presented in the DEIS, which showed that certain water quality criteria ("WQC") would be exceeded either during disposal or shortly thereafter. Many commentors believed that EPA had underestimated the extent of WQC exceedances that would occur following disposal of dredged material at MBDS, and expressed the opinion that any exceedances that result from this activity are not acceptable and are in violation of the Clean Water Act. One commentor stated that EPA had overestimated WQC exceedances at the MBDS.

EPA Response

EPA does not believe that dredged material disposal at the MBDS will significantly affect the water quality of Massachusetts Bay. As described in Section 4.2.1.4 of the DEIS, EPA used a numerical model to predict water quality changes during disposal events. The model simulated the descent of a dredged material plume and the effects of horizontal mixing due to currents on total (dissolved plus sediment sorbed) toxicant levels for disposal events

during the year 1982, during which the largest volume of material was dumped according to available records. Potential acute and chronic toxic effects on marine organisms were then assessed by comparing predicted concentrations of pollutants to EPA WQC for Protection of Aquatic Life (U.S. EPA, 1986). These criteria are established to provide protection to sensitive stages (such as larvae or juveniles) of sensitive species and are periodically revised and updated to reflect the latest scientific knowledge.

EPA chooses to maintain a policy of conservativeness to ensure maximum protection of the marine ecosystem and human health, and therefore built a number of worst-case assumptions into its water quality model. Although, such a conservative approach may overestimate the extent of potential impacts, it enables EPA to guarantee a margin of safety in all of its predictions. The assumptions used in the water quality modeling are discussed below individually.

- EPA's modeling effort used a conservative method to evaluate the temporal effect of disposal events. The applicable ocean dumping regulations which govern water quality impacts at disposal sites are set forth in 40 CFR Parts 227 and 228. The regulations allow for temporary perturbations in water quality caused by disposal operations during initial mixing (mixing within 4 hours after dumping) anywhere within the site (40 CFR §228.5(b)). However, the quality of material allowed to be disposed at a site is governed by the limiting permissible concentration ("LPC") -- the concentration of any constituent which, after allowance for initial mixing, will not exceed applicable marine WQC anywhere, and when there are no marine WQC, will not be acutely toxic (40 CFR §227.27(a)). The LPC is not to be exceeded beyond the boundaries of the disposal site during initial mixing, and it is not to be exceeded at any point in the marine environment after initial mixing. Unfortunately, EPA's WQC, which are expressed in 1-hour, 1-day and 4-day durations (for example, the average of a number of water quality levels measured during any one hour can not exceed the 1-hour criterion), do not correspond with the 4 hour duration of initial mixing allowed under the Ocean Dumping Regulations. Also, EPA's chronic WQC are based on the assumption that an organism is exposed to a continuous discharge, which is not the case for ocean dumping. EPA showed exceedances of the 1-hour acute and 4-day chronic WQC for illustrative purposes - these criteria are not applicable under the ocean dumping regulations. Therefore, for regulatory purposes, predicted water quality levels after initial mixing are only appropriately compared to the 1-day acute WQC. As a result, only **one** WQC exceedance, namely the 1-day criterion for copper, was predicted by the DEIS modeling (as discussed below, this exceedance may have been the result of high ambient water column concentrations for copper used in the DEIS model). In order to more appropriately determine potential LPC exceedances during or after the initial mixing period of 4 hours, EPA has conducted new modeling, which is discussed later in this section.

- EPA also used conservative assumptions concerning the concentrations of chemicals in the ambient water at the MBDS. The water column concentrations of

contaminants at the MBDS presented in Section 3.2 of the DEIS and used in the DEIS modeling, which were obtained from COE sponsored sampling in 1986 and 1987 (COE, 1988), are substantially higher than those typically found elsewhere in Massachusetts Bay. Actual water column concentrations at the MBDS may in fact be quite lower. In an effort to evaluate other water quality data in Massachusetts Bay, EPA examined the water column chemistry data used in EPA's Final Supplemental EIS ("FSEIS") for the Boston Harbor Wastewater Conveyance System. The site furthest offshore (and closest to the MBDS) exhibited water column concentrations quite lower, some several orders of magnitude, than those reported in the DEIS (note that the quality assurance measures taken for the outfall data were much more stringent than those used by the COE for the MBDS). These values are listed on page 5-36 of the FSEIS and summarized in Table 3.3-1. Because ambient water column concentrations contributed significantly in the calculation of predicted water column concentrations, the use of the higher water column concentrations may have resulted in an over-prediction of exceedances. For example, the high ambient copper value used in the DEIS model, 2.82 μg/l (which is very close to the WQC for copper, 2.9 μg/l), was the most significant factor in the resulting predicted WQC exceedance. EPA plans to measure water column concentrations of contaminants at the site in 1992 as part of on-going site management. This will serve to check the water quality data presented in the DEIS.

TABLE 3.3-1: COMPARISON OF AMBIENT WATER COLUMN CHEMISTRY DATA
(All units in parts per billion)

	MBDS DEIS[1]	Outfall FSEIS[2]	Salem Harbor[3]
Cadmium	<0.2	0.006	0.023
Chromium	0.412	0.316	
Nickel	5.0	0.604	0.440
Copper	2.82	0.078	0.350
Zinc	<20	0.810	0.216
Arsenic	2.80	0.498	
Mercury	1.35	0.004	
Lead	1.77	0.091	0.022
Total PCB	0.012	0.00730	

[1]COE, 1988
[2]Batelle, 1988
[3]Gardner et al., 1986

- EPA modeled two scenarios, assuming that 5% and 10% of the disposed dredged material plume remained suspended in the water column. Literature values report that between 3% and 5% of the dumped sediment remains suspended within the water

column and is subsequently advected and mixed horizontally by ambient currents (Bokuniewicz, 1978; Gordon, 1974; Johnson, 1978; Tavolaro, 1982). In light of the literature values, both scenarios modelled by EPA appear to represent conservative estimates. Clearly, the level of conservancy associated with the 10% case is very high, and the 5% case may be more indicative of actual disposal conditions.

- EPA used data from 1982, the year in which the largest volume of dredged material was disposed, thus simulating worst case conditions. Hence, EPA assumed in its analysis that dredged material would be disposed every day of the year, a situation has never occurred yet and is not expected to occur. These assumptions would also tend to overpredict WQC exceedances.

- The model assumes that all pollutants are completely soluble in water, whereas in reality the solubility of the contaminants is dependant upon the various oxidation states that each constituent can undergo. Also, the model does not account for the fact that metals are likely to be co-precipitated with iron and manganese oxides formed during disposal and that many organic chemicals such as PCBs will most likely remain adhered to and settle with the sediment particles. These assumptions would also tend to overpredict WQC exceedances.

- EPA's model did not account for vertical mixing in the water column and therefore presented a lower available dilution than is actually available. This would also tend to result in an overprediction of WQC exceedances.

Despite all the assumptions that would tend to produce overpredictions of WQC exceedances, only one WQC exceedance was predicted - i.e., for the 1-day criterion for copper - and this may have been largely the result of the high ambient water column concentrations used. Therefore, this exceedance is not believed to be significant. This conclusion is reinforced by the additional modeling discussed below.

The Automated Dredging and Disposal Alternatives Management System ("ADDAMS") model, available as of May 1992, provides a more realistic portrayal of initial mixing during disposal than the model used in the DEIS. This is primarily because the ADDAMS model simulates an actual disposal event and is able to calculate water column concentrations 4 hours after disposal. This concentration is needed to assess compliance with the LPC. The ADDAMS model was not used in the DEIS because it was not available at the time.

EPA has recently run the ADDAMS model using the 1982 sediment chemistry data and the ambient MBDS water column chemistry reported in the DEIS. This analysis did not indicate any exceedances of WQC either inside or outside of the proposed MBDS boundary.

In running the ADDAMS model, EPA first determined the contaminant of concern, or the contaminant which would require the greatest amount of dilution in order to meet the

LPC. To determine the contaminant of concern, EPA assumed a worst case analysis. In particular, EPA entered the highest concentration of each contaminant from the 1982 sediment chemistry data, the ambient water column chemistry data from the MBDS (reported on page 35 of the DEIS), and the acute WQC (either the 1-hour or 1-day, whichever was more stringent). For this modeling effort, the contaminant of concern was determined to be copper. Since all the other contaminants required a smaller amount of dilution than what was needed for copper, it was not necessary to run the ADDAMS model for all cases.

To use the ADDAMS model to predict water column concentrations of contaminants after a disposal event, elutriate values must be entered. Elutriate data for 1982 was not available. As a result, EPA estimated what the corresponding elutriate concentration would be from available sediment concentration data. Available data shows that elutriate water column concentrations are approximately 1000 to 10,000 times less than the corresponding sediment concentration (Palermo, 1988). To be conservative, EPA used an elutriate concentration of 100 times less than the maximum sediment concentration for its ADDAMS modeling effort.

Using the inputs, the modeled concentrations of copper in the water column were 2.82 μg/l inside the proposed MBDS boundary 4 hours after disposal and 2.82 μg/l outside of the proposed boundary at all times after disposal. Both of these concentrations are below the 2.9 μg/l acute criterion for copper. Since the concentrations of contaminants in the water column, both inside and outside the MBDS, decrease with increasing time post-disposal, EPA does not believe that it is necessary to model a disposal event for longer than 4 hours post-disposal.

The ADDAMS model will be used to assess potential water quality impacts from individual dredging projects as part of EPA and the COE's on-going ocean disposal programs. EPA believes that use of the ADDAMS model in its ocean dumping program will provide an enhanced level of safety in dredged material management. If a WQC exceedance (either outside the site boundary at any time or inside the site boundary four hours after disposal) is predicted during future project reviews, EPA will recommend that either certain management restrictions (i.e., limiting the rates or volumes of disposal) be imposed or that such dredged material not be dumped at the MBDS. Whether EPA chooses to recommend several mitigation measures or object to a project based on water quality violations is dependant on many factors, including the number of contaminants which exceed WQC, the magnitude by which the WQC are exceeded, and the toxicological importance of the contaminants which exceed the WQC. EPA remains committed to ensuring that dredged material disposal will not cause LPC exceedances.

3.3.1.2 Request for Additional Studies

One commentor recommended that EPA conduct a study to empirically measure the amount and fate of suspended silt remaining in the water column since it was a critical component of the water quality model. One commentor requested that EPA discuss the

movement offsite of contaminants associated with fine grained material that may occur during disposal operations.

EPA Response

EPA does not believe that conducting a study to empirically measure the amount and fate of suspended silt remaining in the water column is necessary to complete its site designation studies. The COE has conducted such studies at a range of disposal sites throughout the country (see Bokuniewicz, 1978; Gordon, 1974; Johnson, 1978; Tavolaro, 1982). Such studies were used by EPA during preparation of the DEIS. While these studies predicted the percentage of the dredged material plume which remains suspended in the water column, the movement offsite and ultimate fate of these particles is currently unknown. Many factors (e.g., current speed and direction at the disposal site, water column density differences at the disposal site, physical characteristics of the dredged material) affect the movement of such suspended sediments. The USGS, in coordination with EPA, Massachusetts Water Resources Authority, and the Massachusetts Bays Program, is currently conducting research on the fate and transport of sediments in Massachusetts and Cape Cod Bays (see also the response to comment number 3.7).

3.3.1.3 Mercury Levels in Massachusetts Bay Waters

One commentor requested that EPA give a citation for the statement on page 38 of the DEIS (paragraph 3.2.1.5.7) that mercury levels above the EPA criteria have been recorded in other parts of Massachusetts Bay.

EPA Response

EPA identified a range of water column chemistry values from 0.0025 to 1.7 μg/l for mercury (COE, 1988; Gardner and Wallace, 1986; and Batelle, 1988). Differences in collection, sample preparation, or analytical procedures may explain the variability. Additionally, seasonal and spatial variations exist. Water column concentrations of mercury also vary with seasonal changes in suspended particulate and phytoplankton and zooplankton processes (Wallace et al., 1982).

3.3.1.4 Merrimack River Inputs

One commentor stated that EPA did not adequately assess the effects caused by the Merrimack River freshwater input.

EPA Response

As stated in the response to number 3.1, the purpose of these analyses is to determine the continuing need for and suitability of the MBDS as an available option for dredged material disposal. EPA believes that sufficient information is available to make this

determination. This FEIS is not intended to answer global questions about the Massachusetts Bay ecosystem, but focuses on specific impacts in the area of the proposed MBDS. EPA is, however, addressing broader contaminant input questions under its Massachusetts Bays Estuary Program. Some of the findings to date are discussed below.

Among the watersheds discharging to the Massachusetts Bays, which includes Cape Cod Bay, the Merrimack River is the largest. The total flow, including riverine sources, publicly owned treatment works, coastal runoff and groundwater, is about 465 cubic meters per second (Menzie-Cura, 1991). The Merrimack River could therefore contribute up to half of all freshwater flow to the Bay, but this flow rate likely represents an overestimate because not all of the water discharging from the Merrimack River enters Massachusetts Bay. It is clear, however, that the Merrimack is important in terms of setting up the initial stratification of the Massachusetts Bay system. Moreover, flow from the Merrimack varies seasonally.

Residual circulation during spring runoff months may be dominated by density-driven forces produced by the Merrimack River plume (Menzie-Cura, 1991). However, the significance of the Merrimack River as a source of pollutants into Massachusetts Bay remains uncertain because, in part, precise long-term circulation patterns are difficult to assess. EPA acknowledges that the MBDS, and sediments in the rest of Massachusetts Bay, receive an unknown percentage of contaminant inputs from the Merrimack River. Because of the relatively small area that the disposal site occupies within Massachusetts Bay, EPA does not foresee contaminant contributions from the Merrimack River to be a principal source of contaminant inputs to the MBDS. Other significant non-point sources of contaminants, such as metals and PCBs, include atmospheric deposition and runoff. Quantification of the relative contribution of non-point sources to the Bay as a whole is on-going and will continue as part of the Massachusetts Bays Program.

3.3.2 Sediment Quality

3.3.2.1 Impacts from Dredged Material Disposal

Many commentors charged that the sediment data in the DEIS suggests that there are adverse impacts to marine resources because of dredged material disposal at MBDS and that continued use of the site will place additional and cumulative stress on the resources of Stellwagen Basin and Massachusetts Bay. One commentor charged that the elevated PCB and PAH levels in the sediment at MBDS make it an "Impact Category I Site" as designated in EPA's Criteria for the Management of Disposal Sites for Ocean Dumping (40 CFR Part 228). Some commentors were concerned that past disposal activities at MBDS had resulted in PCBs, PAHs, and metals at MBDS above Massachusetts Bay background levels and recommended further investigation.

EPA Response

EPA does not believe that poor sediment quality at the MBDS caused by previous dredged material disposal has adversely affected marine resources. This is supported by several field and modeling studies that were conducted for the MBDS designation. The results of all of these field studies (listed in Table 3-1 on page 17 and discussed in Section 5.4 of the DEIS) lend support to the MBDS designation, as neither movement of dredged material offsite nor adverse effects to marine organisms were identified. More recent monitoring surveys, which also support this conclusion, are discussed in the response to comment number 3.9.1 in this FEIS. EPA evaluated sediment chemistry at the MBDS (Section 3.2.2 of the DEIS) and presented several scatterplots and contour maps. This analysis illustrated that stations within the MBDS (closest to the disposal buoy) had the highest concentrations of contaminants, and that stations outside the site, including those on Stellwagen Bank, were indicative of normal ambient conditions in Massachusetts Bay. EPA also examined the levels of contaminants in biota at the MBDS (Section 3.2.3 of the DEIS) to assess potential adverse effects caused by dredged material disposal to marine organisms. The DEIS reported that no statistically significant differences in contaminant levels between organisms on the disposal mound and the reference site exist. In fact, in some cases concentrations of contaminants in the tissues of reference organisms were higher than those on the disposal mound. EPA also evaluated effects on biota (Section 4.3 of the DEIS) and on human use (Section 4.4 of the DEIS), and concluded that dredged material disposal at the MBDS will not cause unacceptable adverse impacts.

Monitoring studies at the existing MBDS have not indicated that any unacceptable adverse impacts have occurred. While higher than ambient sediment concentrations have been demonstrated within the MBDS, EPA did not find that these contaminants have adversely affected the resources either in the MBDS vicinity or on Stellwagen Bank. This statement is supported by all of the analyses listed above. EPA therefore concludes that dredged material disposal at the MBDS has not had any significant adverse effects on the marine resources of Stellwagen Bank (see also the responses to comment numbers 3.4, 3.10, and 3.11). Moreover, the National Oceanic and Atmospheric Administration ("NOAA") states on page 141 of their Stellwagen Bank National Marine Sanctuary DEIS dated January 1991 that "...no far field effects have been identified..." and that "...bioaccumulation at and around the disposal site is inconsequential...." NOAA concludes on page 142 that it "...does not appear, therefore, that the previous use of the site has significantly degraded the resources of the area...." As discussed in Section 3.2.2 of the DEIS, EPA demonstrated that sediment quality impacts will be limited to a small area within the MBDS.

The regulations for evaluating disposal impact were summarized on pages 221 and 222 of the DEIS and can be found at 40 CFR §228.10. With regard to the designation of a disposal site as "Impact Category I", the regulations (at 40 CFR §228.10(c)(1)(ii)) state that a site is classified under Impact Category I when any of the following conditions are present and reasonably attributable to the disposal activities:

"...The biota, sediments, or water column of the disposal site, or of any area outside the disposal site where any waste or waste constituent from the disposal site is present in detectable concentrations above normal ambient values, are adversely affected by the toxicity of such waste or waste constituent to the extent that there are statistically significant decreases in the populations of valuable commercial or recreational species, or of specific species of biota essential to the propagation of such species, within the disposal site and such other area as compared to populations of the same organisms in comparable locations outside such site and area...."

EPA's regulations do not prohibit use of a site designated as Impact Category I, but simply require that EPA consider such effects. If EPA determines that activities at the disposal site have placed the site in Impact Category I, limitations on the use of the site, as are necessary, shall be imposed to reduce the impacts to acceptable levels. EPA does not believe that the MBDS is an "Impact Category I" site, as evidenced by the available data, and maintains that the MBDS should be classified as an "Impact Category II" site because none of the effects listed in 40 CFR §228.10 have been identified to date. EPA's recent monitoring efforts conducted within the MBDS and the reference site (see the response to comment number 3.9.1.1) indicated that no statistically significant adverse effects on valuable commercial or recreational species or their prey have been demonstrated. Additionally, the COE's Disposal Area Monitoring System has shown that similar benthic community structures exist at the MBDS and the reference site.

3.3.2.2 EPA Methodology

One commentor charged that EPA underestimated the concentrations of contaminants present in dredged material disposed at MBDS. One commentor disagreed with EPA's statement that the concentrations of contaminants presented on page 6 of the DEIS represented higher than suspected concentrations and used EPA's PCB data from the MBDS presented on page V of the Executive Summary to support this contention. One commentor stated that EPA should not measure PCBs in environmental samples as Arochlor mixtures.

EPA Response

EPA believes that the data used in its analyses is sufficient to make reasonable conclusions with respect to the siting of an ocean dredged material disposal site in Massachusetts Bay. EPA does not believe that it underestimated the concentrations of contaminants present in previously disposed dredged material because these concentrations were based on a substantial number of sediment chemistry samples that have been taken over the last ten years at locations within and around the MBDS area. Sampling stations were illustrated in Figure 3-4 on page 30 of the DEIS and sediment chemistry information is

presented in Sections 3.2.2 and 4.2.2 of the DEIS. The concentrations presented in the DEIS, and used in EPA's decision-making, were an average of nearly 1000 samples.

In response to the comment which disagreed with EPA's statement that the concentrations of contaminants presented in Table 1-1 of the DEIS represented higher than suspected concentrations, in Chapter 3 of the DEIS, EPA presented a weighted average of the sediment chemistry data within the MBDS boundary as well as data specific to particular areas. This analysis was intended to summarize the range of concentrations of chemicals in the sediments at the existing MBDS. Substantial variability in contamination levels exists within the MBDS, as evidenced by the large standard deviations presented in Table 1-1 of the DEIS. The statistical summary presented in Table 1-1 of the DEIS reported an average PCB concentration of 0.25 parts per million with a standard deviation of 0.62 parts per million. This correlates to a range of PCB concentrations from below the detection limit to 0.87 parts per million. Thus, the 0.414 parts per million value presented in the Executive Summary on page V is well within the range presented in Table 1-1 of the DEIS. Although it is possible for actual chemical concentration averages to be either higher or lower than the weighted average, EPA does not believe that such extrapolations regarding average chemical concentrations can be stated with certainty because of the significant variability of dredged material previously disposed at the site (Chapter 1 of the DEIS). One possible explanation for differences between the weighted average concentration and other sediment data is that the sediment chemistry taken as part of site monitoring could have coincidentally been taken in an area where dredged material with higher concentrations of contaminants than the weighted average were disposed. EPA continues to believe that the sediment chemistry data presented in the DEIS is reliable and EPA and the COE will continue to measure sediment chemistry as part of on-going site monitoring.

In regard to the comment concerning analytical methods for PCB measurement in sediment, EPA's most recent analyses have identified specific PCB congeners (in addition to Arochlors) as demonstrated in the 1989 data (Pruell, et al.), the May 1990 data (Foley, et al.), and the 1991 data (Gardner, et al.). EPA intends to continue to measure specific PCB congeners in the future.

3.3.2.3 Sediment Toxics in Relation to Physical Characteristics

One commentor believed that comparison of sediment contamination within Broad Sound and Massachusetts Bay should be performed in light of grain size and total organic carbon ("TOC"), and that EPA had wrongly compared sites within Stellwagen Basin to surrounding areas. The commentor also indicated that high sediment TOC levels, which occur naturally in settling basins, are beneficial because they reduce the potential for organic contaminants to be accumulated in the lipids of marine organisms. Another commentor requested that EPA discuss the differences in contamination levels between fine and coarse grained sediments.

EPA Response

EPA does not believe that it wrongly compared areas within Broad Sound and Massachusetts Bay. The comparisons of sediment data between 1983 and 1987 presented in Chapter 3 of the DEIS were not intended to indicate significant quantitative differences between regions. The Broad Sound values were provided merely as a qualitative comparison of background contaminant levels in another depositional area of Massachusetts Bay. EPA believes this an appropriate comparative reference because Broad Sound is relatively close to pollution sources in Boston Harbor and will therefore accumulate particles and associated toxics.

EPA agrees, that as a general trend, higher TOC levels in sediments would likely be found in settling basins where fine grained sediments tend to accumulate. However, past disposal activities in small localized areas, rather than sediment grain size distribution, account for the spatial differences in chemical concentration within the MBDS. If sediment type were the main factor in explaining contaminant levels, sandy sediments would be expected to contain lower contaminant levels, and fine grained sediments would be expected to contain higher contaminant levels. However, sediments several kilometers from the MBDS boundary (Stations "se" and FG-23) have similar fine-grained physical characteristics to those near (Stations FG-9, 12-0, and MUD-REF) and within the boundary (Stations OFF and 17-14) of the site and yet generally contain much lower contaminant levels. Thus, sediment type does not appear to be the dominant factor in explaining the variation in contaminant levels. Furthermore, one station with sandier sediment within the MBDS boundary (Station 14-9) has one of the highest levels of contaminants of any station. EPA agrees that, generally, fine grained sediments are more likely to contain contaminants than coarser grained material. However, exceptions to this are not uncommon and in the example provided above, this was clearly not the case.

The above assessment is certainly not a detailed examination of the relationship between sediment type and contaminant levels. Nonetheless, given these observations, EPA does not believe it is appropriate to undertake a detailed analysis of the relationship between sediment types and contaminant levels because of the general non-uniformity of sediments in the entire study area and the quality of the available data.

In relation to the comment concerning the relationship between TOC, contaminants, and bioaccumulation potential, EPA agrees that high concentrations of TOC typically reduce the bioaccumulation potential for organic contaminants. This is largely owing to the fact that the distribution of nonpolar organics in the environment is controlled largely by their solubility in various media. Organic contaminants in sediments tend to occur primarily in association with organic matter, and in organisms are found primarily in the body lipids or fats. Therefore, the tendency for bioaccumulation of nonpolar organic compounds from dredged material is related to the organic content of the material, the lipid content of the organism, and the relative affinities of the chemical for sediment TOC and animal lipid content. By normalizing nonpolar organic chemical concentration data for lipid content in

organisms and organic carbon in dredged material or reference sediment, it is possible to estimate the preference of a chemical for either phase. Concentrations are directly proportional to the lipid content of the organism and the contaminant content of the dredged material or reference sediment, and indirectly proportional to the organic carbon content of the dredged or reference sediment (EPA, 1991; Clarke et al., 1991; Brannon et al., 1991). In other words, typically a high TOC content in dredged material will lead to a lower bioaccumulation potential. Similar relationships may exist between metals and acid volatile sulfides.

3.3.2.4 Data Presentation and Interpretation

One commentor stated that the contour maps and scatterplots presented in Chapter 3 of the DEIS could be misleading in that they may have been used inappropriately to identify a perceived difference between "clean" and "contaminated" areas. One commentor stated that the use of parametric tests for the sediment chemistry data (Section 3.2.2.3 of the DEIS) may have been inappropriate and that statistical correlation could be a function of high fines rather than distance from the dumping point, and that the three kilometer affected area, identified on the scatterplots, is more an artifact of analysis and station grouping than a true reflection of environmental impacts. One commentor suggested that the sediment, water, and body burden data in the DEIS should be discussed with some historical perspective.

EPA Response

In relation to the comment regarding the contour maps, as stated on pages 45 to 55 of the DEIS, EPA presented the contour maps (pages 47 through 62 of the DEIS) in order to illustrate "approximate contours." These maps were not proposed for scientific interpretation, but to provide the reader with a conceptual representation of the chemical contamination of sediments in the MBDS area. The intent of the contours was not to suggest that a continuous linear gradient exists between sampling stations. Rather, the contour maps were included simply to illustrate that differences in contaminant levels do exist, and that in many cases (e.g., copper, zinc, lead) the highest concentrations of contaminants are found within the MBDS boundary. EPA agrees that a more complete and uniform data set would be required to properly illustrate exact linear gradients. However, in that they graphically demonstrate that gross differences in contamination levels exist, the contour maps included in the DEIS are informative and appropriate. Such information assisted EPA in determining that the existing MBDS is a containment area.

The scatterplots presented in the DEIS between pages 64 and 80 were intended to provide a graphic indication of the notable differences between sediment sampling stations. In this context, EPA believes the scatterplots are illustrative and informative. The scatterplots do not test statistical hypotheses, nor were they intended to do so. In fact, the DEIS (on page 72) notes the "variance in data" and states that, "many of the individual sampling stations cannot be effectively compared because stations with just one observation have no variance." Consequently, the DEIS was appropriate in indicating that in some cases

apparent differences in concentrations exist, while indicating that these differences were not tested for statistical significance.

In response to the comment regarding the use of parametric tests, parametric tests are appropriately used on data sets with a normal or near-normal distribution, or with data sets with large sample sizes to compare and interpret numerical data. Non-parametric tests are appropriately applied to data sets which are not normally distributed, especially when these data sets involve smaller sample sizes. Because non-parametric tests apply a hierarchical ranking to individual values, they do not fully reflect the true dispersion of values about a mean. Consequently, non-parametric tests do not properly weigh high and low outliers, and thus do not accurately describe the extreme variation in the data. EPA believes that use of parametric tests in the DEIS was appropriate because the data sets exhibited near-normal distribution and were composed of large sample sizes.

EPA believes that a discussion of the sediment, water, and body burden data in light of a historical perspective would likely detract from the analysis. EPA did not assess the data from a historical perspective because of the lack of reliable documentation on disposal dates and locations. Similarly, the time elapsed between deposition and sampling dates is not well documented. Other factors, such as small spatial variability of sediment contamination and the variability of currents and biological production, could also obscure analysis of any historical trends. Given the non-uniformity of historical data, the lack of proper documentation, and the small scale spatial variability, EPA believes that discussing the data with a historical perspective would likely detract from the analysis.

3.3.2.5 Presence of PAHs

One commentor objected to the statement on page.59 of the DEIS (paragraph 3.2.2.2.4.) that PAHs are ubiquitous in dredged material. The commentor stated that, though common, PAHs are not necessarily ubiquitous in dredged material.

EPA Response

EPA concurs.

3.4 Impacts to Biota

3.4.1 Assessment of Dredged Material Disposal Impacts on Biota

Several commentors worried that dredged material disposal would have negative impacts on the health of aquatic organisms including benthic (bottom dwelling) organisms, endangered species, and commercially and recreationally important fish and shellfish. Others requested that EPA conduct additional studies on the biological effects of dredged material disposal at MBDS, including toxicity, reduced reproductive potential, bioaccumulation, and pathological alterations.

EPA Response

EPA acknowledges that adverse environmental effects such as burial of fish eggs and larvae on the dredged material mound and mortality of plankton in the immediate vicinity of the dredged material plume may be occurring within the immediate area where initial mixing occurs (Section 4.3.2 of the DEIS). However, such effects can and will be limited as required by the existing statutes. The limited water quality effects, as described in Chapter 4 of the DEIS and in the response to comment number 3.3.1, are allowed under the existing statutes and are considered to be acceptable adverse impacts. Through long-term monitoring studies, EPA evaluates existing impacts which reflect cumulative use of the site for many years. However, EPA is aware of the cumulative nature of persistent pollutants being placed in the marine environment and continues to apply management controls on the disposal of dredged materials based on the current level of understanding of chemical and biological interactions in the marine environment and a commitment to protecting the health of that environment. EPA believes that the monitoring studies conducted at the existing MBDS are adequate to assess potential adverse biological effects resulting from dredged material disposal (see also the response to comment number 3.9.1). As a result, EPA does not believe that additional studies are needed for final site designation.

3.4.2 Effects of Overfishing

One commentor was concerned that EPA did not assess the effects caused by overfishing of the area.

EPA Response

As discussed in the response to comment number 3.1, the purpose of EPA's analysis is to determine whether continued use of the MBDS is appropriate and to assess potential effects caused by dredged material disposal in relation to the Ocean Dumping Criteria found in 40 CFR Part 228. Overfishing in Massachusetts Bay is not a potential impact caused by dredged material disposal. It is and will continue to be regulated by the New England Fisheries Management Council.

EPA recognizes that Massachusetts Bay has been continuously overfished and that more information regarding the relative abundance of the fish stocks over recent years is needed. Additionally, EPA believes that an assessment of whether current regulations have demonstrated an effectiveness in addressing any reductions in stock as a result of concentrated fishing effort in this area is needed to evaluate the overall health of Massachusetts Bay's resources.

3.4.3 Assessment of Commercial Fisheries Impacts

Some commentors believed that EPA did not adequately address potential impacts to commercial fisheries.

EPA Response

EPA does not believe that dredged material disposal at MBDS significantly affects commercial fisheries in Massachusetts. As discussed in Section 3.4 of the DEIS, the percentage of the catch of commercial fishing vessels that is collected in the MBDS is relatively small when compared to catch data in the surrounding area. In Section 3.4 of the DEIS EPA estimated that the maximum potential catch value for all species caught in the MBDS is about $21,320 per year. EPA believes that the value of fish harvested in the MBDS relative to those caught in the remainder of Massachusetts Bay is insignificant. As a result, even if there were impacts to commercial fisheries, they would not significantly impact the economics of the fishing industry. Additionally, as discussed in the response to comment number 3.6, many fishermen avoid the area because the scattered debris within the site damages their equipment.

3.4.4 Cumulative Effects

Several commentors were concerned that EPA did not adequately assess the potential for cumulative effects. In particular, some commentors were concerned that the potential for synergistic or cumulative effects from the numerous constituents present in the dredged material was not addressed.

EPA Response

EPA believes that synergistic effects caused by contaminants present in dredged material are adequately assessed through the biological testing required prior to disposal and conducted during site monitoring. Our current knowledge of chemical interactions in the marine environment does not make it possible to deduce potential synergistic or cumulative effects from sediment chemistry alone. Rather, bioassay tests are used to determine whether dredged material disposal will cause an acute chemical interactive effect on the organism. These bioassays, which involve exposing organisms to whole sediments and observing effects, account for synergistic and cumulative effects, but do not identify the chemicals which cause toxicity. Bioassays are most often used in conjunction with sediment chemistry tests, which identify the levels of individual pollutants in the sediment.

Other cumulative effects, such as bioaccumulation, are also addressed through the testing required under EPA and COE testing protocols. Bioaccumulation testing involves exposing organisms to whole sediments and then determining the amount of any constituent which has been taken into the tissue of the organism. Dredged material must not exhibit the potential to cause cumulative effects, such as bioaccumulation. If the potential for significant bioaccumulation of chemicals present in the dredged material is demonstrated through testing, such dredged material is not allowed for unrestricted open water ocean disposal. Material which does not meet these requirements is either not dredged, is disposed either upland or in a contained area, or is allowed with certain management constraints imposed to minimize the

potential for adverse impacts. Bioaccumulation is further addressed under the response to comment numbers 3.5 and 3.9.1.2.

As discussed in Chapter 4 of the DEIS, cumulative effects resulting from continued disposal over time include physical impacts such as burial and isolation. These effects should be limited to burial of fish eggs and larvae on the dredged material mound and mortality of the plankton in the immediate vicinity of the dredged material plume. Burial of benthic fauna may limit food to potential predators. EPA believes that these effects are not a significant cause for concern. Successive deposition over previous discharges tends to maintain the pioneering stage of the benthos. Monitoring surveys conducted by the COE did not detect a significant difference in the diversity of the infaunal community between the MBDS and a reference area. Deployment of a taut line buoy and better control of the actual disposal activities at this buoy will minimize the areal extent of impact. Toxic effects from sediments are also discussed in the response to comment number 3.3.2.

3.4.5 Fishing Bans

One commentor believed that there should be an enforced ban on fishing activities in the MBDS area. A few commentors requested that EPA discuss any shellfish closures near the MBDS.

EPA Response

In 1971, the Food and Drug Administration ("FDA") issued a "Notice to Harvesters" which warned that shellfish and other bottom harvested marine animals from the MBDS could be contaminated from wastes dumped in the Industrial Waste Site ("IWS"), an area one nautical mile westward of the existing MBDS. FDA did not explicitly state the rationale for the closure, namely whether actual chemical contamination of biota or sediments was found, or whether simply the presence of barrels of waste at the adjacent IWS was sufficient justification. In 1980 the National Marine Fisheries Service ("NMFS") closed the IWS to harvesting surf clams and ocean quahogs because of possible environmental degradation. As discussed in the DEIS, most fishermen avoid the MBDS because of the possibility of fouling or damaging their equipment.

Responsibility for imposing and enforcing fishing bans in federal waters is the responsibility of the NMFS. Future monitoring conducted by the COE and EPA will assist the NMFS in determining whether any adverse ecological or public health effects resulting from dredged material disposal have occurred (see also the responses to comment numbers 3.6 and 3.9.1). To date, however, no adverse effects as a result of dredged material disposal at the MBDS have been demonstrated.

3.4.6 Locations of Breeding and Spawning Areas

One commentor was concerned that EPA did not present any information pertaining to spawning or breeding areas.

EPA Response

EPA believes that location in relation to spawning or breeding areas has been adequately addressed in the DEIS and the SDEIS. Spawning and nursery grounds are discussed in Chapter 3 (pages 114 to 117) of the DEIS and on pages 12 to 16 of the SDEIS, and illustrated on page 5 of the SDEIS.

3.5 Bioaccumulation in Biota

3.5.1 Assessment of Tissue Levels

Many commentors were concerned that there may be bioaccumulation of toxics occurring at MBDS as a result of past disposal events. A few commentors were concerned that the elevated levels of PCBs in the tissues of the benthic infaunal polychaete worm, *Nephtys incisa*, as presented in Table 3-18 on page 92 of the DEIS, may cause potential impacts to the food web and fisheries. One commentor charged that through transfer of contaminants through the food chain, the MBDS may be contaminating a significant amount of the commercial fish population in Massachusetts Bay. One commentor charged that EPA did not adequately assess juvenile use of MBDS and was concerned that young fish would be preying on small polychaete worms in contaminated sediments. One commentor charged that EPA wrongly assessed tissue levels by limiting its analyses of benthic infaunal body burden solely to *Nephtys incisa*. A few commentors requested that EPA collect data on small polychaetes and oligochaetes. One commentor requested that EPA explain the extent of our current knowledge about bioaccumulation, discuss any gaps in our knowledge and how they affect our decision-making, identify plans for future monitoring, and specify how EPA would respond if clear evidence of bioaccumulation in fish at the MBDS was found.

EPA Response

EPA believes that potential bioaccumulation effects resulting from dredged material disposal at the MBDS were adequately assessed in the DEIS. Chemical analysis of benthic body burden (Chapter 3 of the DEIS), comparison with EPA's marine water quality criteria (Chapter 3 of the DEIS), and the dredged material testing protocol (Section 5.3 of the DEIS and Section 3.9.1.2 of this document) were used to assess bioaccumulation at the MBDS. Also, as discussed further in the responses to comment numbers 3.6 and 3.9.1, in 1991 EPA analyzed the livers and edible portions of several commercially harvested species at the MBDS. EPA concluded that no significant unacceptable adverse impacts, including bioaccumulation of toxics, resulting from dredged material disposal at the MBDS have occurred.

Regarding the comment which questioned the appropriateness of *Nephtys incisa* for analyzing potential for bioaccumulation in the food web, EPA consulted with Dr. Anne McElroy of the University of Massachusetts, an expert in aquatic toxicology and bioaccumulation, who assured EPA that the benthic infaunal polychaete worm, *Nephtys incisa*, is a suitable species to use and is characteristic of lower trophic level species within Massachusetts Bay (pers. comm., November 1989). In addition, *Nephtys incisa* is the only worm that can be easily collected in large enough quantities at the MBDS for chemical analysis. In other words, *Nephtys incisa* represents the majority of the polychaete biomass in the MBDS vicinity. Although the Benthic Resources Assessment Technique study determined that small short-lived pioneering polychaete worms, such as spionids, would dominate the disposal mound benthic community between disposal events (Lunz, 1986), spionids are so small in size and in number that they are much more difficult to separate and analyze than *Nephtys incisa*. Many bottom-dwelling fish species, including Witch flounder, Winter flounder, and American plaice prey upon benthic infaunal polychaete worms, including *Nephtys incisa*. Additionally, the existing historical database of body burden levels in *Nephtys incisa* enables EPA and the COE to assess long-term trends at the site. As discussed in the response to comment number 3.9.1, testing the body burden of all of the worms collected together to determine the total amount of contaminants available to organisms which prey on benthic infaunal worms is among some of the future monitoring activities considered for the MBDS.

In response to the comment concerning the elevated concentrations of PCBs in polychaete worms reported in Chapter 3 of the DEIS, EPA believes that while elevated tissue levels of PCBs were found in one sample of *Nephtys incisa* taken on dredged material inside the existing MBDS, a statistical difference between dredged and reference materials cannot be supported with the existing data. Since the single analysis cited by the commentor exhibited an unusually high concentration of PCBs, EPA believes that that particular sample is an outlier. Since all of the other samples were several orders of magnitude lower than the sample cited by the commentor, it is possible that the unusually high value reported could be attributed to an error in the laboratory procedures rather than actual contamination of the tissue. No chronic or acute effects owing to sediment toxic accumulation at the MBDS have been documented.

When a compound is present in the water column or sediments, an organism may accumulate the compound to some degree by either absorption or ingestion. If the contaminant is available to the organism in high concentrations, significant bioaccumulation may occur and may impair some essential life process (e.g., respiration or reproduction) or cause mortality. Fisheries and other biological resources are exposed to contaminants through three primary routes of exposure: 1) through the water column, 2) by sediment contact, and 3) by consumption of contaminated prey.

Bioaccumulation consists of the uptake of toxic substances from both water (via the gills or epithelial tissue) and food (detritus, prey, plant tissue) (Brungs and Mount, 1978). The degree of accumulation in aquatic organisms varies depending on the food web, the

availability and persistence of the contaminants in the environment, and the physicochemical properties of the contaminant (Spacie and Hamelink, 1984). Understanding of the mechanisms and kinetics of these very complex processes through experimental work and simplistic theoretical models is still in its development stages and is an on-going process. A number of studies (Bertine and Goldberg, 1972; Brannon et al., 1976; Luoma, 1977; Turekian, 1977; Neff et al., 1978; Peddicord and McFarland, 1978) have concluded that the bulk concentrations (dry weight) of toxicants in sediments are often unrelated to how much a toxicant will be bioaccumulated by an organism or if it will cause toxicity. Weight, age, and sex are among the parameters that can influence the likelihood of bioaccumulation effects. Complete understanding of the phenomenon of bioaccumulation of toxicants is currently limited. EPA believes that it is beyond the scope of this document to survey the current state of knowledge concerning this subject. There are, however, a number of reviews and studies available in the literature which describe various aspects of our current state of knowledge, many of which are referenced in this FEIS. The following list of references represents only a small fraction of the existing literature: Battelle, 1988; Bertine et al., 1972; Boon, 1985; Boon et al., 1987; Boon, 1988; Brannon et al., 1976; Brannon, 1978; Breteler et al., 1985; Brungs et al., 1978; Bryan, 1985; Chiou, 1985; Dillon, 1984; Dillon et al., 1985; Dillon et al., 1990; DiToro et al., 1990; Duinker et al., 1989; Ernst et al., 1977; George, 1982; Gentile et al., 1988; Gibson et al., 1989; Goerke et al., 1977; Goerke et al., 1990; Gossett et al., 1983; Harding et al., 1986; Harvey et al., 1974; Hawker et al., 1985; Hutzinger et al., 1972; James, 1989; Karickhoff, 1984; Karickhoff et al., 1986; Kay, 1984; Lake et al., 1987; Lake et al., 1986; Lake et al., 1990; Landrum, 1989; Lee et al., 1989; Livingston, 1985; Luoma, 1977; Luoma, 1989; Mackay et al., 1981; McElroy et al., 1988; McFarland, 1984; McFarland et al., 1986; McFarland et al., 1989; Neff et al., 1978; O'Connor et al., 1982; O'Conner et al., 1987; O'Donnell et al., 1985; Peddicord et al., 1978; Pruell et al., 1986; Reuber et al., 1987; Rice et al., 1987; Roesijadi et al., 1977; Rubenstein et al., 1988; Rubenstein et al., 1984; Schneider, 1982; Snedecor et al., 1980; Spacie et al., 1982; Spacie et al., 1984; Swartz et al., 1980; Turekian, 1977; Tanabe et al., 1988; Tavolaro, 1984; and Wallace et al., 1982.

The bioavailability of contaminants in sediment is critical to our understanding of bioaccumulation. Bioavailability depends upon a number of factors including the type of contaminant, physicochemical properties of the sediment and overlying water column, the hydrodynamic environment at the disposal site, the characteristics of the organism exposed to the sediments, and the organisms place in the food web. The number of variables that influence each factor can be quite large. Recent theories, which are based on thermodynamic principles, have emerged to explain the concept of bioavailability. Equilibrium partitioning, or the dissociation of a contaminant from the sediment, is based on the behavior of chemicals in different media (Karickhoff, 1984; Reuber et al., 1987) and is the basis for the sediment quality criteria currently being developed by EPA (EPA, 1989). As discussed in more detail in the response to comment number 3.3.2.3, the bioaccumulation potential of an organic contaminant can be predicted by normalizing the contaminant concentration to the lipid concentration of an organism and the total organic carbon content of the sediment (Makay and Patterson, 1981; McFarland, 1984; McFarland and Clarke, 1986; Karickhoff and

Morris, 1986; Lake et al., 1986). By and large, there are many assumptions and unknowns with this approach. Until we can better understand, quantify and field test these approaches, we must rely on standard laboratory bioaccumulation tests, which employ empirical evidence rather than predictive tools, to assess bioaccumulation potential for regulatory purposes.

As discussed in Section 5.3 of the DEIS, the bioaccumulation test currently used is designed to determine whether a sediment proposed for disposal contains contaminants that may be bioavailable to biota around the disposal site (EPA/COE, 1978, 1989, and 1991; Lee et al., 1989). The test is performed by exposing representative deposit-feeding and/or burrowing animals to the sediments to be dredged and to reference sediment. After a twenty-eight day exposure period, the body burdens of the test and the reference organisms are statistically compared to determine "incremental" bioaccumulation. Based on the statistical significance, number, and type of contaminants accumulated, a suitability determination for ocean disposal is made from the bioaccumulation tests and the companion toxicity tests (EPA/COE, 1991). Past criticisms of the bioaccumulation test relate to the accuracy with which potential effects can be assessed. Some of these criticisms include, i) the adequacy of laboratory tests in providing an assessment of in situ impacts, ii) the species used in the bioaccumulation test do not reside in the disposal site and may not be representative of the disposal site biota, iii) the length of the test may not represent steady state conditions found in the environment, and iv) biomagnification is not considered. These criticisms are discussed below.

In the 1980s, EPA and the COE jointly initiated a multi-million dollar research program, in part to address whether laboratory tests accurately represent in situ conditions. This program, called the Field Verification Program ("FVP") (Gentile et al., 1988), included studies of the environmental effects of a contaminated disposal mound in Long Island Sound and a comparison of those effects to the effects predicted by several laboratory tests. These studies determined that the laboratory tests used by EPA and the COE can be used to predict bioaccumulation of PCBs and PAHs in field exposed organisms (Lake et al., 1987). PCBs were the most consistent of the laboratory and field exposures, while PAHs exhibited lesser consistency. The FVP has also recently indicated that laboratory acute toxicity and bioaccumulation signals are reflective of field conditions at the disposal site.

Regarding the appropriateness of the test species, EPA believes that it would be impractical to test every type of organism at the disposal site as part of a regulatory program. Collecting and testing organisms in environments similar to the disposal site is preferred. To date, a suitable species to use in the laboratory has not been discovered at the disposal site in sufficient quantities. Species which live, burrow, breathe, and ingest surface sediments typically represent a worst case bioaccumulation of available contaminants. As discussed in Chapter 5 of the DEIS, the species currently used include the polychaete, *Nereis virens*, and the deposit-feeding bivalve, *Macoma nasuta*, a west coast species. EPA requires *Macoma nasuta*, in lieu of its east coast cousin *Macoma balthica*, because *Macoma balthica* cannot be collected in sufficient quantities. EPA is currently trying to determine the efficacy of using *Macoma nasuta* or discover an alternative species. Until this effort is completed, *Macoma*

nasuta will be the preferred organism to use in the biological tests. Prior to implementation of the regional testing manual and the revised Green Book (EPA/COE, 1991), the bivalve, *Mercenaria mercenaria*, was used. Since this organism periodically shuts down (i.e., stops filter-feeding) when exposed to contaminated sediments and therefore will not represent worst-case bioaccumulation rates, it is no longer the preferred species (Lee et al., 1989; Norm Rubenstein, pers. comm.). EPA believes that use of *Macoma nasuta* provides a worst-case bioaccumulation rate and is an environmentally conservative approach for protecting other organisms at the site.

Recent testing by EPA's Environmental Research Laboratory in Narragansett, RI has indicated that the steady state values of bioaccumulation in laboratory animals may require exposures as long as a hundred days or more (Norm Rubenstein, pers. comm.). From a timing and cost perspective, this would not be practical to use in a regulatory program. Lee et al. (1989) found that in most cases, the twenty-eight day test now implemented (EPA/COE, 1991) generally results in tissue residues within eighty percent of the steady state residue level. When steady state is not approached within the twenty-eight days, tissue levels for organisms usually were within two to four times that of steady state concentrations. This, as Lee et al. (1989) disclose, is consistent with the American Society for Testing and Materials bioconcentration test. A critical element to the regulatory decision-making is whether there is a definitive bioaccumulation signal, such as an elevated body burden, which can be statistically compared to a reference. Steady-state values are not necessary for this type of analysis unless they are to be compared to field body burdens.

EPA and the COE have developed procedures to perform both laboratory and field steady-state body burdens beyond the twenty-eight day test (EPA/COE, 1991) in Tier IV of the testing protocol. To date, however, Tier IV laboratory tests have not been required. For the Tier IV Test to be useful, an adequate data base of background concentrations for the same species is required for comparison. The only tissue standards currently available are the FDA action levels for a limited number of organic compounds and mercury. Studies relating health effects to the body burden are very limited (Dillon, 1984; Dillon and Gibson, 1985, 1989, and 1990). Although many marine animals, birds, and humans have detoxification mechanisms which can reduce or sometimes enhance a toxic effect of bioaccumulation (James, 1989; George, 1981; Harding and Addison, 1986; Livingston, 1985), such mechanisms are not well understood. Until such information is sufficient to be used in a regulatory program, EPA must take an environmentally conservative approach.

Biomagnification is the result of the process of bioconcentration and bioaccumulation by which tissue concentrations of bioaccumulated chemicals increase as the chemical is transferred through two or more trophic levels. The term implies an efficient transfer of chemical from food to consumer, so that residue concentrations increase systematically from one trophic level to another. The biomagnification potential increases with increasing trophic levels (Brungs and Mount, 1978). Because a reliable means for conducting biomagnification assessments is currently not known (Kay, 1985), EPA relies upon environmentally conservative tests to prevent biomagnification. As discussed further in the response to

comment number 3.9.2, EPA believes that the combination of stringent dredged material testing protocols, site monitoring, requirements for a thorough alternatives analysis, relocation of the reference site, and other programs will ensure that adverse environmental impacts, such as significant bioaccumulation, are prevented.

The suitability of dredged material for ocean disposal is dependant upon a balancing of many components. This balancing effort is intended to ensure that harmful effects to the marine environment or to human health do not occur. The suitability determination for a dredged material proposal for ocean disposal is made in light of environmental protection and can appear complicated to those unfamiliar with the process. Many factors, including but not limited to, the number of species in which bioaccumulation is statistically greater, the number of contaminants for which bioaccumulation is statistically greater, the magnitude by which bioaccumulation from the dredged material exceeds that from the reference material, and the toxicological importance of the contaminants which were bioaccumulated in statistically significant quantities, are considered when assessing the suitability of a particular dredged material for ocean disposal. Additionally, the selection of materials suitable for ocean disposal is based on a complex analysis of sediment type, historical actions and activities in the area surrounding the dredge site, the size of the project, and the pollutant levels in the sediments to be dredged. Site monitoring and risk assessments are also among the tools used to evaluate potential effects from dredged material disposal. If found to be necessary, several mitigation measures could be imposed, including limitations on the concentration of a particular contaminant in dredged material proposed for disposal or taking the material to a containment site for contaminated dredged material. If statistically significant bioaccumulation over reference sediment was exhibited and was determined to cause unacceptable adverse impacts at the proposed MBDS, EPA would not allow that dredged material to be disposed at the site. As evidenced by several comment letters, including those for the Gloucester State Fish Pier, Coastal Oil, the Central Artery/Third Harbor Tunnel project, and Boston Harbor (see Appendix B), EPA remains committed to ensuring that disposal of dredged material at the proposed MBDS will not endanger marine resources or human health.

3.5.2 Adequacy of Data

Several commentors believed that the data collected to assess the potential for bioaccumulation of chemicals in biota was inadequate. The commentors stated that PCBs and PAHs in fish samples, including the flesh, organs, and bile, should be analyzed. One commentor criticized EPA for not including data on bioaccumulation in phytoplankton, zooplankton, and ichthyoplankton. A few commentors charged that the bioaccumulation data presented in the DEIS was difficult to interpret because not all parameters were sampled on the same date.

EPA Response

EPA presented body burden data for bivalves, polychaete worms, shrimp, and scallops collected in the MBDS vicinity on pages 83 through 93 of the DEIS. In Chapter 4 of the DEIS, EPA analyzed mortality from physical stress and sublethal effects caused by dredged material disposal on benthic invertebrates, plankton, and fish inhabiting the MBDS. Additionally, the potential to bioaccumulate chemicals is routinely assessed by application of the national and regional dredged material testing protocols for regulatory review of individual projects proposed for ocean disposal (Chapter 5 of the DEIS and Section 3.5.1 of this document). Also, as part of ongoing site monitoring and management, EPA has conducted further analyses of bioaccumulation potential in marine species at the MBDS (for details, see the response to comment number 3.9.1).

In 1991, EPA collected chemical and histopathological data from fish, lobster, clams, and scallops caught at the MBDS. EPA uses this information to assess the health of these organisms and to determine if any chemicals have been bioaccumulated in their tissue. As discussed further under the response to comment number 3.6, the results of a public health risk assessment did not indicate any unacceptable risks of developing either cancer or non-cancer effects from the consumption of seafood harvested from the MBDS. EPA believes that this data aids in demonstrating that substantial bioaccumulation is not occurring as a result of dredged material disposal at the MBDS.

EPA believes that effects caused by dredged material disposal on plankton were adequately assessed in Section 4.3.1 of the DEIS. EPA concluded that mortality from the physical processes and toxics associated with dredged material disposal may occur to a minor extent, but will not have a significant impact on the Massachusetts Bay plankton community. Significant impacts to plankton are not anticipated because of the small area of Massachusetts Bay affected by dredged material disposal.

EPA agrees that all of the data used in its analyses are not necessarily directly comparable. EPA presented all available data in order to disclose the environmental effects of previous ocean disposal at the MBDS and to evaluate the potential consequences of the proposed ocean disposal site designation. EPA maintains that the data presented in the DEIS and the SDEIS are sufficient to assess compliance with the site selection criteria at 40 CFR §§228.5 and 228.6.

3.5.3 Assessment of Bioaccumulation in Protected Species

One commentor stated that EPA underestimated the use of the MBDS by whales and failed to examine the impacts of bioaccumulation of pollutants on whales. One commentor suggested that EPA examine lipid samples (collected by biopsy) of whales to assess bioaccumulation and health risk. A few commentors charged that bioaccumulation of contaminants in protected species may reduce reproduction or increase mortalities.

EPA Response

In the summer of 1991, EPA analyzed blubber biopsy samples of Humpback whales in New England waters for organic constituents. Preliminary results show the presence of certain organic chemicals such as PCBs, DDT series, and chlordanes (Dr. Mona Haebler, pers. comm., December 1991). The biological significance of the presence of these compounds is currently unknown. While some chemicals were detected, it is difficult to state with certainty where or how the whales were exposed to these chemicals. Cause and effect relationships are virtually impossible to determine for many endangered species for several reasons, including the large number of contaminant sources (some unregulated) into the large habitat area used by the species over its lifetime. Clearly, much more research is necessary to try to determine where and how these whales were exposed.

Additionally, EPA attempted to collect sand lance, a common forage of Humpback and Finback whales, in Massachusetts Bay in May and July of 1991 to assess the potential for trophic level transfer through the food web. These collection efforts were unsuccessful. EPA believes that this is because sand lance prefer sandy habitats and the MBDS consists largely of finer grained sediments. EPA is committed to continuing marine mammal research. Future studies will attempt to improve our understanding of routes of exposure and biological effects of chemical contaminants in these and other species of endangered whales.

As discussed in detail in the response to comment number 3.10, EPA believes that by coordinating with the appropriate federal agencies concerning threatened or endangered species, it has appropriately complied with requirements of the Endangered Species Act, the Marine Mammal Protection Act, and the National Environmental Policy Act. Both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service have determined that designation of the MBDS will not jeopardize the continued existence of any endangered or threatened species, their prey, or their critical habitat.

3.5.4 PCB Metabolism

One commentor suggested that the statement on page 200 of the DEIS that PCB's are metabolized is incorrect, although true for PAHs.

EPA Response

EPA checked the scientific literature and with Dr. Richard Pruell of EPA's Environmental Research Laboratory in Narragansett, RI, and has determined that PCBs are indeed metabolized. The following references lend support to this view: Boon, 1985; Boon et al., 1987; Boon, 1988; O'Conner et al., 1987; Elskus et al., 1989; Goerke et al., 1977; Ernst et al., 1977; Goerke et al., 1990; Duinker et al., 1989; Hutzinger et al., 1972; and Tanabe et al., 1988.

3.6 Potential for Public Health Impacts

Many commentors were concerned that insufficient data was collected for commercially important fish species and no human health risk assessment was conducted on consumption of these fish. Several commentors requested that EPA analyze the edible tissue of such fish. Several commentors were concerned that EPA did not adequately assess potential human health risks. Many commentors were concerned about the presence of toxic chemicals in dredged material and their potential impacts on public health. Many commentors stated that exposure to historically contaminated sediments may be hazardous to public health and that capping of these sediments may be needed.

EPA Response

In preparation for this FEIS, EPA evaluated potential human health risks associated with consumption of seafood from the MBDS. EPA concluded that dredged material disposal at the MBDS will not cause significant adverse impacts to public health. EPA's health risk assessment did not indicate any unacceptable risks of developing cancer or non-cancer effects by eating seafood harvested from the MBDS. The methods and results of EPA's health risk assessment are discussed below.

Risk assessment is a tool used to determine the magnitude and probability of potential harm to human health by exposure to toxic substances. It is based on scientific information combined with certain assumptions, and can be an effective tool for providing estimates of potential health risks from various sources, including consumption of seafood containing toxic contaminants. There are several different approaches to assessing potential health risks associated with fish consumption. Two of these methods include comparison of fish tissue contaminant levels to regulatory guidelines such as U.S. Food and Drug Administration ("FDA") Action Levels and application of risk assessment methodology to the site-specific fish tissue contaminant loads. Additionally, the dredged material testing protocol, as discussed in the response to comment number 3.9.1.2, addresses the potential to bioaccumulate contaminants. Such information could be used to predict trophic transfer and biomagnification. All of these approaches have a risk assessment component, and EPA used all of these approaches to evaluate potential risks associated with consumption of fish harvested from the MBDS.

Risk assessments are typically used to help make regulatory risk management decisions concerning the appropriate course of action to protect human health. Such risk management concerns led to the development of regulatory guidelines, including FDA action levels, which were derived using risk assessment.

In a risk assessment, the chemicals of concern are identified, the rate of exposure to populations of concern are estimated, the potential toxicological responses to various doses of the chemicals are determined, and the potential risks of adverse health effects based on dose-

response data and exposure data are estimated. The resulting numbers represent a potential upper-bound likelihood of adverse health effects.

Cancer risks are expressed in terms of predicted additional cases of cancer in an exposed population over a lifetime. For example, 2.7 additional cancer cases in 100,000 individuals would be expressed as 2.7×10^{-5}. Various EPA regulatory programs define acceptable risk differently, with levels of acceptable risk ranging from a level of risk of 1 in 10,000 (10^{-4}) to the extremely protective level of 1 in 10,000,000 (10^{-7}). Determination of an acceptable risk is a risk management decision to be made by the responsible regulatory agency (e.g., a state health department or FDA).

Non-carcinogens are assumed to have a threshold below which health effects are not initiated. This threshold, or reference dose, is the estimated highest average daily exposure to humans over a lifetime unlikely to cause adverse health effects. Because the reference dose reflects the acceptable dose below which no adverse health effects would be expected, any observed dose below the reference dose would be considered acceptable. By comparing the reference dose to the dose from a particular area, a Hazard Ratio can be calculated. If the Hazard Ratio is less than one, the dose is considered safe. If the Hazard Ratio is one or greater, then adverse health effects may be likely, with the likelihood increasing as the Hazard Ratio increases. No non-cancer risks from eating seafood harvested from the MBDS were identified, as all hazard ratios were well below one.

Fish may accumulate toxic chemicals in their tissues through several routes of exposure to contaminants, including absorption through the water column, sediment contact, or by consumption of contaminated prey. EPA presented sediment chemistry and benthic body burden data from the MBDS in Chapter 3 of the DEIS. Additionally, in 1991, EPA collected lobsters, clams, scallops, and bottomfish. EPA analyzed the edible tissues of these organisms for organic chemicals, pesticides, and metals. The results of these analyses are summarized in Table 3.6-1 (see Appendix D for raw data).

In evaluating the likelihood of health risks associated with eating fish caught from the MBDS, EPA first compared the measured tissue levels with regulatory guidelines established by the FDA. The FDA is responsible for establishing and enforcing safe levels (action levels and tolerances) for contaminants in fish and shellfish in interstate commerce. All tissue concentrations from the organisms collected at the MBDS were well below the FDA action levels and tolerance limits (see Table 3.6-2). A limitation to this approach is that only a few FDA levels exist. Consequently, action levels for many chemicals of concern, such as metals and PAHs, are not available. Also, the FDA levels are based on national consumption rates and may not representative of risks in coastal areas like New England where consumption rates may be higher than the national average.

The second and most reliable approach, owing to the site-specific nature of the methodology, is the risk assessment approach. The risk assessment procedure for seafood consumption consists of determining the dose of a chemical that a human would be exposed

TABLE 3.6-1: SUMMARY OF CONTAMINANT LEVELS IN MBDS SEAFOOD
(Edible muscle tissue only; Concentrations expressed in parts per billion dry weight)

	American plaice[1]	Winter flounder[2]	Lobster[2]	Scallops[2]	Quahog[3]
Cadmium	12	27	55	2120	3460
Copper	1580	1070	106900	3550	48600
Chromium	350	140	290	7040	1260
Nickel	120	570	467	660	28200
Zinc	26000	26800	151000	65830	236000
Lead	100	110	160	330	5800
Manganese	760	1470	5880	2590	15300
Sum of the measured PCBs	122.89	82.51	49.76	43.29	66.63
Sum of the measured PAHs	15.20	10.6	66.99	219.11	279.18
p,p'-DDT	1.17	0.97	0.28	BDL	0.98
p,p'-DDD	3.36	2.67	1.07	0.78	8.42
p,p'-DDE	14.82	9.32	7.93	4.76	6.82
Mirex	0.23	0.24	0.16	0.13	BDL
Trans-nonachlor	3.09	2.83	1.11	1.22	1.82
Hexachloro-benzene	0.63	0.69	0.79	0.35	1.68
Lindane	0.17	0.18	0.05	0.09	2.45
α-Chlordane	1.71	1.38	0.63	0.57	2.38

BDL = Below detection limit

[1]Average concentration of 3 samples; [2]Average concentration of 9 samples; [3]Only 1 sample analyzed (Metals concentrations reported for whole organism)

Source: Gardner et al., 1991

TABLE 3.6-2: COMPARISON OF CONTAMINANT LEVELS TO FDA LEVELS
(Edible muscle tissue only; Concentrations expressed in parts per million wet weight)

	American plaice[1]	Winter flounder[2]	Lobster[2]	Scallops[2]	Quahog[3]	FDA Action Level
Sum of the measured PCBs	0.0241	0.0179	0.0102	0.00853	0.00773	2.0[4]
p,p'-DDT	0.00023	0.00021	0.000057	BDL	0.00011	5.0
p,p'-DDD	0.00066	0.00058	0.00022	0.00015	0.00098	5.0
p,p'-DDE	0.00291	0.00202	0.00162	0.00094	0.00079	5.0
Mirex	0.000045	0.000052	0.000033	0.000026	BDL	0.10

BDL = Below detection limit

[1]Average concentration of 3 samples; [2]Average concentration of 9 samples; [3]Only 1 sample analyzed (Metals concentrations reported for whole organism); [4]FDA Tolerance level

Source: Gardner et al., 1991

to during a lifetime, based on a certain consumption rate of seafood with observed tissue levels, and predicting the likelihood of adverse health effects from this dose, based on EPA toxicity values. EPA has developed guidelines for performing risk assessments and has issued a guidance manual entitled Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish (USEPA, 1989). Risk estimates for the consumption of seafood harvested from the MBDS were developed using this methodology.

EPA used the tissue concentration data collected in 1991 in its risk assessment calculations (See Appendix D). Estimates of potential risks were made for the "average" New England consumer for each species. EPA assumed that the average consumer ate about three meals per month of a variety of seafood, only a small portion of which may come from the MBDS. The meal size used, 150 grams (about 1/3 of a pound), was based on USEPA (1989). It should be noted that for the average consumer, surveys indicate that canned tuna accounts for most of the seafood eaten. Also, any potential health effects associated with consumption of seafood from the MBDS are decreased because commercially harvested organisms from the area are mixed in the marketplace with other organisms from coastal and offshore areas. Therefore, for this risk assessment, the average consumer was assumed to eat an average of one gram per day of seafood harvested from the MBDS. This consumption rate is consistent with the consumption rate used for both the Quincy Bay and Narragansett Bay studies for an average consumer. EPA found that increasing the consumption rate by a factor of 100 did not result in increased cancer risks above the acceptable range.

Although these average consumer estimates are typical values for a coastal population, they are probably quite high for the MBDS, since there is little recreational or commercial fishing in the area. In 1971, the FDA issued a warning advising shellfishermen to avoid the MBDS because of potential contamination from toxic and low-level radioactive waste disposed in the vicinity. Also, in 1980 the National Marine Fisheries Service ("NMFS") closed the adjacent Industrial Waste Site ("IWS") to harvesting surf clams and ocean quahogs. Additionally, on June 9, 1992 the FDA and the NMFS have requested that the National Oceanic and Atmospheric Administration place an informational "note" on Massachusetts Bay nautical charts advising fishermen against harvesting fish and shellfish because of possible contamination in the IWS. Moreover, since the seafloor at the MBDS is uneven and scattered with debris and sunken vessels, many fishermen avoid the area because their equipment is easily damaged. Trawling at the MBDS is difficult and many trawl nets were either damaged extensively or lost during all of EPA's trawling efforts at the MBDS. Furthermore, any fish caught in the MBDS area are not necessarily resident because of the movement of most fish and the protracted length of commercial trawls. Generally, human health risks are a concern when a particular population are at a significantly higher risk (e.g., recreational fishermen that catch and eat large quantities of one species from a certain area). There is no such population near the MBDS that would be exposed to contaminated fish on a regular basis.

Based on EPA's estimates for MBDS bottomfish, some general trends within the data can be identified. First, tissue levels can be compared to fish tissue levels collected from

other areas in New England. MBDS tissue levels were only slightly higher than those collected at George's Bank and were substantially lower than those collected from Quincy Bay (See Appendix D).

EPA's risk calculations for both cancer and non-cancer risk generally indicate that the risk associated with the consumption of seafood harvested from the MBDS is within the acceptable range. The data used in EPA's analysis is presented in Table 3.6-1 and the cancer and non-cancer risk results are presented in Tables 3.6-3 and 3.6-4, respectively. The standard assumptions that were made include: i) exposure over a 70 year lifetime, ii) average human body weight of 70 kilograms, and iii) 100% of all of the chemicals ingested are absorbed. Also, for PAHs, EPA applied the carcinogenicity potency factor for benzo(a)pyrene, the most potent PAH compound, to total PAHs. All cancer risk levels calculated are within the acceptable range of 10^{-4} to 10^{-7} discussed above. For the cancer risks, the highest risk calculated, 7.091×10^{-6}, was from PAHs in scallop muscle. Generally, cancer risks are added, and the highest total cancer risk was 8.038×10^{-6}, which was from scallops. No non-cancer risks from eating seafood harvested at the MBDS were detected.

One factor which makes it difficult to assess risk for fish from any area in the open ocean such as the MBDS is the motility of the fish. Since fish move around it is difficult to be certain where any contaminant exposure occurred, much less that all exposure came from a limited area such as the MBDS. According to a report entitled Sources and Loadings of Pollutants to the Massachusetts Bays, dredged material represents approximately 1% of the direct contaminant loadings of both PCBs and PAHs to all of Massachusetts Bays (Menzie-Cura, 1992). EPA therefore believes that the organisms exhibiting PCBs and PAHs in their tissues could have been exposed to sources of PCBs and PAHs other than dredged material.

EPA has concluded that the human health risks associated with consumption of seafood harvested from the MBDS are minimal and no immediate additional risk management actions beyond the on-going dredged material management actions described in Chapter 5 of the DEIS and in Chapter 4 of this FEIS are deemed necessary. Additionally, concentrations of PCBs and PAHs in MBDS fish were much lower than fish from several urban and coastal areas, including Boston Harbor, Quincy Bay, New Bedford Harbor, Buzzards Bay, and Narragansett Bay. In particular, tissue concentrations of species collected from the MBDS were substantially lower than those collected in Quincy Bay and Narragansett Bay, yet EPA concluded that it is acceptable to eat fish harvested from these bays (USEPA, 1988; USEPA, 1991). EPA and the COE will continue to check tissue levels of marine resources as part of the regular management of the MBDS to ensure that the marine ecosystem and public health are not endangered.

TABLE 3.6-3: CANCER RISKS FROM EATING MBDS SEAFOOD

	American plaice	Winter flounder	Lobster	Scallops	Quahog
Sum of the measured PCBs	2.650×10^{-6}	1.970×10^{-6}	1.117×10^{-6}	9.381×10^{-7}	8.502×10^{-7}
Sum of the measured PAHs	4.894×10^{-7}	3.779×10^{-7}	2.245×10^{-6}	7.091×10^{-6}	5.320×10^{-6}
p,p'-DDT	1.114×10^{-9}	1.022×10^{-9}	2.774×10^{-10}	1.531×10^{-10}	5.522×10^{-10}
p,p'-DDD	2.258×10^{-9}	1.986×10^{-9}	7.484×10^{-10}	5.268×10^{-10}	3.349×10^{-9}
p,p'-DDE	1.411×10^{-8}	9.823×10^{-9}	7.857×10^{-9}	4.555×10^{-9}	3.843×10^{-9}
Hexachloro-benzene	2.999×10^{-9}	3.636×10^{-9}	3.914×10^{-9}	1.675×10^{-9}	4.733×10^{-9}
Lindane	6.188×10^{-10}	7.254×10^{-10}	1.894×10^{-10}	3.293×10^{-10}	5.278×10^{-9}
α-Chlordane	6.224×10^{-9}	5.561×10^{-9}	2.387×10^{-9}	2.085×10^{-9}	5.127×10^{-9}
Total Cancer Risk	3.167×10^{-6}	2.371×10^{-6}	3.377×10^{-6}	8.038×10^{-6}	6.193×10^{-6}

TABLE 3.6-4: NON-CANCER HAZARD RATIOS FROM EATING MBDS SEAFOOD
(Known critical effects are listed in parentheses after each chemical)

	American plaice	Winter flounder	Lobster	Scallops	Quahog
Cadmium (Significant proteinuria - renal cortex)	3.360×10^{-5}	8.370×10^{-5}	1.603×10^{-4}	5.966×10^{-3}	5.734×10^{-3}
Copper	1.196×10^{-4}	8.965×10^{-5}	8.420×10^{-3}	2.700×10^{-4}	2.177×10^{-3}
Chromium	1.960×10^{-4}	8.680×10^{-5}	1.690×10^{-4}	3.963×10^{-3}	4.176×10^{-4}
Nickel (Decreased body and organ weight)	1.680×10^{-5}	8.835×10^{-5}	6.805×10^{-5}	9.287×10^{-5}	2.337×10^{-3}
Zinc (Anemia)	3.640×10^{-4}	4.154×10^{-4}	2.200×10^{-3}	9.263×10^{-4}	1.955×10^{-3}
Sum of the measured PAHs (Ocular and internal lesions)	1.064×10^{-5}	8.215×10^{-6}	4.881×10^{-5}	1.542×10^{-4}	1.157×10^{-4}
p,p'-DDT (Liver lesions)	6.552×10^{-6}	6.014×10^{-6}	1.632×10^{-6}	9.006×10^{-7}	3.248×10^{-6}
Hexachloro-benzene (Liver and hematologic effects)	2.205×10^{-6}	2.674×10^{-6}	2.878×10^{-6}	1.231×10^{-6}	3.480×10^{-6}
Lindane (Liver and kidney toxicity)	1.587×10^{-6}	1.860×10^{-6}	4.857×10^{-7}	8.443×10^{-7}	1.353×10^{-5}
α-Chlordane (Regional liver hypertrophy)	7.980×10^{-5}	7.130×10^{-5}	3.060×10^{-5}	2.674×10^{-5}	6.573×10^{-5}

3.7 Sediment Movement

Several commentors stated that there may be unacceptable impacts beyond the site boundary and therefore EPA's conclusion that the MBDS is a containment site is unjustified. Another commentor charged that the potential for dredged material movement towards Stellwagen Bank was not adequately assessed in the DEIS. Some commentors were concerned that contaminants may be remobilized because of resuspension events. Several commentors stated that EPA should quantify the transport or fate of resuspended sediments, specifically addressing site wind data, site disturbance information, and stabilizing/destabilizing effects on sediment distribution.

EPA Response

EPA assessed the likelihood that disposed sediments would be contained in the MBDS by predicting the potential for sediment resuspension (Section 4.1.2 of the DEIS) and by examining sediment contaminant levels outside of the existing MBDS boundary to determine if historically dumped sediments had migrated outside the site (Section 3.2.2 of the DEIS). Progressive sediment movement outside the MBDS boundary, including movement toward Stellwagen Bank, has not been documented. Monitoring results from precision bathymetry and REMOTS studies at the MBDS have confirmed that the majority of dredged material disposed at the site remains within the site boundary (COE, 1988). EPA found that resuspension of dredged material deposited at the site can only occur through wave influence or a combination of waves and currents because near-bottom steady currents at the MBDS were much lower than the lowest steady current needed to cause erosion (see Section 4.1.2 of the DEIS). EPA therefore concluded that significant resuspension can only be caused by a combination of bottom currents and strong northeasterly winds.

In the DEIS, EPA estimated that wave-induced sediment resuspension may occur on the average of only once every three or four years, if at all. However, EPA's resuspension modeling effort was based on a limited data set. For example, after analysis of wind speed data for the years 1978 through 1985 (see page 167 of the DEIS), EPA found that winds capable of causing significant resuspension only occurred once, in February 1978, during that seven year period. Since publication of the DEIS, EPA has evaluated data from 1991 and found two times when the winds were strong enough to potentially cause wave-induced sediment resuspension. These events occurred on April 21, 1991 and October 30 and 31, 1991. Although actual frequencies are not known, the occurrence of potential wave-induced sediment resuspension events appears to be rare.

In response to the comment that requested EPA to quantify the transport and fate of resuspended sediments, including site disturbance information and stabilizing/destabilizing effects, EPA's modelling effort revealed that only the surficial 4% of **unconsolidated** sediments is what is subject to wave-induced resuspension at the proposed MBDS. Generally, after disposal, finer grained sediments consolidate owing to pressure and organic bonding. Additionally, mucal binding, caused by the excretions of benthic fauna and

bacteria, aids in consolidating disposal mounds. All of these factors will reduce the likelihood of resuspension events at the MBDS. Also, continuous disposal may result in newer deposits covering previous deposits so that a smaller footprint, or area subject to resuspension, will likely be created. The ultimate fate of resuspended sediment particles is dependant on many factors, including near-bottom currents, grain sizes, and physical impacts such as trawling. EPA does not believe that a detailed study determining where this small percentage of dredged material ultimately results would be useful because of the demonstrated infrequency of resuspension events and the small amount of material that is subject to resuspension. EPA, in cooperation with the U.S. Geological Survey, the Woods Hole Oceanographic Institute, the University of New Hampshire, and the University of Massachusetts, is addressing sediment transport in Massachusetts Bay under the Massachusetts Bays Program. Contaminants associated with dredged material will be remobilized, but as discussed above, the resuspended sediments represent a very small percentage of the total amount of disposed dredged material and EPA therefore believes that this can be considered negligible. Moreover, the MBDS, as discussed in the response to comment number 3.9.1, will continue to be monitored to determine whether any unacceptable adverse impacts from dredged material disposal occur.

Although the sediment chemistry data from transects extending from the site showed a predominance of high contaminant levels within the existing MBDS boundary, some areas beyond the site boundary also exhibited relatively high contaminant levels (Chapter 3, DEIS) when compared to ambient sediment chemistry in Massachusetts Bay. EPA believes that this could be attributed to several factors including shortdumping over the forty year history of the site, previous disposal in the overlapping area of the Industrial Waste Site, and settling of the small percent of dredged material that may remain in the water column after a disposal event (see also response to comment number 3.3.1). The only increased levels of contaminants found outside the MBDS were concentrated in the southwest area, the area where shortdumping is most likely to have occurred. This is because the southwest area is on the path that vessels coming from the Boston area would have taken to get to the site. This area is on the opposite side of the site from Stellwagen Bank. The levels of contaminants found outside of the existing MBDS boundary which can be attributed to recent dredged material disposal are virtually impossible to distinguish from other potential causes. Moreover, no elevated levels of contaminants were detected outside of the existing MBDS on the eastern side, near Stellwagen Bank (Chapter 3, DEIS).

As discussed further in the response to comment number 3.8, the proposed MBDS boundary encompasses both the contaminated sediment area outside of the existing MBDS and the existing location of the disposal buoy. Thus, EPA anticipates that these contaminated areas will eventually be covered by cleaner sediments (see also the responses to comment numbers 3.8 and 3.9.2), and hence at least partially isolated from the marine environment. Also, use of a taut wire-moored buoy will tend to minimize the size of the dredged material footprint and an on-board COE representative will ensure that shortdumping will not occur (see also the response to comment number 3.9.2).

3.7.1 Request for Data Presentation

One commentor requested that EPA present the wind data used in its resuspension modeling effort.

EPA Response

EPA used wind velocity data from Logan Airport provided by the National Weather Service in accordance with the resuspension modeling to predict the frequency of storms strong enough to potentially cause resuspension. Actual wind speed data at the MBDS is not available. EPA does not suspect significant differences between wind velocities at Logan Airport and the MBDS because land masses, which typically slow wind speed because of friction, are not present between the MBDS and Logan Airport. The wind data used consists of hourly velocity readings taken over an eight year period. EPA believes that inclusion of all of this data would not be useful and that only the interpretation of such data, as presented on page 167 of the DEIS, would be valuable to the reader. The actual data is available to individuals who desire it at the EPA Region I office or upon request to the National Weather Service.

3.8 Final Boundary Configuration

Some commentors were not certain what the final coordinates of the proposed location of the MBDS designation were. Some commentors questioned EPA's proposal to overlap the MBDS and Industrial Waste Site ("IWS") boundaries. Other commentors seemed to favor moving the site approximately one nautical mile westward to overlap the IWS. One commentor stated that the northeastern portion of the MBDS site is unsuitable for disposal because it is the toe of Stellwagen Bank. One commentor suggested that EPA consider a two nautical mile square centered over the IWS for the MBDS boundary, since it would include most of the areas used for past disposal.

EPA Response

The responses to these issues are discussed in detail in Chapter 4.1 of this FEIS.

3.9 Management and Monitoring of the Site

3.9.1 Monitoring

3.9.1.1 Reference Sediment

A few commentors were concerned that the existing reference site may be contaminated. One commentor, on the contrary, believed that the existing reference sediment is representative of disposal site conditions prior to any disposal, similar in grain size to the material to be dredged, and substantially free of contaminants. One commentor charged that

EPA did not completely understand the selection of a reference site. One commentor stated that use of existing reference data in the DEIS is inappropriate to delineate effects if the reference site is deemed to be impacted. One commentor stated that EPA should include a plan to identify a clean reference site.

EPA Response

The suitability of dredged material for ocean disposal is determined in part through its comparison to a reference sediment. EPA continues to believe that a clean reference site is a crucial part of ocean disposal site management as it may govern what dredged material is deemed suitable for disposal in the ocean. On page 218 of the DEIS EPA explained that an appropriate reference sediment is one which i) is substantially free of contaminants, ii) is similar to the dredged material to be disposed with respect to grain size, and iii) represents conditions that would exist at the disposal site if no disposal had ever occurred.

As indicated on page 219 of the DEIS, EPA shares concerns regarding potential contamination at the reference site used for determining dredged material suitability, and has therefore investigated the adequacy of the existing mud reference site through several research studies. EPA and the COE continuously monitor reference sites used for dredged material suitability determinations and disposal site monitoring. Sediment chemistry and benthic body burden of *Nephtys incisa* for the existing and potential new reference sites were analyzed in May of 1990. Although not for every constituent measured, the information collected has indicated that a statistically significant difference between the contaminant levels in the existing reference site and a potential new reference site near Stellwagen Bank exists. Because of these statistically significant differences and other indicated trends, EPA and the COE have chosen to relocate the reference site (MUD REF) to the following coordinates: 42° 22.70' north latitude and 70° 30.30' west longitude (REF A). These sites were illustrated on page 220 of the DEIS. A summary of the sediment chemistry data for the two reference sites is presented in Table 3.9-1. Evaluation of the suitability of the reference site will continue as part of the on-going monitoring conducted at the MBDS.

TABLE 3.9-1: COMPARISON OF REFERENCE SITE SEDIMENT CHEMISTRY

(All units in parts per million; Mean of six analytes)

	MUD REF Former Reference Site	REF A Relocated Reference Site
Total PCBs*	0.021	0.017
Sum of the Parent PAHs*	1.51	1.09
Arsenic	17.5	19.6
Cadmium*	0.14	0.09
Chromium*	113	95
Copper*	23.6	19.3
Mercury	0.172	0.152
Nickel	32.3	30.0
Lead*	60.3	53.9
Zinc*	114.7	102.3

* The former reference site has significantly higher concentrations of this contaminant than the relocated reference site when compared statistically (Wilcoxon 2-sample test, $p < 0.05$)

Source: Arthur D. Little, September 1990

3.9.1.2 Adequacy of Testing Protocol

One commentor requested that EPA define the difference between "clean" and unacceptable sediments. A few commentors stated that the regional dredged material testing protocol was not adequate and that more conservative testing requirements are needed. One commentor charged that the existing testing procedures will enable sediments perceived to be contaminated, such as those from Boston Harbor, to be disposed at the MBDS. One commentor requested that EPA explain the new bioaccumulation testing procedures. One commentor charged that bioassay and bioaccumulation tests should not be the only criteria used in judging the acceptability of dredged material, and that subjective measures should be included. One commentor recommended that the dredged material testing guidance be developed in conjunction with a Citizen's Advisory Board.

EPA Response

The acceptability of sediments for ocean disposal is dependant on its potential for impacting the marine environment as determined by the chemical and biological testing required under the revised testing protocols (EPA/COE, 1989 and 1991). A copy of the regional dredged material testing protocol was included in Appendix A to the DEIS. Sediments that exhibit significant mortality or potential to bioaccumulate contaminants are not deemed suitable for unconfined ocean disposal.

EPA believes that the dredged material testing protocols are adequate because they are based on over fifteen years of research. Additionally, as discussed in the response to comment number 3.5.1, research under the Field Verification Program has indicated that acute toxicity and bioaccumulation exhibited in the laboratory tests used are reflective of field conditions at the disposal site.

As discussed in detail in Section 5.3 of the DEIS, both the regional and national dredged material testing protocols employ a tiered approach to testing. In general, the tiers, in order of increasing complexity, consist of a review of available information, sediment chemistry and grain size analyses, and bioassay and bioaccumulation tests. The revised regional dredged material testing protocol was jointly developed by the EPA, the COE, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and several other agencies and is believed to include sensitive and adequate tests.

In response to the comment that requested EPA to explain the bioaccumulation testing procedures, the revised bioaccumulation procedures are explained in the dredged material testing protocol, Evaluation of Dredged Material Proposed for Ocean Disposal, which is commonly referred to as the "green book", (EPA/COE, 1991) and also in the regional dredged material testing protocol (EPA/COE, 1989). The bioaccumulation test lasts for 28 days and requires use of the bivalve, *Macoma nasuta*, and the polychaete, *Nereis virens*. EPA believes that the bioaccumulation testing has been improved by adding *Macoma nasuta*, a deposit-feeding bivalve. These procedures are based on the recent work by Lee et al.

(1989) which is currently being reviewed by the American Society for Testing and Materials ("ASTM").

As discussed in Chapter 5 of the DEIS, the toxicity test revisions now employ a more sensitive test organism, *Ampelisca abdita*, which is recognized by the ASTM as a reliable indicator of sediment contaminant toxicity. EPA believes with this and other stringent modifications, such as lower detection limits and testing for an increased selection of contaminants, the testing protocol has been improved. Further research, including the development of chronic toxicity tests, is being conducted to refine testing procedures even further.

In response to the comment which charged that the testing protocol will allow contaminated sediments to be ocean disposed, EPA has determined that the surficial sediments from Boston Harbor, as tested along the proposed Third Harbor Tunnel alignment and the Mystic River, Chelsea River, and Reserved Channel for the federal navigation improvement project, are not suitable for unrestricted open water disposal at the MBDS (see Appendix B). Moreover, any contaminated sediments, those not meeting the requirements of the protocol, will not be disposed at the MBDS (see also Chapter 4 of this document). Only dredged material which meets such requirements will be allowed for disposal at the MBDS. The need for ocean disposal, the availability of other alternatives, and site management are also considered before a permit for ocean disposal is issued.

The green book was noticed in the Federal Register on April 4, 1991, and has undergone extensive public review. The green book guidance provides the framework for a nationally consistent program. Locally, EPA and the COE plan to revise the regional protocol in order to make it consistent with the green book. A subcommittee of State Coastal Zone Management and COE Dredging and Dredged Material Task Force, consisting of agency, constituency and public members, will provide input during this process. Since, there will otherwise be opportunity for public participation, EPA does not believe that establishment of a separate Citizen's Advisory Board to review the protocol is warranted.

3.9.1.3 Need to Include a Specific Plan

EPA received varied comments on the types of monitoring and mitigation activities that should be conducted to ensure that potential adverse impacts from dredged material disposal are prevented. Many commentors were concerned that a specific monitoring program was not included in the DEIS. One commentor requested that EPA clarify (Section 5.4.3) what sediment types require monitoring more frequently than once per year.

EPA Response

EPA agrees that a monitoring program is necessary to continue to 1) establish baseline conditions at the disposal site, 2) evaluate potential impacts resulting from dredged material disposal, and 3) ensure that no unacceptable adverse effects have occurred. Site monitoring

data is also used to assess whether management techniques at the site are adequate to mitigate any undesirable effects caused by dredged material disposal at the site. EPA remains committed to ensuring that adverse ecological or human health effects do not occur.

In Chapter 5.4 of the DEIS, EPA provided a conceptual strategy for disposal site monitoring. EPA discussed the types of effects that are monitored and the techniques used to monitor ocean disposal sites. EPA also provided information regarding historical monitoring at the MBDS. As discussed in Section 5.4 of the DEIS and partially listed on Table 3-1 of the DEIS, the MBDS has received substantial monitoring in the past. To date, the data collected as part of EPA and the COE's ocean disposal site monitoring programs at the existing MBDS (presented in Chapter 3 of the DEIS and in Appendix D to this FEIS) has not shown that unacceptable adverse impacts resulting from dredged material disposal at MBDS have occurred.

EPA and the COE have entered into a regional Memorandum of Understanding, which states that any site with final designation status "...shall be monitored on a regular basis by the COE to ensure that use of the site is not unreasonably degrading or endangering the marine environment or endangering human health...." The COE and EPA meet annually to determine the scope and extent of monitoring activities to be conducted (see Section 5.14 of the DEIS). As discussed further in Chapter 4, EPA plans to share future draft monitoring plans with the Dredged Material Task Force (see also the response to comment number 3.9.2.3).

The type and amount of monitoring is primarily dependent on three factors - intensity of site use, the degree of concern about potential environmental effects, and availability of resources for funding and conducting such monitoring. Individual monitoring plans are governed by the current state of knowledge and the questions raised by it; specific monitoring plans should be flexible enough to respond to new questions, unexpected results, or available technology. Generally, EPA and the COE monitor characteristics such as movement of material, changes in sediment or water quality, benthic diversity, and bioaccumulation. Future monitoring of the MBDS is expected to be similar to that already described in the DEIS and supporting documents. However, because of the need for specific monitoring plans to be responsive to new information as it is gathered and new questions as they are asked, it is not appropriate for EPA or the COE to commit to a specific course of monitoring for each year. Target species and analytes are discussed in Chapter 4 of this FEIS. As future monitoring plans are developed, EPA will make them available for public review.

In 1992, the COE plans to conduct precision bathymetry and REMOTS studies at the MBDS in the vicinity of the disposal buoy. Such work will enable EPA and the COE to determine where the dredged material has settled and physically assess whether a mound has been created. EPA plans to analyze water column chemistry in July 1992. Future monitoring may include total spionid body burden analysis to aid in predicting trophic level transfer and comparison of toxicity tests on the disposal mound and reference site to ensure that toxic effects from dredged material disposal have not occurred. Monitoring studies

conducted by EPA to locate containers of low-level radioactive or industrial waste are discussed in the response to comment number 3.9.2.5.

In response to the comment that requested EPA to clarify what sediment types require more frequent monitoring, EPA believes it has adequately described the consistent approach taken to characterize potential adverse effects from dredged material disposal in Chapter 5.4 of the DEIS. To recapitulate, the tiered approach to monitoring utilizes rapid data collection techniques to test the effects of dredged material disposal on the marine environment. The tiered monitoring approach employs a framework of early warning triggers that lead to either more intensive monitoring in a higher tier or management action. The first tier is usually a physical assessment of mound placement and uses bathymetric and sediment profile camera surveys (Section 5.4.3 of the DEIS). Another tool involves comparing the colonization of the sediments by benthic organisms to the expected pattern of seasonally adjusted benthic succession to determine whether the disposed dredged material has caused unacceptable adverse impacts to the environment. Community type and rate of recolonization are effective indicators of sediment impacts. Higher tiers are employed if sediment movement or adverse effects are demonstrated in earlier tiers. Intensity would also be increased in the event that monitoring results do not conform to predicted conditions. Also, any results which indicate a potential environmental effect would trigger more intensive monitoring for that specific effect.

3.9.1.4 Request to Monitor for Additional Species

Many commentors believed that fish, prey, and endangered species should be monitored.

EPA Response

In 1991, EPA conducted monitoring studies in the vicinity of the MBDS in order to determine whether any ecological or human health impacts exist. The location of the 1991 trawl transect is illustrated on Figure 3.9-1. The results of this study and a discussion of their significance can be found in Appendix D. These activities included:

i) complete histopathological analyses of Winter flounder, *Pseudopleuronectes americanus*; American plaice, *Hippoglossoides platessoides*; Yellowtail flounder, *Limanda ferruginea*; and sea scallops, *Placopecun* sp. from the MBDS/IWS area (histopathological studies provide an indication of organism health);

ii) chemical analyses on the edible tissue of winter flounder, American plaice, sea clams, sea scallops, and lobster, *Homarus americanus* (chemical analysis of the edible tissue of these organisms will enable EPA to assess potential effects on the organisms and to human health - see also the response to comment number 3.6);

Figure 3.9-1: Location of the Trawl Transect

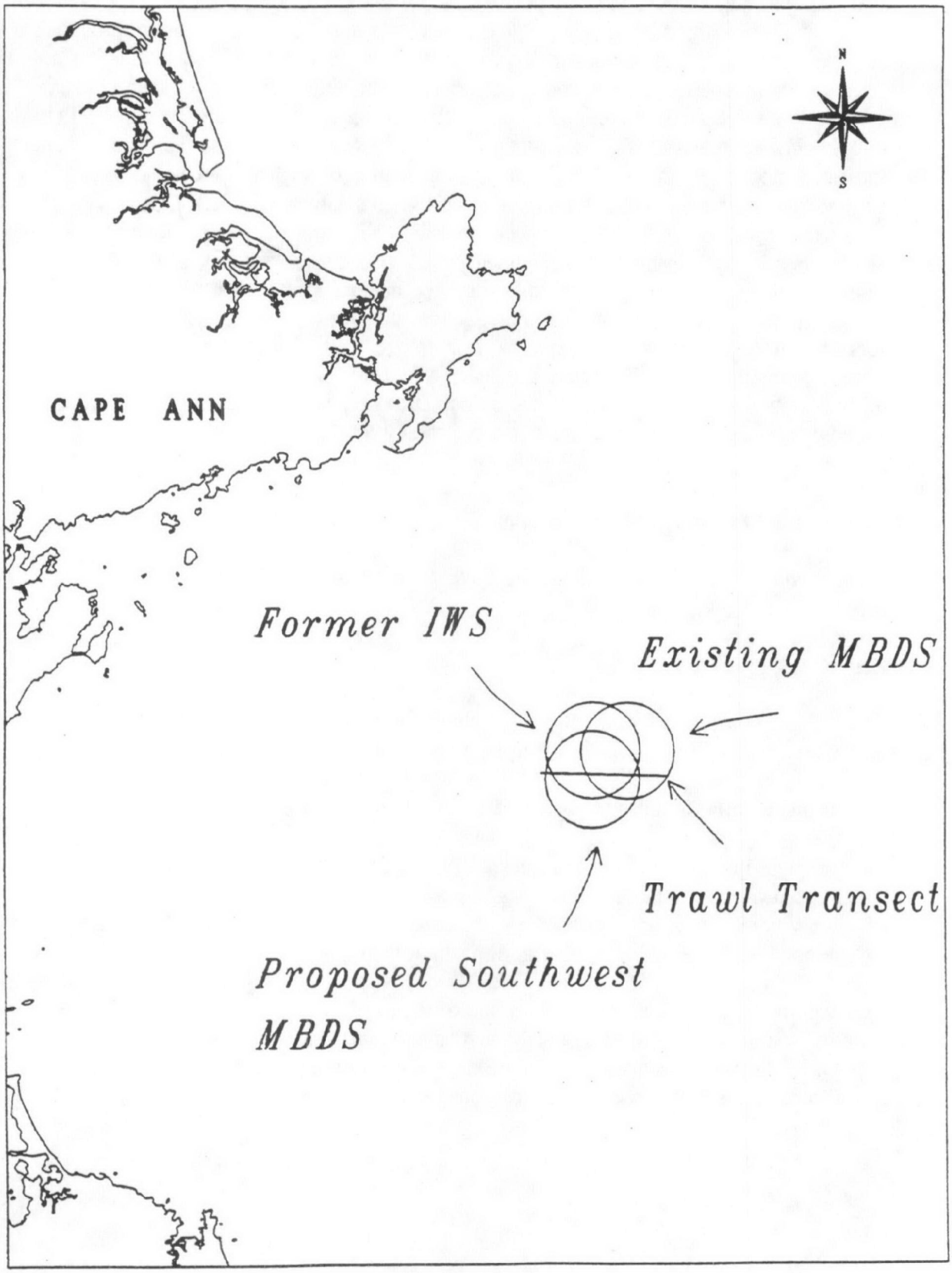


Figure not drawn to scale.

iii) chemical analyses of liver and hepatopancreas on winter flounder, American plaice, and lobster to assess potential effects on these organisms; and

iv) sediment chemistry from the MBDS/IWS area to compare to any effects demonstrated by the tissue chemistry or histopathology.

While EPA believes that the histopathology and body burden studies are important in developing a biological database for Massachusetts Bay, the natural movements of Winter flounder, American plaice, scallops, and lobsters may limit their usefulness in assessing effects caused solely by dredged material disposal. Also, the natural migratory patterns of Winter flounder and lobster include contaminated areas in coastal Massachusetts, including Boston Harbor and Quincy Bay. Additionally, Winter flounder typically do not inhabit depths over 150 feet, and depths at the MBDS average 290 feet. The Winter flounder collected at the MBDS were caught in the northeastern area of the site, approximately one and a half nautical miles from the disposal buoy and in an area 150 feet shallower.

Also in 1991 (as discussed further in the response to comment number 3.10) EPA initiated studies to identify organic chemical contaminants in blubber biopsy samples from Humpback whales in New England waters. Preliminary results show the presence of certain organic chemicals such as PCBs, DDT series, and chlordanes. The biological significance of these compounds and whether these chemicals occur in most whales or in whales from other areas are currently unknown. As discussed in Section 3.3.4 of the DEIS, whales cover an enormously large area in their lifetime. As a result, EPA does not believe that the MBDS can be considered to be the only source of contaminants, or even a significant source of these contaminants. Additionally, the blubber samples were collected in the Gulf of Maine, and it is not known if these whales ever visited the MBDS. Future studies will attempt to improve our understanding of routes of exposure and biological effects of chemical contaminants in endangered whales (see Chapter 4 of this document for a list of target analytes).

3.9.1.5 Request for Additional Studies

A few commentors recommended that EPA study potential trophic transfer of pollutants.

EPA Response

As discussed in Section 5.4 of the DEIS, trophic transfer of pollutants is inherent in the tiered approach to monitoring and is considered in both the COE's and EPA's monitoring programs. Typically, monitoring programs attempt to identify indicators of adverse effects before they occur. Sources of contaminants to fish, including water column contaminants, sediment contaminants, and body burden of prey species, have historically been analyzed at the MBDS in order to assess the magnitude and extent of different exposure routes. As discussed in the response to comment number 3.9.1.4, tissue chemistry was performed on American plaice, Winter flounder, lobster, clams, and scallops taken from the MBDS. All

samples exhibited levels of contaminants well below FDA action levels (see also the response to comment number 3.6).

3.9.2 Management

3.9.2.1 Contaminated Sediment Management

Several commentors requested that EPA restrict the disposal of "contaminated sediments" at the site. Several commentors believed that contaminated sediments should not be disposed at MBDS and that EPA should consider disposing solely clean sediments. Some commentors believed that tighter constraints on the levels of contaminants of concern should be placed in permits. Many commentors stated that EPA should not rely upon site management measures to prevent impacts associated with disposal of contaminated sediments.

EPA Response

As discussed in the response to comment number 3.9.1.2, contaminated sediments are those that indicate significant mortality or potential to bioaccumulate chemicals in biological tests. Such sediments are not allowed to be dumped at the MBDS (see Appendix B). As illustrated on page 215 of the DEIS, these sediments, which are deemed to have the potential for unacceptable adverse ecological or public health impacts, are not acceptable for unrestricted open ocean disposal. As explained in Chapter 5 of the DEIS and in Chapter 4 of this document, only dredged material that meets the requirements of the testing protocol will be allowed for disposal at the MBDS.

EPA believes that tighter constraints on the disposal of dredged material than those imposed in the past have been imposed at the MBDS. These constraints include: i) stricter requirements in the dredged material testing protocol as discussed in Section 5.3 of the DEIS and in the response to comment number 3.9.1.2, ii) relocation of the reference site to a cleaner area near Stellwagen Bank as explained in the response to comment number 3.9.1.1, iii) the requirement by the COE for disposal inspectors on every trip to the MBDS (see Section 5.1.2 of the DEIS), and iv) the use of a taut wire moored buoy.

3.9.2.2 Capping as a Mitigation Measure at the MBDS

Several commentors believed that the feasibility of capping as a management strategy at MBDS should be studied before it is used. One commentor stated that, based on past problems, more restrictive positioning and verification of mound formation is needed to show that capping is effective. Several commentors stated that capping may not be effective in deeper water. One commentor recommended that the Blue Circle Atlantic and General Electric dredging projects be used in a pilot study to test the feasibility of capping at MBDS.

EPA Response

EPA agrees that there are many uncertainties associated with the effectiveness of capping contaminated sediments as a management strategy at the MBDS. Several of these uncertainties were noted on pages 229 and 230 of the DEIS. EPA concluded that the viability of capping as a management strategy was uncertain. Since publication of the DEIS, several other uncertainties related to capping have been identified, including:

i) whether intrusion of water to the dredged material plume causes enough dispersion to prevent formation of an effective mound;

ii) whether the physical characteristics of the dredged material to be disposed at the site render the material more inclined to disperse during its descent to the seafloor;

iii) whether capping can sufficiently reduce risks to the marine ecosystem such that they become less than those associated with disposal in other media;

iv) whether there would be sufficient volume of clean material to cap the contaminated material for any particular project; and

v) whether adequate long-term monitoring and contingency plans are in place.

EPA continues to believe that these issues and others must be adequately addressed before capping can be relied upon as an effective management tool at MBDS. Moreover, EPA compiled a list of forty one unresolved issues related to capping as a mitigation measure at the MBDS which was sent to the COE on September 27, 1991. A copy of this letter is included in Appendix B. Based on the available data, it remains unclear if disposal of contaminated materials and subsequent capping at the MBDS can be routinely and successfully performed. Currently, dredged materials which do not meet the requirements of the testing protocol will not be allowed for disposal at the MBDS. As evidenced in EPA's letters to the COE dated June 12, 1991 and September 27, 1991 regarding the federal Boston Harbor Improvement dredging, EPA will strongly uphold its policies on dredged material suitability and capping for ocean disposal (See Appendix B).

According to COE records, the Blue Circle Atlantic project, consisting of 33,800 cubic yards of dredged material and the General Electric project consisting of 4,800 cubic yards of dredged material, were both dredged and disposed in 1986. Hence, these sediments cannot be used in a pilot study.

The COE conducted an experiment in 1982 and 1983, to compare hopper and clamshell dredging apparati. This study did not indicate that a mound could be created at the MBDS. Although provisions for point dumping at a taut wire moored buoy were made, the distribution of dredged material following disposal indicates that such provisions were

unsuccessful in controlling disposal. In some instances, dredged material was detected over 750 meters from the disposal point (SAIC, 1984; SAIC, 1985).

EPA believes that pilot studies should be conducted, albeit with uncontaminated dredged material. Differences between the dredged material and the cap material could be detected by using material with different grain sizes or material with different isotope signatures. Placement of the material could be tracked with side scan sonar and REMOTS to delineate the footprint and to determine whether the dredged material has been completely covered. The capped mound would then be closely monitored to determine its effectiveness in isolating potential contaminants. EPA is currently working with the COE and others to develop a pilot capping feasibility study at the MBDS. Until this study and others are done, the efficacy of capping in deep oceanic environments, such as the MBDS, remains uncertain.

3.9.2.3 Public Dredged Material Management Workshops

Several commentors recommended that a Citizen's Monitor Group be created to monitor and assess disposal activities at the MBDS. Additionally, several commentors recommended that the sanctuary manager for the Stellwagen Bank National Marine Sanctuary, if designated, be included in such a group in order to review permits and management of site.

EPA Response

EPA believes it has satisfied the comments regarding the recommendation to create a Citizen's Monitor Group. In April 1991, EPA and the COE initiated a series of public workshops on dredging and disposal issues in the Massachusetts region. The aim of the workshops was to foster improved communication and understanding of the complex issues surrounding management of dredged material by bringing together environmental organizations, site users, and managers to examine relevant research and monitoring efforts. Consistent with this goal, the workshops accommodate presentations from participants and allow ample time for discussion. To date, EPA and the COE have hosted several workshops discussing the current state of our knowledge related to i) capping and ii) the industrial and low-level radioactive containers. Alternatives for contaminated dredged material is the topic planned for the next meeting. EPA and the COE were pleased that individuals from numerous disciplines participated in these workshops.

Recently, the COE and the Massachusetts Coastal Zone Management Office initiated a Dredging and Dredged Material Task Force. Representatives from EPA, other state and federal agencies, environmental groups, bay users, and the public have been asked to participate in the task force. Several subcommittees are being established, which cover topics such as dredged material testing, regulatory controls, and management options. The Dredged Material Task Force hopes to develop a long-term, state-wide management strategy for dredged material.

EPA has also recently created the "Advisory Committee on the Waste Barrels in Massachusetts Bay", which will review information generated by EPA and others on past dumping practices at the Industrial Waste Site and elsewhere in Massachusetts Bay. Again, the group is composed of representatives from environmental groups, fishermen, bay users, elected representatives, state and federal officials, and the public.

In response to the comment that recommended that the sanctuary manager be involved in permit review and site management, the COE stated in their letter to NOAA dated November 9, 1990, that it welcomes NOAA involvement in the permitting process in an advisory role (see Appendix B). EPA also welcomes such involvement from the NOAA sanctuary program. Additionally, the COE's permitting process is public. Each permit application is made available for public comment so that interested parties can participate in each disposal permit decision (see also Chapter 4 of this document). Also, site monitoring information developed by EPA and the COE will be available to NOAA for review.

3.9.2.4 Need for a Contaminated Dredged Material Plan

Several commentors believed that EPA should develop a plan for contaminated dredged material in the region. Many commentors charged that a long-term disposal management strategy is needed. Such a strategy would include alternative disposal options for dredged material deemed unsuitable for disposal at MBDS, such as upland or nearshore containment. Many commentors were concerned that sediments dredged from Boston Harbor would be disposed at MBDS in the absence of such a plan.

EPA Response

EPA recognizes the need for a long-term strategy to address contaminated material not suitable for disposal at the MBDS, and is currently participating in an effort to develop such a strategy. This effort is being conducted through the Dredging and Dredged Material Task Force discussed in the response to comment number 3.9.2.3. Also, the COE is currently providing funding and technical support to Massachusetts and New Hampshire to assist in evaluating engineering, environmental, and economic issues related to dredging and dredged material disposal planning. EPA is participating in both of these efforts and plans to be a signatory to a Memorandum of Understanding ("MOU") that is being prepared for EPA, the COE, the Massachusetts Executive Office of Environmental Affairs, and Massport. The MOU will establish agreements for developing a long-term management plan.

The Task Force hopes to develop a plan to address management of both clean and contaminated sediments from Boston Harbor and elsewhere in the state and would address such issues as, i) projecting the location, quantity, and quality of sediments to be dredged for the next 50 years; ii) identifying potential disposal alternatives and sites (including upland, nearshore and other aquatic environments, and other options such as commercial reuse); iii) determining the engineering, environmental and economic feasibility of disposal alternatives,

such as containment structures; and iv) coordinating and improving the regulatory structure and process for dredging projects.

Until such a long-term strategy is formulated, EPA and the COE will continue to review permit applications on a case-by-case basis. EPA does not believe that the absence of such a strategy invalidates this case-by-case approach, because under any conditions contaminated sediments (those which fail prescribed testing protocols) are not acceptable for unconfined disposal at the proposed MBDS. Final site designation does not constitute approval for disposal of any particular material from an individual dredging project at MBDS, nor does it supersede the ocean dumping regulations prohibiting unconfined open water disposal of contaminated sediments. In the context of the limited purpose of this FEIS and the limited nature of the federal action at issue here -- to decide whether MBDS should remain available for use -- EPA believes that it is appropriate to proceed with site designation prior to development of a long-term plan for regional contaminated dredged material disposal.

At the time of publication of the DEIS, EPA had not reviewed actual sediment and biological test data from Boston Harbor sediments. In June 1991, EPA determined that surface sediments dredged from Boston Harbor, the Mystic and Chelsea Rivers, and the Reserved Channel, are not acceptable for disposal at the MBDS (See Appendix B). Alternatives to ocean disposal will be explored in detail in an Environmental Impact Report to be developed by Massport and an EIS by the COE, both of which are subject to public review. EPA plans to work closely with Massport and the COE on this project. Additionally, EPA has conducted an initial screening of viable alternatives for contaminated dredged material. In particular, the work has been limited to identification of areas, including upland disposal, aquatic containment areas, and confined disposal facilities, that may be worthy of further investigation.

3.9.2.5 Industrial Waste Site Issues

Several commentors expressed concern regarding the presence of radioactive waste previously disposed at the Industrial Waste Site ("IWS"). Some commentors saw this as potentially problematic because if dredged material was allowed to be dumped on the barrels it could hinder future study. Several commentors recommended that a thorough study of the proposed MBDS and IWS should be conducted to look for barrels of radioactive and hazardous waste, followed by a thorough alternatives analysis considering remediation. A few commentors believed that EPA should periodically monitor the barrels, canisters, and other industrial and radioactive waste. One commentor stated that the Boston Lightship and the IWS should be identified on charts. One commentor suspected that EPA was not cognizant of the adjacent IWS and stated that there should be reference to explosives in the site history section.

EPA Response

As stated in the response to comment number 3.1.1, the purpose of the analyses presented in the DEIS, SDEIS, and this FEIS is to determine the continuing need for and suitability of the proposed MBDS as an available option for dredged material disposal. EPA does not intend to expand the stated purpose to include potential remedial actions at the IWS should they be necessary. Consequently, this FEIS will not determine whether remedial action is needed at the IWS or how it should be done if necessary. However, EPA is engaged in an on-going effort to determine the extent of environmental or public health risks posed by past dumping in Massachusetts Bay, and the potential need for remediation.

As discussed in Chapter 1 of the DEIS, industrial waste such as organic and inorganic compounds, intentionally sunken derelict vessels, and construction debris have been dumped at the IWS since the 1940s. According to EPA records, the IWS was last officially used in 1977. Chemicals, low level radioactive waste ("LLW"), and munitions have also been disposed at the IWS. The last disposals of LLW at the IWS are believed to have taken place in 1959. The IWS has not been permitted for use since 1977, and it was formally de-designated as a chemical waste dump on February 2, 1990 (55 FR 3688).

Further information on wastes disposed at the site and their potential environmental impacts (known to date) can be found in an EPA report entitled Data from Studies of Previous Radioactive Waste Disposal in Massachusetts Bay, published December 1984. EPA is currently revisiting the results of this report. This survey was based in part on studies conducted by EPA and the National Oceanic and Atmospheric Administration ("NOAA") during 1981 and 1982 on LLW dumped at the IWS. These studies included side scan sonar; sediment and biota chemistry; comprehensive radiological monitoring of biota, sediments, and water; and tests on commercial seafood samples. The report states that between 1952 and 1962, 4,008 containers of LLW, including 1438 five gallon pails, 1860 thirty gallon drums, and 710 fifty-five gallon drums, was authorized by the Atomic Energy Commission to be dumped at the IWS. Upon impact, these barrels were partially covered by soft sediments. The report concludes that "...most analyses for radionuclides in biota and sediment samples collected from Massachusetts Bay show levels of radioactivity below the mean detection limit...." The report also states that the concrete used to encase the LLW was specifically formulated to resist sea water corrosion and that "...Each container was expected to remain intact in its disposal environment for at least 800 years...."

In July, 1991, EPA funded a joint research project with the International Wildlife Coalition ("IWC") to locate barrels and visually assess the condition of waste containers over a ten square nautical mile area in the area surrounding the western half of the IWS (but in areas not surveyed by EPA and NOAA in 1981 and 1982) using side scan sonar and remote underwater video (Wiley et al., 1992). The IWC used this data to categorize and rank targets for a August 1991 follow-up survey using a remotely operated video ("ROV") camera. The IWC estimated that the barrel density within the north-central portion of the IWS to be approximately 5190 per square nautical mile. Ninety three targets were inspected

in eighteen study sites. Of these ninety three targets, sixty four were identified as fifty five gallon drums. Seventy five percent of these barrels were open. Of the thirty seven barrels that were inspected in detail, half were empty. The remaining half contained either laboratory glassware or concrete.

In December 1991, EPA surveyed the former Boston Lightship Disposal Site, an area which was reportedly used for waste disposal (Schoenherr et al., 1992). The survey employed side scan sonar and ROV camera to locate and assess the condition of the waste containers. Careful interpretation of the sonar records provided the location of up to 196 possible barrels over the 16 square nautical mile study area. An additional 101 unidentified targets were also located. It is important to note that the presence of "targets" on side scan sonar records does not necessarily mean that actual barrels exist at that location, but could be targets that give the same sonar signatures as barrels. EPA was unable to confirm the identification or assess the condition of the targets with the ROV camera because of technical problems and weather constraints. Currently, it is not possible to provide a total number of waste containers for either the IWS or the Boston Lightship Site. However, given conservative assumptions, the probable density of waste containers in the IWS area is about three orders of magnitude higher than in the Boston Lightship area.

EPA plans to continue its assessment of the extent of and potential risk to the ecosystem and public health from waste disposal in Massachusetts Bay. The short-term strategy will focus on public health and ecological risk at two identified sites, namely the IWS and a "re-dump" area off Cohasset, where Massachusetts fisherman have reportedly disposed waste containers retrieved during their dragging operations. Sediment, water, and marine organisms will be collected in the immediate vicinity of the waste containers. On-going investigations regarding past disposal practices will assist EPA in identifying areas where sampling efforts should continue. Over the long-term, EPA hopes to conduct additional surveys of areas believed to contain waste containers to determine the need for further sampling or management action.

EPA has also established an independent scientific peer review committee to review all pertinent study objectives, methods, plans, results, and proposed management plans developed by the study team to ensure technical soundness, quality, and usefulness of the effort. The Advisory Committee on the Waste Barrels in Massachusetts Bay, will continue to meet periodically to review and discuss activities such as study plans, results, and management actions (see also the response to comment number 3.9.2.2). EPA will also mail pertinent information regarding studies and meetings to the interested public as they are developed, and will have open public meetings as necessary.

Additionally, EPA is planning to evaluate the IWS again under the Superfund program. The Hazard Ranking System ("HRS") model has very recently been revised to more fully assess threats posed by potential hazardous waste disposal sites through incorporation of environmental considerations. Sites which were scored using the original HRS model may be re-scored using the revised HRS if those sites possess characteristics

which were not assessed using the original HRS model. EPA believes that the IWS is such a site, and plans to reassess it using the revised HRS model.

The first steps in the Superfund reassessment will be to collect and review all the currently available site information, and to determine whether any additional data is needed to support a revised HRS score. The information produced from the aforementioned research and monitoring studies will provide vital information for this reassessment. If the HRS score for the IWS meets or exceeds the ranking threshold for National Priorities List ("NPL") eligibility, the site will be considered for possible inclusion on the NPL. If listed on the NPL, the IWS would become eligible for Superfund program remediation funds.

EPA believes that further work is needed to state with certainty whether remedial action is warranted and what any such action might entail. EPA continues to believe that it is imperative to base any possible remedial actions on sound technical information. This is not only because of the great expense that could be involved in a remedial action, but because, as is discussed below, certain kinds of remedial activities could cause more harm to the environment or risk to public health than the IWS currently presents.

It is important to emphasize that no remedial action has yet been recommended. However, if it is determined that remedial action is needed, a full analysis of possible remedial alternatives will be performed. Three general remedial alternatives would likely be considered: 1) the "no action" alternative (with or without certain site management measures to control particular potentially hazardous activities at the site), 2) removal of wastes, and 3) capping the wastes with an appropriate material (such as clean marine clays). EPA recognizes that difficult questions need to be addressed when determining what remedial action, if any, is appropriate for the industrial and radioactive wastes at the IWS. These questions include the potential risk to the marine environment or public health posed by present conditions at the IWS, the dangers that would be posed by either attempting to remove or cover wastes on the seafloor, the availability of upland or aquatic disposal sites for any wastes that are removed, the availability of suitable cover materials and the efficacy of capping the waste containers, and the costs associated with each of the various options. Continued use and final designation of the MBDS for dredged material disposal will not preclude any of these remedial options.

3.9.2.6 Roles of EPA and the COE

One commentor requested that EPA explain the relative roles of EPA and the COE, and declared that the COE is the permit decision-maker and EPA's role is to advise, elevate and veto.

EPA Response

EPA believes that its role is that of a joint regulatory authority. EPA has primary authority for determining whether particular dump sites may be designated. EPA also adopts

the regulatory criteria that are used to determine whether a particular dumping proposals should be permitted. Sections 5.1 and 5.2 of the DEIS discuss EPA's and the COE's respective enforcement and permitting authorities as set forth under the MPRSA, whereby EPA can veto proposed permits if it deemed them not to comply with applicable regulatory criteria. EPA and the COE jointly assess compliance with the MPRSA and its accompanying regulations. EPA and the COE share particular enforcement authorities, with EPA being responsible for seeking penalties, under the MPRSA.

3.9.2.7 Other Management Comments

One commentor requested that EPA discuss measures to prevent short-dumping. Another commentor requested that EPA discuss the reasons for moving the "A" buoy after January 1975. Some commentors suggested that EPA impose seasonal restrictions on disposal at the MBDS to prevent impacts to endangered species and their prey. One commentor did not believe that seasonal restrictions were an adequate management tool at MBDS. One commentor charged that EPA proposed to dilute project material with clean materials, and stated that this is not an acceptable management practice. Several commentors requested that EPA consider setting maximum limits on the volume of material dumped and the rate of disposal in order to avoid toxic exceedances.

Response

As discussed under Section 5.1 of the DEIS, enforcement of the MPRSA and its accompanying regulations is a joint responsibility of EPA and the COE. Section 5.1 of the DEIS also states that an onboard COE representative accompanies all vessels transporting dredged material for ocean dumping. One duty of this representative is to ensure that short-dumping, or disposing of dredged material before actually reaching the disposal site, does not occur. If short-dumping does occur, it is reported promptly to the COE and EPA for enforcement action. Dredged material permits issued by the COE specify which material from a particular project is allowed for open water ocean disposal, the location of the allowed dumping, and other conditions.

In 1963, the U.S. Coast Guard deployed disposal marker "A" buoy to the northwest of the present MBDS (42° 26.8'N and 70° 35.0'W). This area became known as the Industrial Waste Site ("IWS"). In 1975, at the request of the Commonwealth of Massachusetts and the COE, the IWS buoy marker was moved to its present location (42° 25.7'N and 70° 35.0'W). EPA has been unable to verify the rationale for moving the "A" buoy. The basis for the current proposal to move the boundary of the MBDS to the southwest, which overlaps both the existing MBDS and the IWS in part, is discussed in Chapter 4 of this document.

EPA did not identify any unacceptable effects from previous dredged material disposal at the MBDS, including those on endangered species or their prey (see the response to

comment number 3.10). EPA therefore concludes that seasonal (or other) restrictions on dredged material disposal currently are not necessary to prevent such impacts.

EPA agrees that dilution with clean materials is not acceptable management practice. This is why discrete chemical testing is required on the sediments to be dredged, without compositing different areas together. During dredging some dilution does occur because surface materials are mixed with deeper (and usually cleaner) sediments. This dilution is not considered during testing of the material, however, and only sediment which passes the test protocols without such dilution is approved for disposal at the MBDS.

EPA has, on a case-by-case basis at disposal sites much shallower than the MBDS, approved sequential capping as a management tool. Sequential capping involves disposal of more contaminated sediments followed by capping with less contaminated sediment. This reduces long term exposure of biota and does not involve dilution of sediment contaminants. However, as noted in Section 5.4.7 of the DEIS and discussed under the response to comment number 3.9.2.2, EPA currently does not believe that capping can be relied upon as a mitigation measure at the MBDS. Moreover, EPA continues to maintain that dredged material which does not meet the requirements of the testing protocols is not suitable for open ocean disposal at the MBDS. Other management options, as discussed in Chapter 4 of this document, may be considered to mitigate potential effects from dredged material disposal.

EPA believes that the existing management of the MBDS combined with the ocean dumping regulations are sufficiently protective of the environs of the disposal site. As a result, EPA does not believe that placing general site limitations on the volumes or rates of disposal of sediments is necessary at this time. Such types of restrictions, if warranted, may be considered by the COE for individual permits.

3.10 Endangered Species

3.10.1 Methodology of Endangered Species Assessment

Many commentors charged that EPA did not fully or accurately evaluate potential impacts to endangered species, including the potential effects of dredged material disposal on prey species. One commentor stated that EPA should consider the conservation recommendations of the National Marine Fisheries Service ("NMFS") to prevent potential adverse effects from dredged material disposal to endangered species.

EPA Response

The Endangered Species Act of 1973 (16 USC §§1531 et seq.) ("ESA") requires all federal agencies and their permittees and licensees to ensure that their actions are not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of critical habitats of such species. If any activity may

affect an endangered or threatened species, the federal agency must assess the potential impacts in detail and obtain a biological opinion from the U.S. Fish and Wildlife Service ("USFWS") or the NMFS about the potential effects. EPA believes that by coordinating with the appropriate federal agencies concerning threatened or endangered species, it has appropriately complied with requirements of the ESA, the Marine Mammal Protection Act, and the National Environmental Policy Act. EPA used all available data in its EISs and has acknowledged the data provided by a commentor (see the response to comment number 3.10.2).

The NMFS is responsible under Section 7 of the ESA for consulting with federal agencies to assess whether any federal projects will jeopardize the continued existence of endangered or threatened species including marine mammals, fish, or reptiles. The NMFS may recommend further actions to facilitate conservation and recovery of endangered or threatened species. These actions may include protection of their prey or essential habitat. EPA closely consulted with the NMFS, a cooperating agency, during preparation of the DEIS. NMFS concluded that although disposal of dredged material could affect certain federally listed threatened or endangered species, designation of the proposed MBDS will not jeopardize those species, their prey, or their critical habitat. EPA and the COE are presently implementing the conservation measures recommended by the NMFS in their Biological Opinion.

Additionally, the USFWS in their letter dated November 22, 1989, has determined "...that designation of the MBDS will not jeopardize endangered or threatened species under the jurisdiction of the Fish and Wildlife Service...." Copies of the Biological Opinions conducted by the USFWS and the NMFS are located in Appendix C.

3.10.2 Additional Information

One commentor stated that EPA did not accurately represent the presence of fin whales within the MBDS and that a better description is necessary. One commentor offered a number of informational comments and clarifications regarding endangered species. These comments include: schooling fishes are not always the preferred prey; sightings of humpback whales in Spring and Fall have been documented within the site; mother and calf pairs are frequently seen at MBDS as documented in 1988 and 1989; right whales have been observed every April since 1985; 19 right whales, including four mother and calf pairs reside at MBDS in July through October, as documented in 1986; Sei whales are usually seen with right whales; and sand lance use sediments on the northeastern portion of Stellwagen Bank within the existing MBDS.

EPA Response

As discussed in the response to comment number 3.10.1, EPA believes it has adequately assessed impacts to protected species, and this is support by the NMFS of No Jeopardy to the continued existence of any threatened or endangered species (See Appendix

C). EPA used the same information and references in its assessment that the commentor quoted (see the following references that were used and listed in the DEIS: Balcomb et al., 1978; CETAP, 1982; Chu, 1986; COE, 1988; Gaskin, 1976; Hain et al., 1981, 1982; Hays et al., 1985; Jonesgard, 1966; Katona et al., 1977, 1979, 1980, 1984; Kenney et al., 1981; Kraus et al., 1981, 1984, 1986; Leatherwood et al., 1976; Mayo et al., 1982, 1985; Mitchell, 1974, 1977; MBO, 1980-1985; Moore et al., 1952, 1963; Nicholas, 1979; Overholtz et al., 1979; Payne et al., 1982, 1983, 1984, 1986; Schevill et al., 1960, 1976, 1979; Schmidley, 1981; Scott et al., 1981; Sergeant, 1966; Watkins et al., 1979; Weinrich, 1985; Whitehead et al., 1981, 1982; and Winn et al., 1975). Also in the DEIS, EPA explained that the majority of dredging and dredged material disposal occurs in the winter, while whales are present in the area of the MBDS principally during the summer, and occasionally in the spring and fall.

3.11 Coexistence with National Marine Sanctuary

3.11.1 Impact of National Marine Sanctuary Designation on MBDS Designation

Several commentors requested that EPA discuss the potential for conflicts between its proposed designation of the MBDS and the National Oceanic and Atmospheric Administration's ("NOAA") proposed sanctuary designation, including the legal implications for EPA's proposed designation and future use of the MBDS should a Stellwagen Bank National Marine Sanctuary (the "Stellwagen NMS") be designated. A few commentors asserted that the NOAA is authorized to regulate any dumping to ensure consistency with purposes of the sanctuary designation. One commentor believed that the MBDS should be placed within the proposed Stellwagen NMS boundary in order to allow for greater regulation of the site. Several commentors asserted that EPA did not adequately address potential impacts to sensitive habitats such as the Stellwagen Bank area.

EPA Response

The siting of both ocean disposal sites and national marine sanctuaries ("NMSs") is governed by the Marine Protection, Research, and Sanctuaries Act of 1972 ("MPRSA"). Title I of the MPRSA authorizes EPA to designate dredged material disposal sites and Title III authorizes NOAA to designate NMSs to provide comprehensive and coordinated conservation and management for areas of the marine environment that are determined to be nationally significant.

Title III of the MPRSA does not preclude a dredged material disposal site being encompassed by, or adjacent to, a NMS. To the contrary, Title III (see 16 USC §1431(b)(5)) specifically directs that NMSs should accommodate multiple and existing uses, where consistent with protection of the NMS's critical resources. Title III (see 16 USC §1434(c)(1) and (2)) also states that NMS designation does not give NOAA any right to terminate existing permits or other authorizations to conduct activities in the marine environment, but only that

NOAA may condition the exercise of such authorizations as necessary to protect the NMS's critical resources.

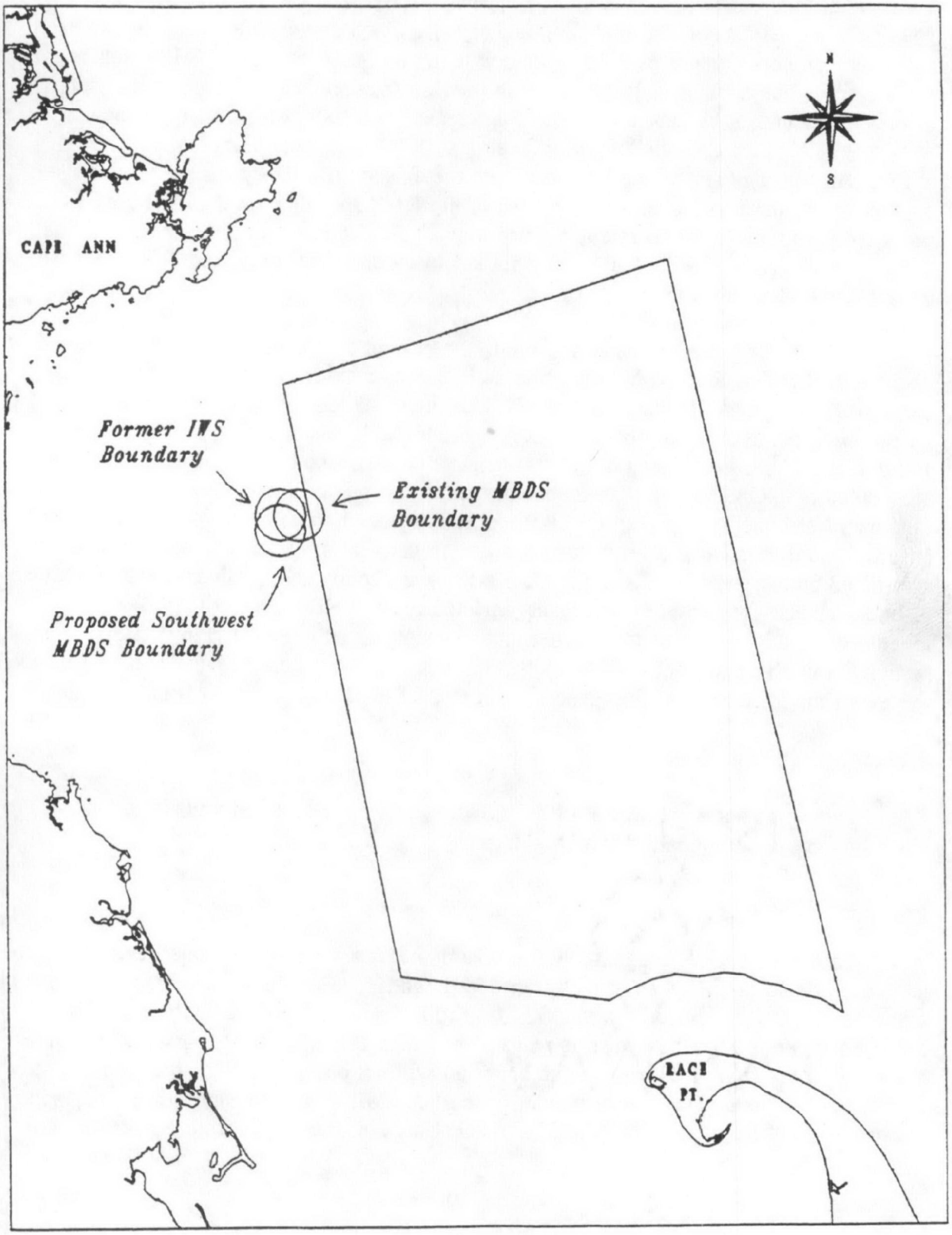
In February of 1991, NOAA issued a Draft Environmental Impact Statement/Management Plan ("DEIS/MP") which set forth several potential boundary configurations and management alternatives for a proposed NMS in Stellwagen Bank. NOAA's preferred NMS boundary presented in the DEIS/MP is illustrated on Figure 3.11-1. NOAA's boundary configuration does overlap part of the existing MBDS, but does not overlap the final MBDS boundary recommended in this FEIS.

Key sections of NOAA's discussion of the relationship between the proposed Stellwagen NMS and the MBDS are presented in pages 136 through 142 of the DEIS/MP. In the DEIS/MP, NOAA proposed that, assuming the Stellwagen NMS ultimately does encompass the MBDS, dredged material disposal would continue to be allowed at the MBDS provided that there is no destruction, loss, or injury to Sanctuary resources, but with oversight from NOAA as part of its NMS management effort. Such oversight would include certifying all dredged material disposal permits to ensure consistency with the NMS. Certification could involve adding permit conditions or denying permits. Dredged material disposal would be prohibited elsewhere in the Stellwagen NMS.

NOAA based this approach in part on its recognition, as explained in its DEIS/MP, that no adverse impacts to the marine ecosystem in Stellwagen Bank have been found to result from dredged material disposal at the MBDS, and that state-of-the-art methods are being used to monitor the MBDS to identify and address possible impacts. Also, EPA addressed potential impacts to sensitive habitats in Sections 3.2.3, 3.3, and 4.3 of the DEIS and in the responses to comment numbers 3.3.2 and 3.7 in this document. NOAA also acknowledged that Title III of the MPRSA expressly indicates that NMSs are intended to accommodate multiple and existing uses of the designated area, if those uses are compatible with protection of the NMS's critical resources. In addition, NOAA noted that there are precedents for dredged disposal sites being accommodated within NMSs off the coast of California. Finally, NOAA indicated that if the MBDS was not within the Stellwagen NMS, then it would only seek to regulate dredged disposal if it believed the effects of particular disposal operations threaten to enter the NMS and harm its critical resources.

EPA supports NOAA's proposed designation of a Stellwagen NMS. Regardless of the location of the NMS boundaries finally selected by NOAA, EPA agrees that there is no reason to terminate use of the MBDS even if it was encompassed by the Stellwagen NMS. Furthermore, EPA also agrees that dredged material disposal activities should not be authorized if they are shown to potentially injure Sanctuary resources. The existing Ocean Dumping Regulations, guidance, policies, and practices constitute a strict regulatory regime designed to protect the marine environment including a Stellwagen NMS should it be designated. The key regulations are set forth at 40 CFR Part 227 and §§228.5, 228.6, 228.10 and 228.11. These regulations do provide that in monitoring the effects of dredged materials

Figure 3.11-1: NOAA's Preferred National Marine Sanctuary Boundary for Stellwagen Bank



disposal, special attention be paid to marine sanctuaries. Moreover, if harmful effects are found to occur at a sanctuary, disposal site use must be modified to reduce those effects.

EPA believes that while NOAA should play a role in future permitting, the proposed certification role is excessive and inconsistent with Title III of the MPRSA (see 16 USC §§1431(b)(2) and (5) and 1434(a)(1)(A) and (a)(4)), which only authorizes NOAA to exert regulatory authority where existing regulation is not adequate to protect NMS resources and further regulation is reasonably necessary to provide such protection. Congress's intent was to prevent redundant bureaucracy from being created as a result of Title III (see Senate Report 96-894, Part 1, 96th Cong., 2d Session 4, 1980 U.S. Code Cong. & Ad. News 2583). As indicated above, EPA believes that the existing regulatory regime is a stringent one and is adequate to protect the resources of the NMS and, therefore, that NOAA's proposed permit certification role is not necessary. To ensure such protection of the NMS, EPA believes that NOAA should involve its sanctuary personnel as necessary in the existing permit review and development process.

NOAA already currently has a role in the permitting process for dredged material disposal at the MBDS. The National Marine Fisheries Service, an arm of NOAA, participates with EPA, the COE and the U.S. Fish and Wildlife Service in a joint review of all proposed ocean dumping permits. EPA and the COE welcome this participation, in addition to NOAA's expressed desire for the state coastal zone management agencies (who are funded by NOAA) to also participate in this review process. NOAA should also have its sanctuary personnel take part in the existing multi-agency joint review process for permits to ensure that information and knowledge concerning disposal proposals and sanctuary resources are shared among the agencies as permit decisions are being made. Given the complexities of both sanctuary and disposal site management, EPA and NOAA agree that they must, together with the COE, develop a better understanding of how respective regulatory authorities will be exercised. EPA, NOAA, and the COE are currently developing a protocol to govern the interaction of the agencies with respect to activities in the MBDS.

3.11.2 Buffer Zone Creation

One commentor believed that the MBDS should not be located within the Stellwagen NMS boundary, but thought that a "buffer zone" should be established.

EPA Response

EPA does not believe that a buffer zone is necessary because no unacceptable effects have been demonstrated even inside the MBDS boundary (see also the responses to comment numbers 3.3, 3.4, 3.5, 3.6, 3.9, and 3.10). Thus, if near-field effects within the existing MBDS have not been exhibited, it is reasonably foreseeable that effects outside the MBDS boundary (away from dredged material deposits) will not occur. Further, the NOAA states on page 142 of its DEIS/MP that previous use of the MBDS has not significantly degraded the resources of the area. The NOAA also acknowledges that no far-field effects caused by

dredged material disposal have been identified. These statements serve to bolster EPA's conclusion that dredged material disposal has not harmed sanctuary resources. Moreover, stricter controls imposed on disposal, as discussed in the response to comment number 3.9.2, will ensure that unacceptable adverse effects will not occur with future dredged material disposal.

3.11.3 Reference Sites Relocated to within the National Marine Sanctuary Boundary

One commentor asserted that the existing reference site and sites A and C, being considered as possible new reference sites, are within the proposed Stellwagen NMS boundary. This commentor cautioned that sediment removal activities may, therefore, be subject to prohibition or regulation.

EPA Response

Since the relocated reference site is located within the proposed NMS boundary, research or monitoring activities at these sites could be prohibited because they could be categorized as "Alteration of, or Construction on, the Seabed." EPA has requested a "Special Use" permit from NOAA to continue use of the reference site located within the proposed Stellwagen NMS. EPA does not believe that this activity will harm any of the marine resources of Stellwagen Bank. To the contrary, use of the relocated reference site will advance our knowledge of the condition of the area and will ultimately result in stricter controls on the disposal of dredged material (See also the response to comment number 3.9.1.1).

3.12 Miscellaneous Comments

3.12.1 Use of MWRA Data

One commentor criticized EPA for not using data from certain MWRA studies in the DEIS.

EPA Response

The data from the MWRA studies was used in the MBDS analyses. EPA listed it in the references section under: U.S. EPA, 1988. Boston Harbor Wastewater Conveyance System Draft Supplemental Environmental Impact Statement because all of the data used in MWRA's EIR was referenced in this EIS.

3.12.2 Presentation of Physical Oceanography Data

One commentor charged that the physical oceanography discussion in the DEIS should have been a synthesis rather than a summary of separate studies.

EPA Response

EPA's analysis, presented in Chapter 3 of the DEIS, was a synthesis of information regarding separate physical oceanographic studies. Various studies were cited within the synthesis discussion both as references and to illustrate the wide (and sometimes varying) data set. Because of the vast variability of the circulation within the Gulf of Maine, it is simply difficult to state with certainty what the predominant patterns are.

3.12.3 Insufficient Access to Public Hearing

One commentor was concerned that the public hearing did not allow for sufficient public access.

EPA Response

EPA made every possible attempt to encourage public involvement and inform interested parties via written announcements. EPA notified approximately 200 individuals and organizations directly (through announcements) of the date, time, and place of the public hearing. Additionally, EPA published a press release in various newspapers along the Massachusetts coast.

Unfortunately, entry to the public hearing held on November 1, 1989 at the Department of Transportation building in Cambridge, MA was initially restricted and some attendees gained access through the back door. However, to EPA's knowledge, everyone who had intended to attend the public meeting was granted access. Additionally, formal comment was accepted in writing on the DEIS and SDEIS until November 13, 1989 and August 22, 1990, respectively.

3.12.4 Identification of Other Historically Used Sites

One commentor stated that the Boston Lightship and the IWS should be identified on charts.

EPA Response

The Boston Lightship Disposal Site and the IWS are identified on Figures 1-2 and 1-3 of the DEIS, respectively.

3.12.5 Reference citations

One commentor stated that several citations in the DEIS text are not included in the list of references. For example, COE, 1988 (p.148) and MMS, 1983 (p.149) are not given in the references. Conversely, Clarke and Gibson (1987) and TRIGOM (1974) were listed twice in the DEIS. On page 13 of the SDEIS, the TRIGOM 1974 reference is not listed.

EPA Response

"COE, 1988" is listed in the DEIS under "U.S. Army Corps of Engineers, 1988." "MMS, 1983" is listed in the DEIS under "Minerals Management Service (MMS), 1983." The second "Clarke and Gibson" reference and the first "TRIGOM" reference in the DEIS should be deleted. The "TRIGOM 1974" reference is listed in the SDEIS under "The Research Institute of the Gulf of Maine (TRIGOM), 1974."

3.12.6 Minimizing Impacts through Comparison to the Gulf of Maine

One commentor charged that EPA attempted to minimize potential adverse effects caused in the MBDS vicinity through comparison with the Gulf of Maine.

EPA Response

EPA's presentation of ambient data in the Gulf of Maine is intended solely to allow the reader to put predicted impacts at the MBDS in context. EPA also compared sediment and water quality at the MBDS to other specific areas within Massachusetts Bay. EPA's final siting decision for the proposed MBDS was based on compliance with the site selection criteria, not on comparisons with other areas.

3.12.7 Segmentation

One commentor stated that EPA wrongly separated designation and management issues during the EIS process.

EPA Response

The purpose of the DEIS was to assess whether the physical and biological characteristics of the MBDS make it an appropriate site for dredged material disposal in light of regulatory criteria and existing and proposed management techniques. This is evident in Chapter 5 of the DEIS, Chapter 4 of this FEIS, and in the response to comment number 3.9, where both management and monitoring considerations are discussed in detail.

However, the EIS is not a decision-making document for site management and monitoring. Site management is largely governed by the permitting process which, as discussed in Chapter 5 of the DEIS, is governed jointly by EPA and the COE. Site monitoring is also jointly conducted by EPA and the COE. Additionally, EPA has held a series of dredged material management workshops and the COE and CZM have organized a Task Force to foster improved communication and understanding of the complex issues surrounding management and monitoring of dredged material (see the response to comment number 3.9.2). Site monitoring issues will be discussed at future workshops and through the Task Force.

3.12.8 Involvement of Other EPA Staff

One commentor stated that EPA's permit review staff should be included in the MBDS designation process and charged that their expertise and counsel, which would add immeasurably to the process, has not been used to date.

EPA Response

EPA did include the permit review staff during the EIS preparations. EPA's primary ocean dumping permit reviewer is also the main preparer of the site designation EISs. Moreover, permit review staff from the NMFS, USFWS, and the COE were also involved in the EIS development.

CHAPTER 4. RECOMMENDED PLAN

This Chapter discusses the location of EPA's proposed final boundary of the Massachusetts Bay Disposal Site ("MBDS"), the factors considered during project evaluation, coordination and publicity for dredging projects and monitoring studies, target species to be collected and chemicals to be measured (in sediments, water, and organisms) as part of specific MBDS monitoring surveys, and decision options should unacceptable effects to marine resources be identified.

Although this FEIS concludes that properly managed continued use of the MBDS will not result in significant unacceptable adverse impacts on the marine environment, it does concede that past disposal may have resulted in some environmental degradation. EPA is confident that environmental conditions at the MBDS will improve for several reasons. First, only dredged material that meets the requirements of the national and regional testing protocols is allowed to be disposed at the MBDS (see also Sections 3.9.1.2 and 3.9.2.1 of this document). In particular, sediments that are allowed for ocean disposal are those that do not exhibit significant mortality or the potential to bioaccumulate contaminants (see Section 5.3 of the DEIS). Second, capping, a mitigation measure used to isolate contaminated sediments, will not be relied upon until the efficacy of capping at the MBDS has been effectively demonstrated (see also Section 3.9.2.2 of this document and Appendix B). Third, tighter constraints on the disposal of dredged material have been imposed at the MBDS. These constraints include: i) stricter requirements in the dredged material testing protocol as discussed in Section 5.3 of the DEIS and in Section 3.9.1.2 of this document, ii) relocation of the reference site to a cleaner area near Stellwagen Bank as explained in Section 3.9.1.1 of this document, iii) the requirement by the COE for disposal inspectors on every trip to the MBDS (see Section 5.1.2 of the DEIS), and iv) the use of a taut-wire moored buoy. Moreover, as explained in Section 4.1, by relocating the MBDS boundary the eastern portion of the existing MBDS will remain pristine and previously disposed dredged material can eventually be covered with newer deposits. All of these factors lead EPA to believe that conditions at the proposed MBDS will improve.

EPA and the COE conduct annual monitoring surveys at the MBDS to determine dredged material distribution and movement (including resuspension), benthic organism colonization on dredged material, sediment chemistry, and bioaccumulation of contaminants in benthic organisms (see Chapter 5.4 of the DEIS and Section 3.9 of this document). The COE's Disposal Area Monitoring System ("DAMOS") monitors the region's ocean disposal sites for physical, chemical, and biological effects and is considered the most advanced and comprehensive monitoring program of its kind in the nation (Section 5.4.4 of the DEIS). The COE's DAMOS program includes bathymetric surveys, side scan sonar, underwater photography, divers, sediment analyses, biological analyses, and submersible vessels.

EPA and the COE plan to share specific monitoring plans for the MBDS with the Dredged Material Task Force as they become available (see Section 3.9.2.3 of this document). Review and comment on specific monitoring plans from area experts will assist

EPA in meeting its environmental goals. The Dredged Material Task Force anticipates that a long-term management strategy for dredged material will be approved in the near future. In its ocean dumping program, EPA continues to explore opportunities and approaches to reduce contaminant sources to protect the marine resources of Massachusetts Bay.

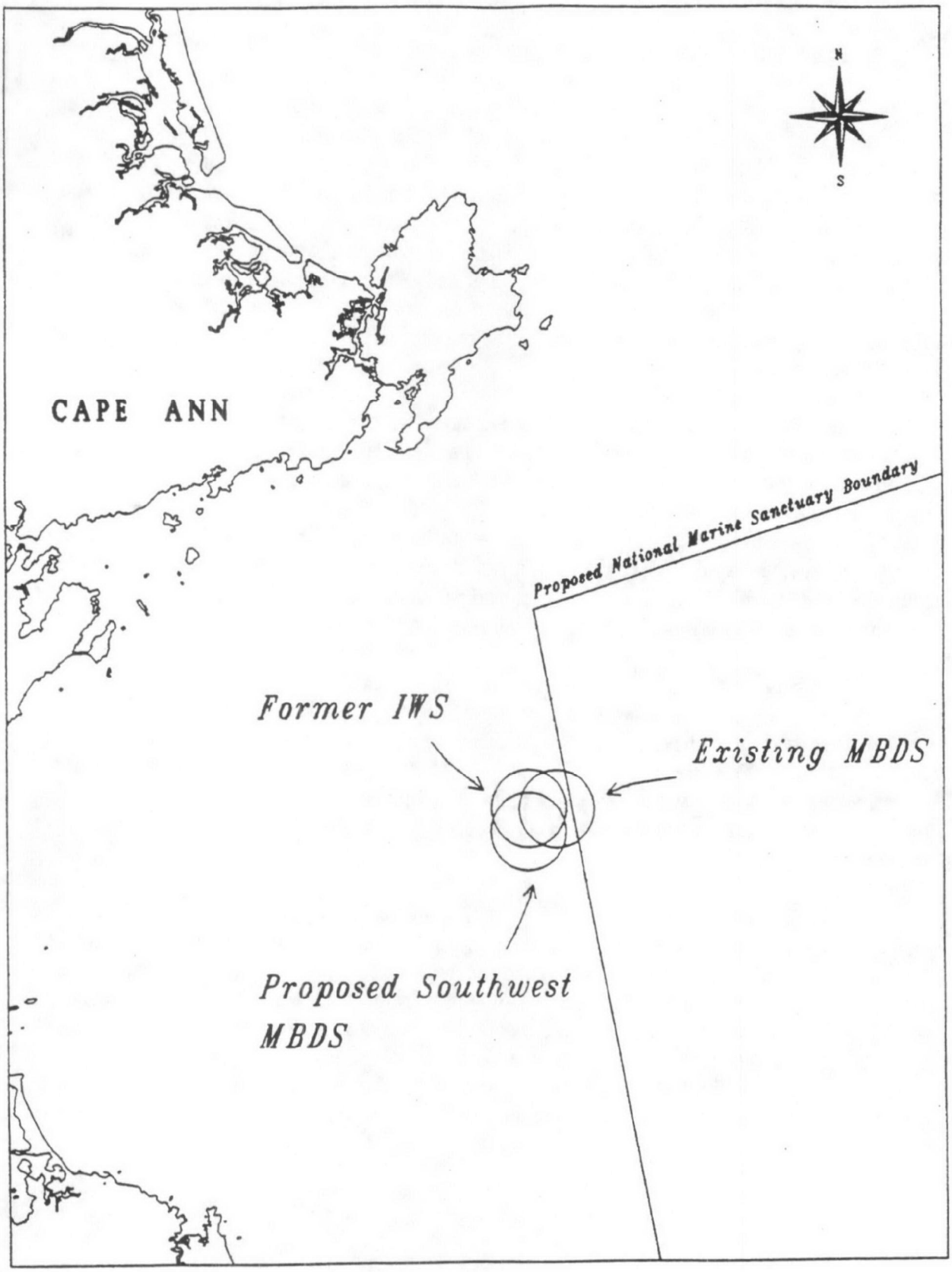
4.1 Final MBDS Boundary Configuration

EPA is currently proposing to designate an area southwest of the existing MBDS, a two nautical mile diameter circle centered at 70° 35.0' west longitude and 42° 25.1' north latitude, as the modified boundary for the MBDS (Figure 4-1). These are the coordinates EPA proposes to list in the Federal Register when the Final Rulemaking is published. The boundaries of the existing MBDS, the Industrial Waste Site ("IWS"), and the proposed MBDS are depicted on Figure 4-1.

EPA's proposal to revise the existing MBDS boundary by moving it slightly to the southwest will have several advantages. First, the revised MBDS boundary will not encompass the relatively pristine eastern portion of the existing MBDS, including the toe of Stellwagen Bank. This area has not been used historically for dumping and is not included in the proposed MBDS boundary and will therefore remain clean. Second, although the new boundary would overlap the IWS in part, the proposed MBDS boundary avoids the northern area within the IWS where old waste barrels and debris are concentrated. Relocation of the MBDS boundary to the southwest area will not result in disposing dredged material on top of previously disposed barrels or debris. Given the uncertainty as to the condition and proper management of these waste containers, EPA is not currently proposing (and in fact has never proposed) to dispose dredged material on top of barrels, as has been suggested by some commentors. The potential public health and environmental risk from past disposal at the IWS and other sites in Massachusetts Bay is the subject of ongoing EPA studies (see Section 3.9.2.5 of this document). Third, the new MBDS boundary encompasses an area outside the existing MBDS where contaminated sediments have been identified, probably as a result of past short-dumping (see Section 3.7 of this document). Relocating the MBDS boundary will enable EPA and the COE to eventually cover this contaminated area with cleaner sediments (see Section 3.9.2 of this document). Fourth, the revised disposal site boundary will not encroach onto the proposed boundaries of the Stellwagen Bank National Marine Sanctuary as proposed by the National Oceanic and Atmospheric Administration ("NOAA") (see Section 3.11 of this document). EPA believes that the proposed boundary illustrated on Figure 4-1 is a more suitable boundary than the two nautical mile square centered over the IWS recommended by one commentor for the reasons discussed above. Comments regarding EPA's alternatives analysis in the SDEIS are addressed in Section 3.2.2 of this document.

The actual disposal location will not change since the disposal buoy (the site where barges dump dredged material) will remain in its present location for the next several years. The disposal site boundary delineates the area where dredged material is to be contained. The existing location of the disposal buoy is illustrated on Figure 3-4 on page 30 of the DEIS. The disposal buoy can be moved within the disposal site boundary, but that is not

Figure 4-1: Location of the Proposed MBDS Final Boundary



proposed at this time. Since the existing disposal buoy is located in the area of overlap between the existing MBDS and the proposed MBDS boundary, it will not be necessary to relocate the disposal buoy.

4.2 Project Evaluation and Coordination

A review of a particular project's disposal alternatives must be conducted prior to selecting ocean disposal as the preferred disposal option (Section 5.2.1 of the DEIS and 40 CFR Part 227). The availability of other feasible disposal alternatives, the proposed method and time of dredging, the environmental conditions at and near the disposal site, and the physical and chemical nature of the material to be dredged are all considered. The options available for a particular dredging project depend in part on the nature of the sediments (see also Sections 3.1.2 and 3.2 of this FEIS). Dredged material has been used to replenish or nourish beaches, trucked to landfills to be used for cap or daily cover material, used as the foundation for structures or as construction aggregate, and to create saltmarshes or islands, and dumped in the ocean.

When characterizing dredged material, many factors are considered, including sources of contamination at the dredging site, such as, natural drainage patterns in the area, the presence of any outfalls in the vicinity, and the area's hydrology; any previous or current sediment test data for other projects nearby; the extent of any historical or current industrial activity in or around the site; and any spills of oil or other substances that have occurred in the area. Sediment samples are taken in areas that will adequately characterize the sediments to be dredged. Selection of sampling sites and the chemical and biological testing procedures are explained in the regional dredged material testing protocol (Appendix A to the DEIS).

The COE announces each dredged material disposal project via a public notice that usually allows 30 days for comments (Section 5.2 of the DEIS). Anyone who wishes to receive these notices can be added to the COE's mailing list. All projects are also closely coordinated with the EPA, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service, all of whom receive sediment testing results. State concurrence, in the form of state permits and water quality and coastal zone management certifications, is also required for dredging projects.

As additional safeguards, the COE routinely imposes special conditions on dredging projects. Special conditions in permits are administered on case-by-case bases. Examples include restrictions on the type of dredging equipment used, seasonal restrictions, and conditions to assure accurate placement, if disposal in the ocean is allowed. As added precautions for ocean disposal projects, disposal is restricted to sites that have been identified from scientific investigations as environmentally suitable, buoys are maintained at the designated sites, and precise coordinates are stipulated for the approved disposal point within the site. Violations are aggressively pursued by EPA and the COE (Section 5.1 of the DEIS).

4.3 Specific Chemicals and Organisms to be Monitored at the MBDS

This section discusses the target organisms to collect and chemicals to measure (in sediments, water, and organisms) as part of specific MBDS monitoring surveys. Inclusion of these list does mean that EPA plans to collect all of these organisms and measure all of these constituents in water, sediment, and tissue. The generic lists of organisms and chemicals within this section will be used in generating specific monitoring plans.

4.3.1 Target Analytes

The following sections discuss the analytes targeted for sediment, water, and organism tissue samples collected as part of the on-going MBDS Monitoring Program. A list of target constituents to measure in sediments, water, and tissue can be found in Table 4-1. Recommended methods and expected detection limits are presented in the dredged material testing protocol (Appendix A to the DEIS). The target analyte list was developed by identifying contaminants that either are known to be present in dredged material or that exhibit any of the following factors:

- Persistence in the marine environment
- Biological availability
- Potential to bioaccumulate
- Toxicity to marine organisms or humans

4.3.1.1 Target Analytes in Sediments and Water

The following sections briefly discuss the rationale for measuring each of these analyte categories in marine sediments and the water column as part of the on-going MBDS Monitoring Program.

4.3.1.1.1 PAHs

Alkyl-substituted PAH compounds, parent PAH compounds, and alkyl homologues are all recommended target PAH analytes. Alkyl-substituted PAH compounds are often found in greater abundance than the respective parent PAH compound. The relative concentrations of the different alkyl homologues within a family (e.g., naphthalene, C_1-naphthalenes, C_2-naphthalenes, C_3-naphthalenes, and C_4-naphthalenes) provides information regarding the source of the contamination.

TABLE 4-1: TARGET CONSTITUENTS TO MEASURE IN SEDIMENTS, WATER, AND TISSUE

I. Total Organic Carbon[1]

II. Grain size analysis (percent sand, silt, & clay)[1]

III. Percent Water[1]

IV. Polychlorinated biphenyls (PCBs)

Total PCBs
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

Individual PCB Congeners

8 - 2,4'-dichlorobiphenyl
18 - 2,2',5-trichlorobiphenyl
28 - 2,4,4'-trichlorobiphenyl
44 - 2,2',3,5'-tetrachlorobiphenyl
47 - 2,2',4,4'-tetrachlorobiphenyl
52 - 2,2',5,5'-tetrachlorobiphenyl
66 - 2,3',4,4'-tetrachlorobiphenyl
101 - 2,2',4,5,5'-pentachlorobiphenyl
105 - 2,3,3',4,4'-pentachlorobiphenyl
118 - 2,3',4,4',5-pentachlorobiphenyl
128 - 2,2',3,3',4,4'-hexachlorobiphenyl
138 - 2,2',3,4,4',5'-hexachlorobiphenyl
151 - 2,2',3,5,5',6-hexachlorobiphenyl
153 - 2,2',4,4',5,5'-hexachlorobiphenyl
170 - 2,2',3,3',4,4',5-heptachlorobiphenyl
180 - 2,2',3,4,4',5,5'-heptachlorobiphenyl
187 - 2,2',3,4',5,5',6-heptachlorobiphenyl
194 - 2,2',3,3',4,4',5,5'-octachlorobiphenyl
195 - 2,2',3,3',4,4',5,6-octachlorobiphenyl
206 - 2,2',3,3',4,4',5,5',6-nonachlorobiphenyl
209 - 2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl

TABLE 4-1: TARGET CONSTITUENTS TO MEASURE IN SEDIMENTS, WATER, AND TISSUE (Continued)

V. Chlorinated Pesticides

Hexachlorobenzene
Lindane
Alpha-Chlordane
Gamma-Chlordane
Oxychlordane[2]
Dieldrin
Trans-nonachlor
p,p'-DDD
p,p'-DDE
p,p'-DDT
Mirex

VI. Polycyclic Aromatic Hydrocarbons (PAHs)

Sum of Parent PAHs
Fluorene
Phenanthrene
Anthracene
C1 homologs of phenanthrene and anthracene
C2 homologs of phenanthrene and anthracene
C3 homologs of phenanthrene and anthracene
C4 homologs of phenanthrene and anthracene
Fluoranthene
Pyrene
Benz[a]anthracene
Chrysene
Sum of benzofluoranthenes
Benzo[a]pyrene
Benzo[e]pyrene
Perylene
Indeno[1,2,3-cd]pyrene
Benzo[g,h,i]perylene
Sum of molecular weight 276 PAHs
Dibenz[a,h]anthracene
Sum of molecular weight 278 PAHs
Coronene
Sum of molecular weight 302 PAHs

TABLE 4-1: TARGET CONSTITUENTS TO MEASURE IN SEDIMENTS, WATER, AND TISSUE (Concluded)

VII. Trace Metals

Aluminum[1]
Cadmium
Lead
Antimony
Nickel
Tin
Silver
Mercury
Arsenic
Chromium
Copper
Selenium
Nickel
Zinc
Iron
Manganese

[1] Sediment analysis only
[2] Tissue analysis only

4.3.1.1.2 PCBs

Individual PCB congeners are preferred for analysis because the usefulness of measuring PCBs as Aroclor mixtures may be limited. This is primarily because analytical methods that quantify PCB concentrations by Aroclor assume that the distributions of PCBs detected in environmental samples are identical to industrial formulations, which is not usually the case. Furthermore, Aroclor determinations do not provide information regarding the potential biological significance of the PCBs.

4.3.1.1.3 Butyltin Compounds

The butyltin compounds are targeted because of their use in antifouling paints. Tributyltin and related compounds are more likely to occur in harbors and marinas where vessels treated with the paint are moored. To date, butyltin compounds have not been detected in the sediments, water, or organisms collected at the MBDS. Moreover, in 1988 the use of antifouling paints containing organotins were banned for vessels less than twenty five meters in length. As a result, levels of butyltin in sediments are expected to diminish further.

4.3.1.1.4 Physical Characteristics

Physical characteristics of the sediments, such as percent water and grain size, allow EPA and the COE to predict how the dredged material will behave during disposal. Total organic carbon is often used to predict how much an organic constituent will be bioaccumulated in a test organism (see section 3.3.2.3 of this document).

4.3.1.2 Target Analytes in Organisms

Selection of target analytes in organisms is often dependent on the results of sediment analyses. Unless biomagnification is predicted, only analytes or compound classes that are detected in sediments are measured in the organisms because if an analyte is found in tissue but not in sediments, it is likely to have been bioaccumulated somewhere other than the disposal site. Additionally, not all constituents need to be measured. For example, PAHs are metabolized in fish and PCBs are metabolized in lobsters. Therefore, these constituents may not need to be measured in the tissues of these particular organisms. Chemicals that are likely to bioaccumulate include PCBs, PAHs, pesticides, phthalate esters, mercury, copper, arsenic, cadmium, zinc, lead, and chromium. Contaminants in tissues are affected by endogenous factors such as the lipophilic nature of the contaminants and the reproductive state and feeding state of the organism, and exogenous factors such as water temperature, dissolved organic matter, and interactive responses as a result of exposure to multiple compounds (McElroy et al., 1989).

4.3.1.2.1 Auxiliary Analyses

Additional analyses which may be undertaken in the MBDS Monitoring Program may include histopathological examination of tissue samples. Histopathological abnormalities resulting from exposure of organisms to contaminants can often be detected microscopically. Abnormalities can also be caused by nutritional stress, natural toxins, poor water quality, disease, and parasitism (see also Appendix D).

4.3.2 Species Selection

Target species of bottom-dwelling finfish, shellfish, and benthic infauna to collect as part of MBDS site monitoring are discussed in the following sections and listed in Table 4-2. It is important to recognize that the natural movements of some species limit their usefulness in trying to relate demonstrated effects and particular exposure routes. EPA based its species selections on the existing data and on the following criteria:

- Organisms that normally inhabit the MBDS and are thus available for sampling for the duration of a monitoring program

- Selected commercial species of bottom-dwelling finfish and shellfish

- Organisms that can be collected in sufficient biomass to allow quantification of contaminant residues by current and validated analytical methods

- Organisms that are efficient bioaccumulators

- Organisms that have a limited ability to metabolize organic chemicals, or that accumulate metabolites in their bile

- Organisms that are exposed to the dredged material to maximize the probability that any detected contaminants in their tissues were derived from disposed materials

- Organisms that have limited migratory patterns

4.3.2.1 Bottom-dwelling Finfish

The American plaice, *Hippoglossoides platessoides*, is the recommended species of bottom-dwelling (demersal) finfish in the MBDS area for monitoring. In bottom trawls performed in the vicinity of MBDS by the COE, the NMFS, and the Massachusetts Division of Marine Fisheries ("MDMF"), American plaice was dominant throughout the year and also accounted for the highest percentage of total catch by weight (Chapter 3, DEIS). American plaice occurs on sand and soft bottom substrates and has been the most abundant species recorded in bottom trawls in the MBDS.

American plaice was selected over the winter flounder, *Pseudopleuronectes americanus*, primarily because of the declining numbers of winter flounder noted in this area (Bridges, 1991; Hubbard, 1991). Also, winter flounder typically do not inhabit waters that are deeper than 150 feet and depths at the MBDS average 300 feet. Because of their migratory nature, significant numbers of winter flounder were not caught in the spring, summer, and fall bottom trawls in the vicinity of the MBDS conducted by COE, NMFS, and MDMF (Chapter 3, DEIS). Spring and fall 1991 MDMF bottom trawls 2 to 3 miles west of the MBDS captured American plaice, but no winter flounder (Currier, 1991).

The witch flounder, *Glyptocephalus cynoglossus*, although also a relatively non-migratory resident of Massachusetts Bay, was not chosen because it is less abundant than the American plaice and is less important commercially, accounting for less than six percent of the commercial catch in the vicinity of the MBDS (Chapter 3, DEIS).

Because size, weight, and duration of exposure of an organism can affect measured concentrations of contaminants and the ability to metabolize contaminants, EPA would attempt to collect American plaice in the size range of ten to twenty centimeters for analysis. This is primarily because fish in this size range forage upon a range of prey sizes. Seasonal variations should also be noted for bottomfish species. For example, high levels of lipids associated with reproductive products during spawning season could result in elevated levels of organic contaminants that would not normally occur during other times of the year.

4.3.2.2 Shellfish

The shellfish species recommended for MBDS monitoring is the American lobster, *Homarus americanus*. Although the American lobster can be found on many bottom types, they prefer rocky substrates. This species has been collected in sufficient numbers for chemical analysis both within the MBDS and in bottom trawls conducted by the COE, the NMFS, and the MDMF in the spring and fall in the vicinity of MBDS (Chapter 3, DEIS). The migratory habits of the American lobster in Massachusetts Bay are currently being summarized by the MDMF.

The American lobster is commercially significant and may accumulate contaminants from a variety of food sources because it is a scavenger. Also, the hepatopancreas of the lobster, or the "tomalley", accumulates lipophilic contaminants. Since the hepatopancreas is esteemed to be a culinary delicacy by certain ethnic groups, chemical analysis of this organ provides important information in assessing human health risks.

The Northern shrimp, *Pandalus borealis*, is a commercially harvested species that is common on Stellwagen Bank. Its usefulness in a monitoring program may be limited because of its seasonal migration inshore during spawning season (February/March). This migration could expose the organism to other sources of contaminants. Although *Pandalus borealis* has been monitored at the MBDS in the past, and would be considered for future monitoring, it is not the preferred shellfish species to monitor.

TABLE 4-2: TARGET ORGANISMS TO USE IN MONITORING THE MBDS

I. Fish

1. American plaice, *Hippoglossoides platessoides*
2. Witch flounder, *Glytocephalus cynoglossus*
3. Winter flounder, *Pseudopleuronectes americanus*

II. Shellfish

1. American lobster, *Homarus americanus*
2. Northern shrimp, *Pandalus borealis*

III. Benthic Infauna

A. Polychaete Worms

1. *Nephtys incisa*
2. Sandworm, *Nereis virens*
3. Spionids

B. Bivalves

1. Ocean quahog, *Artica islandica*
2. Clam, *Astarte* sp.
3. Sea Scallop, *Placopectin* sp.

4.3.2.3 Benthic Infauna

The benthic infaunal species recommended for monitoring at the MBDS are the ocean quahog, *Arctica islandica*, and the polychaete worm, *Nephtys incisa*. *Nephtys incisa* can be collected within MBDS in biomass sufficient for chemical analysis. Also, EPA and the COE have an existing database of tissue concentrations of metals and organic contaminants in *Nephtys incisa* collected at the MBDS (Chapter 3, DEIS).

Spionid polychaetes, although an abundant infaunal species in the vicinity of MBDS, are too small, too difficult to collect, and too difficult to sort. Also, spionids probably do not provide a significant portion of the diet of any of the commercially harvested flounder species and would therefore not provide a useful trophic transfer link to these fish species. *Nephtys incisa* is a larger polychaete which is a common food of flounders (see also Section 3.5.1 of this document).

Another large polychaete worm, *Nereis virens*, is commonly found in intertidal and subtidal shores and is rare in deeper waters. *Nereis virens* has been commercially harvested in order to be used as bait for anglers. Although *Nereis virens* can be found on all sediment types, it has not been collected at the MBDS and therefore was not selected as a target species.

One commercially significant infaunal species in the MBDS area is the ocean quahog, *Arctica islandica*. Although not common, it has been collected in the vicinity of the MBDS. Another clam, *Astarte* sp., can be found on all sediment types, but prefers sand and till. This clam has been collected at the MBDS, but is usually rare on silty substrates. *Astarte* sp. is present in Stellwagen Basin, although rare, and is not commercially harvested. The sea scallop, *Placopectin* sp., is a commercially harvested species that is common throughout the Gulf of Maine, including the Stellwagen Basin area. *Placopectin* sp. has been collected in the MBDS. The motility of this species may limit its usefulness in a monitoring program. For these reasons, *Arctica islandica* has been selected as the target species.

4.4 Tiered Monitoring and Management Decision Options

EPA and the COE monitor dredged material disposal sites to ensure that sediments dredged from the harbors and waterways are properly managed. Monitoring considers both short-term and long-term effects immediately observable and monitored before, during, and immediately following the time of disposal. The procedures and monitoring techniques to be used to assess whether unacceptable adverse impacts resulting from dredged material disposal have occurred were described in Chapter 5 of the DEIS.

This section discusses possible management options to consider when adverse impacts resulting from dredged material disposal at the proposed MBDS are detected, including those defined in the Ocean Dumping Regulations. It does not attempt to specify particular responses to any predicted or actual adverse impact resulting from disposal activities. As

discussed in Section 3.9.1.3 of this document, the timing of monitoring surveys and other activities is governed by agency funding resources, the frequency of disposal at the MBDS, and the results of previous monitoring surveys. Should any adverse effects caused by dredged material disposal be demonstrated, appropriate management responses will be decided by EPA and the COE on a case-by-case basis. Examples of actions to be considered under each tier are discussed below.

4.4.1 Tier 1: Sediment Transport Evaluation

Potential effects from sediment deposition and transport can include: i) identifiable progressive movement or accumulation of disposed dredged material that may affect any shoreline, marine sanctuary, or critical biological area; and ii) consistent detection of significant amounts of dredged material outside the disposal site boundary using side-scan sonar, bathymetric surveys, sub-bottom profiling, sediment profile camera surveys, or other similar oceanographic survey methods. If dredged material movement offsite is discovered, EPA or the COE could employ several management actions. These include:

1. Revise size or location of the dump zone, or move the disposal buoy to a more central location within the disposal site

2. Incorporate and enforce stricter permit conditions on navigation and placement of barges

3. Limit the amount of dredged material disposed at the site each year

4. Reconfigure the disposal site boundaries

5. Specify dredged material density or modify the consistency (i.e., percent clumping)

6. Evaluate the effect of sediment movement outside the MBDS on sensitive benthic communities under Tier 2 or 3

7. Limit designation of the MBDS to a finite time and initiate environmental studies for a new disposal site

8. Implement other management options that are developed as the monitoring program progresses

9. Specify tidal current conditions in disposal permits under which disposal may occur

4.4.2 Tier 2: Physical Impacts on Biological Resources of Concern

If dredged material at the MBDS is shown to have physical impacts on sensitive biological resources, such larval life stages, then identification of the magnitude and significance of these impacts will occur in Tier 2. An assessment of the sensitive benthic resource will be made by comparing the specific resources of concern at the MBDS to the same resources at the reference sites. Resources of concern may include benthic organisms, shellfish, or fisheries. EPA or the COE may address effects to sensitive biological resources by:

1. Restricting disposal to specific locations within the MBDS to allow other areas within the site to recolonize

2. Restricting disposal to a more central location within the disposal site to prevent material from moving out of the site boundary

3. Incorporating and enforcing permit conditions on navigation and placement of barges

4. Assessing the significance of adverse impacts on commercial and recreational fisheries resources or human health

5. Evaluating body burden impacts and bioaccumulation effects in Tier 3

6. Reconfiguring the disposal site boundary

7. Initiating environmental studies for a new disposal site

8. Implementing other feasible and responsible management options that are developed as the monitoring program progresses

9. Restricting disposal operations to certain times of the year

4.4.3 Tier 3: Body Burden Analysis of Biological Resources

If effects to sensitive benthic resources either outside or within the MBDS boundaries are anticipated, then monitoring body burdens of resident species will occur in Tier 3. Body burdens of chemicals of concern will be assessed by comparing tissues of specific resources of concern at the MBDS to the same resources at the reference sites. The resources of concern should be the same as those identified in Tier 2 or higher trophic levels that prey upon the benthic resource. EPA or the COE could address such effects in several ways, including:

1. Re-evaluate bioaccumulation testing and analytical procedures before issuing disposal permits

2. Define the levels of contaminants in dredged material that would be suitable for ocean disposal, or restrict the quality of material to be dredged

3. Determine extent of adverse impacts on commercial and recreational fisheries resources or human health

4. Initiate environmental studies for a new disposal site

5. Implement other feasible and responsible management options that are developed as the monitoring program progresses

6. Restrict disposal operations to certain times of the year

CHAPTER 5. ERRATA

Several typographical errors and recommended text changes were identified within the DEIS.

1. Throughout the DEIS, "specie" should be changed to "species."

2. On page 177 of the DEIS, the formula should also be divided by "H" in order to provide the correct units.

3. On page 178 of the DEIS, "ppm" should be "ppt."

4. On page 11 of the DEIS the references to Sections 2.C., 5.B., and 5.C., should be changed to 2.3., 5.2., and 5.3., respectively.

5. On page 35 of the DEIS, Table 3-2, the footnote "2" on the average water column concentration of lead should be moved one line up to the average water column concentration of mercury.

6. On page 43 of the DEIS, the value of "4952" ppb for PCB analysis in sediment samples is inaccurate. It should read "495*" ppb.

7. At the bottom of page 43 of the DEIS, "outliner" should be "outlier."

8. Throughout the DEIS, the noun "data" should be used in the plural form.

9. On page 101 of the DEIS, "*Paranois*" should be "*Paraonis*."

10. In paragraph 2 on page 124 of the DEIS, the "two species" of turtles in the Gulf of Maine, should be changed to "three species."

11. On Table 3-32 and pages 143 and 144, "Ridleys" should be "ridley."

12. The List of Preparers should include all of the personnel involved in the preparation of the COE's Site Evaluation Document.

13. On page 33 of the DEIS, the source citation for the figure should read "Modified from SAIC 1987."

14. On page 171 of the DEIS, the summary statement should state that "at most only 4% of the recently deposited material" would be resuspended.

15. On page 218 of the DEIS, paragraph 2, "simulate" should be changed to "stimulate."

16. On page 110 of the DEIS, the references to footnotes "c" and "d" should be reversed.

17. On page 217 of the DEIS, paragraph 2, "Section 5.3.5" should be "Section 5.4.7".

18. On page 3 of the DEIS, the last two sentences should read "...The repositioning of the site (buoy) may .... that lack of stringent (appropriate) disposal controls earlier in the century (in the past) and repositioning ...."

19. On page 7 of the DEIS, "1.6 million" cubic yards of "maintenance" dredging of the federal Boston Harbor Channel should be changed to "2.3 million" cubic yards of "improvement" dredging.

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APPENDIX A

PUBLIC AND AGENCY COMMENT LETTERS

Marine Realty Trust
[illegible] Essex Avenue
Gloucester MA [illegible]
[illegible]

Kenneth J. Liakoros

May 16, 1990

Ms. Kymberlee Keckler, Engineer
Environmental Protection Agency, Region One
J.F K. Federal Building
Office # W.Q E. 1900
Boston, MA 02203

Re Proposed Relocation of
OffShore Dredge Disposal Area

Dear Ms. Keckler.

It has come to our attention that your agency is soliciting public comment relative to a proposal for relocating the present dredge disposal area to a new location approximately 50 miles offshore. As a marine contractor and waterfront property owner, I should like to offer the following comments for your consideration

First is that the proposal would have a dramatic escalation effect upon all public waterfront projects that involve dredging The cost increases, (to be detailed below), would be so enormous as to prevent some projects from coming to fruition Additionally, some projects with specifically allocated grant limits would have to spend so much on the dredging that all other landward improvements relative to the project would have to be cut

The economic effects on the areas involved would be dramatic in terms of little or no growth in each port, decreased employment in those areas, decreased revenues to the state and local coffers because of this economic impact

In the private sector these extreme cost consequences would manifest three activities. The first is that no new private waterfront developments involving dredging would be undertaken, because of this extreme cost. Second, existing marine waterfront facilities, which are already permitted for maintenance dredging, would not go forward with that activity because the increased cost could not be passed along to its consumers The third and most prevalent effect would be the rejuvenation of "midnight dumping" If a marina operator has an existing facility with legal dredge permits which require offshore dumping, but he does not have the financial resources to do it, he certainly will not abandon his investment. He will be forced into either quietly removing the material somehow dumping it into channels which routinely have their dredging maintained by federal authorities, or he will periodically and consistantly remove the material and find onshore disposal sites contrary to his permit.

In conclusion, I therefore feel that the net effect of your proposed relocation of the dump area will be to decrease growth and increase economic decline in the public sector, coupled with, the strangulation of growth and an increase in illegal environmental activity in the private sector.

In the way of substantiation and backup, I offer the following for your consideration.

One is that the relocation for the disposal area from 12 +/- to 50 +/- miles offshore has cost ramifications far in excess of the fact that it will take a little more time to get to the area and back. First and foremost is the fact that there are very few tugboats in the New England area at present that would be capable of towing a 3,000 cubic yard dump scow 50 miles offshore and back with any reasonable assurance of being able to withstand unforeseen weather conditions. In present circumstances a reasonable and prudent tug boat captain must project weather conditions relative to their possible occurance within the time frame that it takes to make the trip from the dredge area to the disposal area and back, ie, his exposure window. Because a tug boat under tow only makes approximately 3 knots per hour, the average trip to the disposal area and back is around 8 to 10 hours. Certainly the weather in this window is somewhat confidently predictible and therefore a captain with a certain size vessel, upon exercising some prudence, is safely assured of making the trip.

If you relocate the dredge area to a position of approximately 50 miles offshore the window for performance is now expanded to approximately 35 hours round trip. Because nobody can confidently project the weather relative to a 35 hour span, there now exists no safe performance window for the average size tug boat currently performing these duties

The net direct economic impact upon the consumer would be that this service could not only be performed by a select few individuals or firms willing to invest over a million dollars in a tug boat for the purpose of hauling dredge material which can only be done a couple of times (because of environmental reasons), during the year Firms willing to perform such service would be extremely rare therefore, their rates for the service would be extremely high.

Two, given that the relocation, 50 miles out, would make the towing aspect of the trip so expensive, a reasonable person would try an increase scow size to get as many cubic yards in the scow as possible and therefore, minimize his per cubic yard cost There are presently, in the New England area, approximately six certified scows in the one to three thousand cubic yard range I am not aware of any in excess of those volume quantities Because of the per cubic yard increase in dumping expense those presently existant certified scows may become obsolete and only new multi million dollar larger volume scows would be able to perform the work Again, individuals or firms willing to invest that type of money into equipment which can only be periodically used, approximately twice a year (because of environmental constraints), would be very rare and their rates for usage would be extremely high

The third ramification which drives the expense, to public and private consumers, through the roof, would be that this increased sized equipment, now necissitated for the performance of the work, may not be logistically able to access the shore side dredge location. By that I mean that relative to the width and draft of the vessel, they may not be able to make it into the shallow harbor and/or through narrow bridges to access the channels that need to be dredged The net effect of this would be the institution of a new methodology whereby the dredging is performed by smaller equipment and the materials are then taken to deep water and transferred to larger vessels for final disposition at the new relocated dredge site. Therefore, a new level of performance has been institued, a doubling of the amount of equipment necessary for the performance of the work is now in place and the increase cost from this doubling is added to the increased costs for the oversized equipment previously mentioned.

I'm absolutely convinced that the long term effect of the proposed relocation of the disposal area to a distance of approximately 50 miles offshore will be dramatic in its economic impact and will foster a renewed incentive for circumvention of a existing environmental laws by means of "midnight dumping"

Best Regards,

James F Dominick

JED/gfb

THE YANKEE FLEET

Yankee Fishing Fleet • Yankee Whale Watch • Portugese Salaris • Yankee Gift & Tackle • Nature Sailaris

May 27, 1990

Ms. Kimberlie Keckler
E.P.A. Region 1
JFK Federal Building
WQE 1900
Boston, MA 02203

Dear Ms. Keckler,

Please accept our concern on the possible closing of the dump site that is located just West of Stellwagen Bank. Having worked and lived for many years on the waterfront of Massachusetts we recognize the need for an affordable site for the disposal of dredge material from maintenance dredging in local harbors. This ongoing effort is necessary to maintain existing depth and channels in our waterways.

The distance from shore is critical in any cost analysis in looking at new sites. As a fisherman in the area I do not believe that another site within 20 miles from shore will be acceptable to the parties using or who are concerned about our coastal resources. If that is the case, any site further offshore would make many maintenance dredging projects cost prohibitive. You must view that issue as you approach making your final recommendation as a factor in making the decision.

Fair Winds,

Capt. Tom Hill
Operations Manager

TRH/lf

25 Essex Ave • Gloucester, Mass 01930 • (508) 281-0311 • (800) WHALING in New England • FAX (508) 281-2889
P.O. Box 4068 • Key West, Florida 33040 • (305) 294-7009 • In Florida (800) 611-0139 • FAX (305) 294-6515

Review Comments on the Massachusetts Bay Disposal Site
Draft EIS

List of Preparers - CEQ regulations require the authors and scientific backgrounds of the EIS text preparers to be identified Since a majority of the text is taken verbatim from the Corps' Site Evaluation Document, these authors should be listed as preparers with identification of the specific portions prepared by the Corps personnel

Page 3, Site History, paragraph 2 Last two sentences are misleading and we suggest the following changes The repositioning of the site (buoy) may that lack of stringent (appropriate) disposal controls earlier in the century (in the past) and repositioning As written they contradict earlier studies in the 1970's and are not in concert with the DEIS text on p 32

Page 7, paragraph 2 The statement defining disposal of 2 8 million cubic yards at MBDS over the past ten years is inaccurate As NED's site evaluation document clearly states the 2 8 million cubic yards were disposed over the 12 years listed in the EIS table referenced in that paragraph Clarification of the use of the 10 vs 12 years in calculations throughout the remainder of the EIS should be provided

Page 7, Paragraph 3 Regarding the proposed Boston Harbor Federal channel maintenance dredging generating up to 1 8 million cubic yards of material There is a proposed improvement dredging (2 3 mcy) and numerous infrastructure proposals that should be discussed Maintenance dredging of the Federal channels is not proposed for the near future as stated.

Page 11 References to Sections 2 C , 5 B , and 5 C should be changed as appropriate to all numerical references

Page 13, Paragraph 2 The discussion should also indicate CADS and Portland sites do not have the capacity to accommodate the regional disposal needs

Page 33 The Source citation for the figure should read "Modified from SAIC 1987" since it is not an exact duplication of their figure

Page 36 The Table 3-2 footnote #2 refers the reader to a discussion of mercury The footnote should be one line up

Pages 37 to 38 We have reason to believe the methods used to collect the water chemistry values may have over estimated

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM MASSACHUSETTS 02254 9149

17 November 1989

REPLY TO ATTENTION OF
CENED-OD-R
Regulatory Branch

Ms. Kymberlee Keckler
US Environmental Protection Agency
Region I
JFK Federal Building (WQE-1900)
Boston, MA 02203-2211

Dear Ms. Keckler:

Attached are comments based on our review of the Massachusetts Bay Disposal Site Draft Environmental Impact Statement The comments represent those of both New England Division's Regulatory Branch and Impact Analysis Branch.

Since we were able to review earlier portions of the draft most of our comments are minor and are directed at clarifying certain points. However, some of our comments reflect areas where we feel our earlier comments on the draft were not adequately addressed or where information or figures were not previously available for our review.

Thank you for the opportunity to review this document. Certainly we support the designation of this site. If you have any questions on our comments please contact Dr. Tom Fredette of my staff at 647-8563.

Sincerely,

William F. Lawless, P.E.
Chief, Regulatory Branch
Operations Division

Enclosure

concentrations (see Wallace et al. 1988) The discussion should note that these values are worst case

Page 38, Paragraph 3 2 1 B.7. EPA has inserted a statement that mercury levels above the EPA criteria have been recorded in other parts of Massachusetts Bay This statement should be provided with a citation of the study or deleted.

Page 43. The value of 4952 ppb of PCB for the September 1985 sample OFF dredged material is inaccurate Table 3 B 2 -2 in our site evaluation report lists the value as 495 ppb, the '2' is a footnote above the value.

Page 45. The comparisons between sediment chemical data from 'Broad Sound and Massachusetts Bay between 1983 and 1987' to site specific data are an inaccurate interpretation of the contaminant potentials The comparative discussions of sediment chemistry should be restricted to basin specific data or a series of generalizations with regards to grain size

Page 47 (et. seq). The use of contour mapping of discreet data points is misleading in many instances where data points are not closely spaced The mapping routine assumes that a continuous linear gradient exists between points when this is likely not to be the case. We recommend deleting the figures to avoid misleading the reader

Page 58, Paragraph 3.2.2 2.1 The discussion of total organic carbon fails to convey to the reader the natural occurrence of these levels especially in settling basins. There also needs to be discussion of the relationship to grain size

Page 59, Paragraph 2. The text (and elsewhere) discusses how various differences in chemical concentrations exist. Then it is stated that these differences are not statistically significant It is inaccurate to identify a perceived difference if it cannot be statistically supported

Page 59, Paragraph 3 2 2 2 4 PAH's, though common, are not necessarily ubiquitous in dredged material

Page 63, Paragraph 3 2 2 3. This use of parametric statistics for these data is questionable Non-parametric tests should have been used instead Also there is variation in two dimensions not just one, due to the influence of the historic site. This is not discussed or analyzed at all There is no provision for evaluating the effects of grain size or other influences

Page 63, Paragraph 5 The scatterplots depicting the relationship of the analytes to the distance from MBDS center are misleading There was historic disposal of dredged

material and industrial waste outside of the existing site boundary, most disposal has been at a buoy which was not located at the center of the site, and there are variations in sediment types in the site.

Page 72. The discussion that concentrations continue to decrease outside the site ignores the fact that all strata have stations that are both on and off dredged material At least two stations in the Outside strata are likely to be on dredged material deposited earlier in the century. If there is a trend outside the site it needs to be more clearly supported with statistical weight rather than a casual interpretation of scatterplots.

Page 77, Continuing Paragraph. The statement 'that there may be a southwesterly dispersal pattern of contaminants' is totally conjecture. The samples to the southwest were simply taken on areas of dredged material deposited earlier in the century, i e Gilbert's (1974) stations #2-#4 and 12-0 and FG8

Page 77, Paragraph 2. It is more likely that all three compounds are correlated with particle surface area. Since there is more fine-grained material in the site, the concentrations would be higher

Page 77 to 78 We still disagree with the blanket statement that the data show the affected area to be about 3 km from the buoy We believe this is an artifact of the particular analyses and grouping of the data which ignored the fact that dredged material was disposed outside the site earlier in the century.

Page 171, First Paragraph, last sentence The summary statement should state that 'at most only, 4% of the recently deposited material' would be resuspended.

Page 200, Paragraph 2 The statement that PCB's are metabolized is incorrect. The statement is true for PAH's

Page 212, 5.2 1 Economics of upland disposal is not the only factor considered in the alternatives analysis The potential for adverse impacts of other disposal methods is also evaluated

Page 213, 5 2 3 It should be made clear that the decision is made by the District Engineer, with the other agencies providing information on potential environmental impacts EPA's role is with advice, elevation, and veto authority

Page 218, 5 3 4 There seems to be a persistent misunderstanding on the selection of a reference site 'The

purpose of the reference sediment is to serve as a point of comparison to identify potential ecological effects of chemical contaminants in the dredged material Therefore, (from the EPA/Corps Implementation Manual, 1977) "This reference sediment must have sedimentological characteristics similar to the disposal site and should be an approximation of the sediment that would be found at the disposal site if no disposal had ever taken place there " In order to evaluate the effect of the dredged material or the site as separate from other environmental influences, the reference site needs to reflect and integrate the impacts of other influences on the system

Page 225, last paragraph This paragraph needs to more clearly indicate that the description of the monitoring plan is an example of tiered monitoring that might be employed at MBDS Final details still have not been made and it will likely continue to evolve

Executive Summary

Page ix, Paragraph 2. Our comments about a "clean" reference site apply here as well.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM MASSACHUSETTS 02254 9149

REPLY TO ATTENTION OF

31 August 1990

CENED-OD-R
Regulatory Division

Ms. Kymberlee Keckler
US Environmental Protection Agency
Region I
JFK Federal Building (WQE-1900C)
Boston, MA 02203-2211

Dear Ms. Keckler:

Attached are several comments based on our review of the Massachusetts Bay Disposal Site Supplemental Draft Environmental Impact Statement.

Thank you for the opportunity to review this document. Certainly we continue support the designation of this site and agree that reconfiguration of the boundaries offer several potential advantages. If you have any questions on our comments please contact Dr. Tom Fredette of my staff at 647-8563.

Sincerely,

William F. Lawless, P.E.
Chief, Regulatory Division
Operations Directorate

Enclosure

Comments
Massachusetts Bay Disposal Site
Supplemental Draft Environmental Impact Statement

1. We agree that the zone of siting feasibility based on $18-20 per cubic yard is a reasonable analysis tool to help define the geographic range to examine. However, we believe it should be emphasized that for many projects disposal costs of $18-20 would be prohibitive to their viability. Even within the geographic range of harbors that have potential to use MBDS (Gloucester to Plymouth) there are currently proposed projects for which the economics of transportation to MBDS is unfeasible (for example Duxbury). This point should be clearly stated in the revision.

2. We agree that reconfiguration of the boundaries offers potential advantages. In addition to those that you listed a shift of the site to the west will result in (1) a larger proportion of the site existing over muddy areas, increasing the available space for disposal of muddy materials, (2) increased average depth of the site providing deep water protection for more of the site, and (3) providing an opportunity to cap sediments disposed earlier in the century that may have higher levels of contamination.

We are aware that there has been debate over the advantages and disadvantages of covering the barrels and containers that are present on the bottom. As you mention, burial of these containers may offer the advantage of decreasing the rate of any material release to the environment.

3. If EPA gives any further consideration to boundary configuration we suggest that rather than a circle, a 2 nm square be considered. Such a square would include the area where disposal has been occurring in the last few years, as well as including additional areas where historic disposal is likely to have occurred. The proposed circle does include the existing active disposal point, but <u>does not</u> include the entire deposit of recently disposed dredged material.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

Mr. Paul Keough
Acting Regional Administrator
U.S. EPA, Region 1
JFK Federal Building
Boston, Massachusetts 02203-2211

November 17, 1989

Dear Mr. Keough:

Thank you for the opportunity to comment upon the Draft Environmental Impact Statement - Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site.

General Comments

We recognize the difficult task your staff is dealing with in defining the appropriate scope of the DEIS with respect to site designation versus site management issues. While our comments focus on the scope of the evaluation, as presented in the DEIS, we do not concur that designation and management considerations can, or should, be separately evaluated We would concur with separate evaluation of designation and management only if the site were truly contained (physically, chemically, and biologically), or if there existed a regulatory process that prevented the disposal of toxic, carcinogenic or other deleterious materials. We do not believe either of the two conditions of true containment or effective management applies to the massachusetts Bay Disposal Site/Foul Area Disposal Site (MBDS/FADS). We are also aware of the implications of two recent court decisions regarding the separation (segmentation) of site designation from disposal and site management decisions (Friends of Earth V Hall, No. 88-380 R, W D. Washington, August, 1988 and Town of Huntington V Marsh, No 88-6095, Second Circuit, October, 1988) These decisions confirm and expand upon many of the issues we identified in our scoping comments on this proposed site designation process Needless to say, many of these significant issues remain to be considered in this NEPA process However, to assist you in your ultimate decision regarding final designation of the site, we address management implications at the site only as they affect assumptions and conclusions of the DEIS

Specific Comments

The preliminary conclusion of the DEIS, as presented in the Executive Summary, states in part, "The designation of MBDS as a disposal site for dredged material appears to be appropriate. Intensive oceanographic evaluations performed at MBDS indicate that continued use of the site for dredged material will not have any significant adverse environmental impacts. It is apparent that material deposited at the site remains in place, and since the area has previously been used for disposal of dredged material, such a designation would not degrade additional areas of the ocean " We are not convinced that the data presented in the DEIS support this tentative conclusion Specific comments relative to our skepticism follow

Pg. 1, Section 1.1. In the first paragraph, in the discussion of the purpose for the EIS, it is stated "However, it is important to note the need for the proposed dumping as well as a full spectrum of available land-based alternatives must be evaluated before ocean disposal has been chosen as the preferred plan. Only when there are no practicable alternatives available, which have less adverse environmental impact, should ocean disposal be permitted." This is an accurate statement of law and agency policy, but is a criterion that is not strenuously applied in practice. Although this issue at first appears to relate only to site management, it also has important implications for site designation. The MBDS/FADS received interim designation, in part, because its convenient location made disposal there economically feasible as opposed to less economic disposal in a shallow water containment facility or upland containment facility, or at an open-water disposal site off the continental shelf. Therefore, the site continues to be the most economically feasible (i.e., the only feasible site), even though there are other alternatives which would have "less adverse environmental impact", as required by law and policy. Failure to consider other disposal sites and options in the DEIS, and the granting of final designation will assure that the site remains the only economically feasible disposal site. Therefore, we view the limiting of disposal alternatives solely to the continued use of the MBDS/FADS as a guarantee that site managers will have no choice except to determine that there are not practicable alternatives to disposal at MBDS/FADS. We are confident that this is not your intent, although it will be a result of the preliminary conclusion of the DEIS.

We want to be clear on this point. We are not proposing the selection of an economically expensive open-water disposal alternative so that other, less environmentally damaging alternatives become more feasible. What we are proposing is consideration of disposal options, consistent with law and agency polices, that are less environmentally damaging than the open-water disposal of toxic materials in a biologically productive area such as Massachusetts Bay.

The arguments and proposal presented above presume that open-water disposal at MBDS/FADS has greater adverse environmental impacts than would disposal at other sites, or would other disposal options. We elucidate that presumption in some of the comments that follow.

Pg. 3-7, Section 1.1.1.

In referencing Table 1-1, the DEIS (Pg. 3-7) cautions us in interpreting the data in the table ... "since the perceived need to test material biases the results. For example, material from harbors considered to be non-polluted was not tested, and is not considered in the average (see Table 1-1). In general, the tests were performed on surficial sediments in the dredging areas considered to be most polluted. The deeper layers, which are usually less contaminated, generally have received little or no testing, and could represent the majority of a project's disposed material." We interpret these statements to mean that the concentrations of contaminants in table 1-1 are probably higher than the average concentration of these same contaminants at the MBDS/FADS because "cleaner" sediments were not represented in chemical analyses of materials proposed for dredging and disposal. However, we find that the opposite appears to be true - that what should be a "worst-case" representation of contaminant concentrations in material dumped at MBDS/FADS,

is actually an underestimate of actual site conditions. As an example, table 1-1 lists the weighted average PCB concentration in materials at MBDS/FADS as 0.22 ppm, based on bulk sediment analyses from project files. However, actual sampling of disposal-impacted areas at MBDS/FADS shows a mean concentration of 0.414 ppm of PCBs. (pg V, Executive Summary)

This difference is not raised as an inconsistency needing correction, but rather as an example of a site management problem related to site designation. We believe the inconsistency illustrates a basic problem in the site management process - the inaccurate representation of chemical (and possibly) biological test results used to determine the suitability of materials for disposal at MBDS/FADS, and other open-water sites. The inaccurate representation may be unintentional, due to analytical or sampling deficiencies, or, in some cases, may be due to fraud on the part of disposal proponents or their agents. Whatever the cause of misrepresentation, it should give us reason not to rely on site management as a means of preventing adverse impacts at disposal sites.

Pg. 7, Section 1.2. This section discusses the anticipated need for regional disposal actions. The DEIS states that approximately 2.8 million cubic yards of dredged material has been dumped at MBDS/FADS during the previous 12 years. Just one future project - the Federal Channel "Improvement" Project - could generate a volume of dredged material equal to approximately 60 percent of the volume presently at MBDS/FADS. Based on our knowledge of sediments likely to be dredged in the Federal Channel Project, we would expect this project to require disposal of significantly contaminated materials. Experience prevents us from being confident that the existing (although improved) sediment testing protocol will prevent disposal of highly contaminated materials from Boston Harbor at MBDS/FADS.

Over the next 50 years, it is estimated that the MBDS/FADS could receive an additional 15 million cubic yards. In an attempt to put these volumes of dredged material in perspective, we calculated the quantity of PCBs in the 2.8 million cubic yards of dredged material that has already been dumped at MBDS/FADS. Using extremely conservative assumptions (i.e. assumption that will underestimate the quantity of PCBs present*), we calculate that there are a minimum of 650 lbs of PCBs in the dredged materials presently at MBDS/FADS. This conservative figure is enough PCB to contaminate 74,000,000 tons of fish to the 2.0 ppm FDA action level. Less conservative assumptions regarding dredged materials result in calculations of 1370 pounds of PCBs presently at MBDS/FADS, and the potential to contaminate 156,000,000 tons of fish to the 2.0 ppm FDA action level. Of course, this exact scenario of fish contamination is highly improbable. We use it to illustrate the relative importance of what may at first analysis appear to be an insignificant amount of PCBs. However, if only a fraction of that amount of PCB was incorporated into organisms using the site, it would represent a significant mobilization and transport of a toxic material from the site. If we assume that an additional 3-5 percent of disposed material is transported from the site by physical processes during disposal operations, a minimum of 20 - 33lbs of PCBs have left the site during disposal operations. Additionally, every 3 years we

*Assumptions:
- Volume disposed = 2.8 million cubic yards.
- Bulking factor of dredged material = 1.5.
- Wt. of 1 Cu. Yd. Sed. = Wt. 1 cu. yd. of water (=1686 lbs).
- Sediment = 50% water by weight
  Mean PCB concentration = 0.414 ug/g.

can expect bottom currents sufficient to resuspend and transport 4 percent of surficial material from MBDS/FADS (Section 3.1.2.2). This could result in the off site transport of an additional 26lbs of PCBs during every "critical" storm event.

If we accept the predictions of future use of MBDS/FADS, we can conservatively expect (assuming dredged materials of similar quality) PCB quantities at least 6 times greater than those discussed above. That is a minimum of 3900 pounds of PCBs dumped in Massachusetts Bay, a minimum of 120-200 pounds of PCB lost from MBDS/FADS during disposal, and a minimum of 155 pounds of PCBs transported from MBDS/FADS during each critical storm. Even considering the concepts of dilution of toxic materials as they leave the site, we do not understand your preliminary conclusion that MBDS/FADS is a "confinement" area. In our view it is not confined physically or biologically.

Pg. 34 and 35, Section 3.2.1. This section references water column sampling data (table 3-2) from sampling events in 6/85, 9/85 and 1/86. We note that the average water column concentration of 33 samples analyzed for mercury was 1.35 ppb. This exceeds the Criterion Continuous Concentration (i.e., the allowable "chronic" concentration) of 0.025 ppb established for the protection of marine species and their uses. This average mercury concentration exceeds the recommended maximum chronic standard by more than 50 times. Similarly, the "acute" exposure standard of 2.1 ppb mercury was also exceeded in the January, 1986 sampling in which the 9 replicate samples averaged 2.4 ppb. The exceeding of these two standards indicates that marine organisms from the MBDS/FADS, and their uses, are at risk from exposure to mercury. Other contaminant levels also exceeded water quality criteria. For example, the average copper concentration (n=29) of 2.8 ppb is very near the 2.9 ppb standard for the protection of marine organisms from acute exposures (Criterion Maximum Concentration). With a mean of 2.8 ppb and a standard deviation of 1.3 ppb, we assume that several water column copper concentrations included in the 29 samples greatly exceeded the 2.9 ppb Criterion Maximum Concentration, and therefore placed marine organisms at the MBDS/FADS at acute risk.

Water column PCB concentrations were variable at MBDS/FADS, although at least two samples taken in 9/85 and 1/86 indicated dissolved PCBs of 0.075 ppb and 0.110 ppb, in excess of the 0.03 ppb chronic water quality criterion. While these two samples may represent anomalies, pore water concentrations of PCBs are likely to be higher than water column concentrations, thereby exposing important food chain in-fauna to potentially unacceptable PCB levels. In this regard, we note that PCB body burdens of Nephtys incisa taken from stations within the "boundaries" of the MBDS/FADS appear significantly greater than the levels in Nephtys taken from outside the site boundaries. The weighted mean PCB level in Nephtys from within the MBDS/FAD is 0.812 ppm dry weight (0.151 ppm wet weight) while the level from Nephtys from outside MBDS/FADS is 0.246 ppm, dry weight (0.053 ppm, wet weight). Neither value is indicative of a "clean" site, and the 0.812 ppm value for Nephtys within the site is so high as to represent a potential hazard to other components of the food web of which Nephtys is a part.

This contention is supported by data presented in the DEIS and in scientific literature. Tissue concentrations, of PCBs in marine organisms are normally at least as great as, and typically greater than, the PCB concentration in the sediments associated with those organisms. Average in situ PCB

bioaccumulation factors (tissue/sediment) reported for clams (Malins et al, 1980), shrimp (Tetra Tech, 1986) and English sole (ibid) were 5.9, 3.7, and 3.6, respectively. A range of 5-20 was reported as representing bioaccumulation factors in Atlantic croakers taken in a survey by NMFS (1987). A PCB tissue threshold of approximately 100 ug/kg is documented in several studies as resulting in significant detrimental effects to fish reproduction (von Westernhagen, et. al., 1981; Monod, 1985; Spies et. al., 1985). If we conservatively assume a bioaccumulation factor of only 1.0, as opposed to the range of 3.6 - 3.7 cited above, sediment concentrations of 100 ug/kg could result in significant reproductive impairment in fish. Sediment PCB concentrations of at least 100 ug/kg are found within 3 km of the disposal buoy (figure 3.23). Applying the logic presented above, we can expect some fish within 3 km of the disposal buoy to have PCB tissue concentrations at least as great as the approximate "effects" threshold of 100 ppb.

Although sediments farther than 3 km from the disposal buoy generally have what appears to be relatively low PCB levels of 40 - 50 ppb, these levels would be potentially harmful to fish with the more realistic bioaccumulation factors greater than 2.0 as opposed to 1.0 used in the foregoing conservative scenario.

The exact zone of influence of materials migrating from MBDS/FADS to adjacent areas is unknown, although it is certainly significantly greater that the area officially designated within 1 km of the disposal buoy Figures 3-7 through 3-23 clearly depict contaminant concentration gradients extending from maximum levels near the center of the 1 km-radius site to at least beyond 3 km from the disposal buoy. Although levels of specific contaminants vary in their pattern of dispersal from the site, it is obvious that disposal at the site has resulted in elevated contaminant concentrations in a significant portion of sediments (and presumably biota) of Massachusetts Bay. Again, using sediment PCB levels to illustrate our contention regarding disposal of contaminants from MBDS/FADS, we note that PCB levels of 40-50 ppb are seen at 5+ km from the disposal buoy (Sec 3.2 2.7.5), while Massachusetts Bay and Cape Cod Bay "background" concentrations range from less than 0.3 ppb to 18 ppb.

While these arguments regarding potential "effect" levels of PCBs in Massachusetts Bay fish are conjecture deduced from the scientific literature and data in the DEIS, we have not seen data collected in this assessment process that prove or disprove our hypothesis that fish in the environs of the MBDS /FADS are at risk from contaminants introduced to the area during dredged material disposal. Similar arguments may apply to other contaminants, especially PAHs or other organic contaminants, not presently delineated during sediment testing.

SUMMARY

Time restrictions prevent us from further detailed comments on the DEIS. Due to these time constraints, our technical assessments and subsequent comments primarily focus on the potential impacts of PCBs on living resources of Massachusetts Bay. However, PAHs and presently-unmonitored organic contaminants may be of equal or greater concern, and should be considered in assessments conducted in preparation of the final EIS To a lesser extent, certain metals appear to presently approach or exceed risk levels for marine life and uses of marine life

We disagree with the preliminary conclusion of the DEIS that MBDS/FADS is a containment site, and that its continued use will not have significant adverse environmental impact, and that it is therefore, appropriate to grant it final designation. We believe that upon examination of the comments you will receive regarding final designation, you will also conclude that final designation is not appropriate, or, that lacking more in-depth biological/toxicological assessments, designation is premature.

The difficult decision EPA made in attempting to separate site designation issues from site management issues should be reconsidered. Past site management practices have not protected living resources of Massachusetts Bay from detrimental impacts associated with the disposal of hazardous sediments at the MBDS/FADS. We have no reason to believe that future site management practices will be protective of Massachusetts Bay biota. Conversely, appropriate site designation can result in the future protection of marine resources. We believe that the expansion of the alternatives analysis in the final EIS will contribute significantly to the protection of marine resources.

Sincerely yours,

Vernon B. Lang
Acting Supervisor
New England Field Office

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Region
Management Division
Habitat Conservation Branch
One Blackburn Drive
Gloucester, MA 01930-2298

November 15, 1989

Paul G. Keough
Acting Regional Administrator
U. S. Environmental Protection Agency
JFK Federal Building
Boston, MA 02203

Dear Mr. Keough:

The National Marine Fisheries Service (NMFS) has reviewed the Draft Environmental Impact Statement (DEIS) for the Massachusetts Bay Dredged Material Ocean Disposal Site (MBDS) designation. We believe that this DEIS is deficient and should be redrafted and re-released. We have previously commented to your agency and the New England Division Army Corps of Engineers regarding disposal activities at this site. Rather than restate these issues, we incorporate our previous comments by reference and have attached the pertinent correspondence.

As documented in the DEIS, Massachusetts Bay is home to populations of commercially and recreationally harvested finfish and shellfish, such as American plaice, winter flounder, witch flounder, cod, redfish, haddock, silver, red, and white hake, pollock, lobster, scallop, shrimp, and Jonah and rock crabs Also present are endangered and threatened species, such as sea turtles, humpback, fin, and right whales, and protected species such as seals, dolphins, and other toothed whales. As the conservation and management of these fishery resources and protected species are the primary responsibilities of the NMFS, we are concerned that disposal site(s) designated for dredged material from the metropolitan Boston area provide reasonable and feasible disposal management options for handling contaminated harbor sediments. To date, disposal options which would protect these living resources, and the commercial fishing industry have been, at best limited.

The most frequently-used option for disposal of contaminated sediments from the Boston area over the past 8 years has been unconfined, and largely uncontrolled, open water disposal at the MBDS. Since contaminated sediments disposed at MBDS have not been isolated from marine organisms, bioaccumulation of contaminants and trophic transfer within the marine food chain may be occurring. The limited data collected and reported in the DEIS indicate that some benthic organisms within the disposal site have significantly

elevated levels of polychlorinated biphenyls and polyaromatic hydrocarbons in their tissues. Since, as the DEIS notes, about 80% of the fishery resources within the MBDS vicinity are demersal, we believe that there is unacceptable potential for contaminant transfer to commercially harvested species from direct sediment contact and dietary uptake. In this regard, it is particularly disturbing that the DEIS indicates that the quality of some sediments at the MBDS is similar to sediments in Quincy Bay, an area for which the Environmental Protection Agency has issued warnings regarding fish consumption. NOAA and FDA have been obligated to take similar actions at the MBDS. These were described in the January 3, 1980 Federal Register. It is unfortunate that the ramifications of those Federal actions are not fully discussed in the DEIS. We have repeatedly expressed concern, during the review of individual disposal permit applications and throughout the designation process, about the adverse effects that disposal practices at MBDS could have on fishery resources. These concerns continue to be ignored.

The lack of suitable, resource-protective options for contaminated dredged material disposal has been a major source of contention among the federal resource agencies (NMFS, U.S. Fish and Wildlife Service, and EPA) and the Corps of Engineers during individual permit review. Regrettably, the DEIS does not resolve this controversy and needs to investigate alternatives. The major conclusion of the DEIS is that the status quo is the only solution. It does not explore suitable alternatives nor does it address the significantly elevated levels of contaminants in both surficial sediments and organisms at MBDS. The DEIS does not identify nor discuss any other disposal sites, despite the noted limitations of the MBDS, the presence of other historically-used disposal sites within the MBDS vicinity, and the identification of potential sites by the Third Harbor Tunnel Project and the Massachusetts Office of Coastal Zone Management. In this respect, we believe that the DEIS fails to meet the minimum requirements of the National Environmental Policy Act (NEPA).

In fact, we consider this designation process to be similar to that used by the Army Corps of Engineers (ACOE) in its designation of the Western Long Island Sound Disposal Site (WLIS III). In a recent court decision, Huntington v. Marsh, (859 F.2d 1134, 2d Cir. 1988) the 2d Circuit Court affirmed the Federal District Court's decision that the EIS for WLIS designation was inadequate under NEPA, in part, because it failed to address alternatives to the site. The Court required the ACOE to redraft the EIS. Specifically, the decision requires the ACOE to evaluate the availability of alternatives to ocean disposal, including upland disposal sites and remedial measures to reduce the need for dredging. The EPA should accept the clear precedent established by this case and apply it to the alternatives investigation for the MBDS.

NMFS expected that EPA would use the designation opportunity to seek environmentally acceptable solutions to the dredged material disposal problems of the Boston area. Instead, the EPA defers resolution of these problems to other entities. Specifically, the DEIS suggests that the analysis of disposal alternatives should be conducted at the individual permit review stage, and that the ability to manage and cap contaminated sediments will be assessed in the future, as will be the appropriateness of the reference site for dredged material testing. We and other resource agencies have been seeking resolution of these issues which have been unresolved for the past 8 years. Our experience has been that the individual permit review process does not lend itself to resolution of these management issues. As evidence of this, the MBDS remains the option of choice for contaminated dredged material from the Boston area, despite indications that Massachusetts Bay is being degraded and that the state is embarking on a multi-billion dollar effort to clean up inner Massachusetts Bay. The DEIS indicates to us that we are justified in our concerns for harm to occur to living marine resources from disposal practices at MBDS.

The DEIS lacks any sufficient plan or strategy to effectively manage the MBDS. In a recent occurrence, the fishing boat "ITALIA" hauled up four barrels of highly acidic material in the vicinity of the MBDS. One of the barrels broke through the net and spilled its content on the deck. At the Coast Guard hearing it was evident that this was not an isolated incident. In fact, it seems to happen more often than not. The DEIS only notes that the MBDS was an industrial waste site pre - 1976. Because of the frequent occurrence and high potential for fishermen to pick up industrial waste a more detailed discussion is warranted in the DEIS. This discussion should concern: the type of materials disposed at this site; the exposed nature of this material; the potential for fishermen to continue to haul this material aboard their vessels; the potential health hazards to the public; and the potential impacts to marine resources. We suggest exploration of methods in which suitable dredged material(s) would be used to isolate the industrial wastes and reduce the Public risks associated with this area of the Bay.

The DEIS lacks a substantive discussion of the Stellwagen Bank area becoming a National Marine Sanctuary. As you are aware, a portion of the MBDS is within the boundaries of the proposed Stellwagen Bank Sanctuary. If this site becomes a marine sanctuary it is possible that disposal activities at the MBDS will be restricted. The DEIS must discuss this option in detail.

Finally, we have received your November 6, 1989, request for concurrence with your determination that the MBDS designation is not likely to adversely affect endangered species pursuant to Section 7 of the Endangered Species Act, as amended. We have not had time to fully analyze the basis for your conclusion. The NMFS, in response to an ACOE request for formal consultation has drafted

a biological opinion that tentatively concludes that use of the site for the projects specified by the Corps is not likely to jeopardize the continued existence of any endangered or threatened species under our purview. Certain conservation recommendations are being developed in the ACOE opinion that apply to activities at the MBDS, and should be considered in your Section 7 consultation. To expedite these conclusions, we urge you to join the ACOE efforts and conduct a joint Section 7 consultation. To facilitate this, please contact Doug Beach at (508) 281- 9254.

In conclusion, we find that the DEIS for this project fails to meet the minimum requirements of the NEPA. In light of this, we believe that the document should be redrafted and re-submitted as a DEIS. The redraft should include a thorough review of alternative disposal options, conduct a risk assessment, address cumulative effects of other actions within the MBDS, and investigate possible remediation of existing MBDS conditions.

It is also important to note for the record that the public hearing conducted on the final designation of the MBDS is open to challenge on the issue of sufficient public access. The meeting was held on November 1, 1989, at the Transportation Building in Cambridge, Massachusetts, at 7:00 p.m. The parking lot adjacent to the facility was chained prior to 7:00 p.m. The front doors to the Transportation Building were closed and locked at 6:30 p.m. No signs were posted in the lobby directing attendees to another entrance, or to the appropriate floor and room number. Anyone arriving after 6:30 p.m. would have had to know about rear entrances to the building and parking lot in order to find his or her way to the public meeting.

Sincerely,

Thomas E. Bigford

Thomas E. Bigford
Branch Chief

Attachments

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northeast Region
14 Elm Street
Gloucester, MA 01930-3799

JUL 24 [redacted]

F/NER74:SM

Colonel Edward Hammond
Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254

B. Hyman

Mr. Michael Deland
Regional Administrator
U.S. Environmental Protection Agency
Region I
J.F.K. Building
Boston, MA 02132

Dear Mr. Deland:

The National Marine Fisheries Service (NMFS) bears responsibility for the conservation and management of our nation's living marine resources. A portion of these legislative mandates is addressed by our on-going oceanic research activities. For the past several years, as part of that effort, the NMFS and several coastal states have been investigating the potential for and the effects of bioaccumulation of polychlorinated biphenyls (PCBs), petroleum-based hydrocarbons (PHCs), and other anthropogenically derived compounds in fish and other organisms. Many of these substances are persistent in the environment, have been shown to bioaccumulate, and can produce toxic or sublethal adverse effects on living organisms. Therefore, we request your active involvement in the review of any actions that would introduce such contaminants into the ocean. We refer especially to your responsibilities under the Marine Protection, Research, and Sanctuaries Act with regard to the ocean disposal of contaminated dredged material at the Boston Foul Area Disposal Site (FADS).

The NMFS is concerned that current dredged material disposal practices could endanger the health and edibility of valuable commercial and recreational fish and shellfish species. The purpose of this letter is to express and document our concerns and suggest ways to reduce risks to living marine resources, their habitats, and the industries and people that depend on them for food or livelihood. We specifically address several points of contention, including the "capping issue" at the FADS, and elicit your support in a cooperative effort to solve problems associated with ocean disposal of contaminated dredged materials from the Boston metropolitan area.

Contaminant Concerns

Preliminary analysis of available research data indicates that although no public health emergency presently exists there is a serious cause for concern regarding the levels of certain contaminants in several fish stocks. Striped bass (Morone saxatilis) have been banned from the marketplace in New York and New Jersey because of concern for elevated levels of PCBs. Bluefish (Pomatomus saltatrix) contain detectable amounts of PCBs in edible tissues. These species are two of our nation's premier recreational fish in terms of directed effort and social value. Rubinstein et al. (1984) demonstrated that contaminated sediments can serve as a significant source of PCBs for uptake and trophic transfer in marine ecosystems. They found that fish feeding on polychaetes from contaminated sediments accumulated more than twice the PCB body burden of fish exposed to contaminated sediments but fed uncontaminated polychaetes. Results indicated that fish isolated from direct contact with PCB-laden sediments accumulated significantly less PCBs than fish having direct contact with the sediment.

Degraded aquatic environments have been linked with the increased incidence of tumors, lesions, fin and shell erosion, and other pathological conditions in demersal fish and shellfish. Much of the earlier literature describing pollution-associated diseases of fish and shellfish was summarized by Sindermann (1979). The results of several recent studies illustrate the probable relationship between contaminated sediments and fish pathologies. For example, Malins et al. (1984) reported an increased incidence of pathological conditions in Puget Sound fish inhabiting degraded environments. They found a positive correlation between sediment polynuclear aromatic hydrocarbon (PAH) levels and liver neoplasms in English sole (Parophrys vetulus). Estrella (1984) related higher prevalences of gill blackening and shell erosion in the American lobster (Homarus americanus) with polluted coastal environments, specifically Boston Harbor and Buzzards Bay. Murchelano (1985a) found a higher prevalence of hepatic lesions, including carcinoma, in Boston Harbor winter flounder (Pseudopleuronectes americanus) than in winter flounder from unpolluted east coast environments.

Two recent studies raise serious concerns about the effect that disposal of contaminated dredged material at the FADS may have on the aquatic environment and living marine resources. The Scientic Applications International Corporation's (SAIC) Benthic Resource Assessment Technique analysis conducted at the FADS indicated that the disposal site may be an attractive feeding ground, particularly for juvenile fish. Boehm (1984) conducted a comprehensive survey of toxic organic pollutant distributions in the sediments and biota of Massachusetts Bay, Boston Harbor, and Cape Cod Bay. He found that Boston Harbor was a very heavily polluted area and that Massachusetts Bay, from the Stellwagen Bank area landward, contained significantly elevated sediment levels of PCBs and PAHs, which may be increasing over time. PCB concentrations in northern Massachusetts Bay sediments were, on the average, lower than those in Boston Harbor by a factor of four. The major exception to this generalization was station MB-6, which was located in the vicinity of the FADS. Sediment PCB concentration levels at station MB-6 were similar to those at Boston Harbor stations; indeed, station MB-6 actually had the highest average PCB value of all stations in

Massachusetts Bay. Similarly, PAH levels at station MB-6 were higher than those at other stations in Massachusetts Bay. Boehm (1984) attributed these elevated levels of PCBs and PAHs at station MB-6 to the proximity of the FADS.

All of the aforementioned studies clearly demonstrate the need to effectively isolate dredged sediments contaminated with PCBs, PAHs, and metals so as to minimize adverse effects on living marine resources.

The Capping Issue

As you know, the Environmental Protection Agency (EPA), Region I, is developing an Environmental Impact Statement to assess the final designation of the Foul Area Disposal Site as a dredged material disposal area. As a cooperating agency, the COE, via their Disposal Area Monitoring System program (DAMOS), has synthesized the existing scientific literature and conducted basic physical, chemical, and biological studies for assessing the suitability of the FADS. As you may also know, staff from the NMFS's Northeast Region and the EPA's Narragansett Laboratory have met over the last several months with staff from EPA's Region I, the COE's New England Division, and the major DAMOS contractor, SAIC, to discuss study methods, results, deficiencies, and possible ways to fill data gaps. The most recent such meeting was held on June 9, 1986 in Narragansett, Rhode Island.

One question that requires additional study and that the NMFS believes affects the suitability of the FADS for disposal of contaminated sediments is whether contaminated sediments can be effectively capped at this site. This issue was discussed at the June 9 meeting but the COE did not consider it to be a major question affecting the site designation process. We disagree. The purpose of capping operations is to effectively sequester contaminants, such as heavy metals, PCBs, PAHs, and other petroleum hydrocarbons (PHCs) that have been found to be toxic at low levels and that may bioaccumulate in marine organisms. These contaminants are often present at elevated levels in sediments to be dredged from the Boston metropolitan area. An effective, clean material cap placed over contaminated dredged materials could prevent benthic organisms that rework the sediments and that may be consumed by fish from coming into contact with these contaminants, thereby reducing the potential for bioaccumulation and introduction of these substances into marine food webs. Capping operations have been successful in isolating contaminated sediments in the New York Bight (O'Connor et al. 1983); at the Portland, Maine Disposal Site; and at other shallow water sites. To our knowledge, no successful capping operation has been accomplished at depths similar to those at the FADS (approximately 300 feet).

At the June 9 meeting, COE representatives made several statements regarding capping at the FADS; namely, (1) dredged material to be disposed at the FADS is relatively clean because only material that passes the federal ocean dumping criteria can be disposed; (2) successful capping should be possible at the FADS; (3) the capping issue is a "management" issue, not a "site designation" issue; and (4) the COE will investigate capping at the FADS pending the availability of sufficient time, money, and suitable projects. We discuss each of these four statements below in light of the preceding discussion and the realities of the site designation process, as we understand them.

1. Boston Area Sediment Quality. It seems unrealistic from past experience, anticipated projects, and the reported contamination of sediments of Boston Harbor and its environs to assume that the FADS will be used only for clean materials. Upland disposal sites for dredged material, particularly for contaminated sediments with high percentages of silt and clay, are virtually non-existent in coastal New England. Several dredging projects in the Boston area, totalling approximately 400,000 cubic yards of PCB-, PAH-, and metal-contaminated sediments, are currently "on hold" pending the determination of an adequate disposal site. We also understand that the COE is currently in the planning stages of a large navigation project for Boston Harbor. It is probable that at least some of these latter dredged materials will be contaminated, and that the FADS will be the preferred disposal site.

Several dredging projects over the past few years that the COE determined were acceptable for ocean disposal at the FADS consisted of sediments that had elevated levels of heavy metals, PCBs, and PHCs. In some cases, the sediments failed the bioassay test; others showed a potential for significant bioaccumulation of PCBs, PHCs, or metals. Some of these projects were permitted under the presumption that capping could be achieved at the FADS. In other cases, the level of bioaccumulation was determined to be insignificant, despite the fact that many studies indicate that the 10-day bioaccumulation test is indicative only of the bioavailability of contaminants, and that 10-day body burdens should not be considered as endpoints (Fowler et al. 1978, McLeese et al. 1980, Rubinstein et al. 1983).

2. Success of Capping. The COE continues to cite successful operations in shallower waters as evidence that capping is possible at the FADS, although the 1983 attempt to cap contaminated Boston Harbor sediments at this site resulted in no observable mound formation. The COE contends that capping is feasible at the FADS and that past failures were due to poor disposal management. The NMFS is willing to accept that operational errors may have been the cause of past capping failures. However, we believe that this hypothesis requires verification, and that the "Blue Circle Atlantic" and "General Electric" projects (discussed below) should be that verification. The results of the attempt(s) to cap these projects will form the basis for our review of the capping option at the FADS, and will affect our consideration of the FADS as an acceptable ocean disposal site.

Two recent permit applications, Blue Circle Atlantic (Public Notice No. 21-85-814) and General Electric Corp. (Public Notice No. 24-86-331), for dredging of contaminated sediments and disposal at the FADS are currently pending COE decision. Of particular concern to the NMFS are the elevated levels of PCBs and PAHs. The NMFS does not believe that these materials are suitable for ocean disposal unless they could be effectively isolated from the biota. However, since no upland disposal sites are available, and since the COE contends that capping may be possible at the FADS, we have not objected to ocean disposal at the FADS provided that these projects are capped with an adequate volume of clean sediment.

The NMFS believes that these two projects represent an excellent opportunity to test the feasibility of capping at the FADS, applicant permit compliance, and deepwater monitoring by the DAMOS team. The COE's contractor, SAIC, should have the capability to monitor and assess the success of a capping attempt. Appropriate baseline information should be gathered and the

actual disposal should be stringently controlled. Follow-up monitoring should be conducted to ascertain the overall success of the methodology, the areal extent of the disposal mound, the depth and area of the cap, and the stability of the cap over time relative to both biotic and abiotic factors.

3. Management vs Site Designation. The COE site designation staff has stated that capping is a management question, whose resolution is not essential to the disposal site designation process. We disagree. The ability to isolate contaminated sediments in a subaqueous environment is critical to site designation because of the polluted nature of much of the dredged material that will be disposed at the designated site. The lack of suitable and/or available upland disposal sites and other alternatives to openwater disposal clearly indicates the need for the capping option to be fully explored and resolved now. The condition of the sediments at the FADS, the apparent use of the FADS by juvenile fish, the inability of our present testing methodology to clearly define acceptable or unacceptable sediment contaminant loadings, and the need to maintain safe navigability of our ports and harbors all dictate that we develop methodologies for dealing with polluted sediments.

4. Agency Priorities and Involvement. Time, money, and suitable projects must be committed now, prior to site designation, or the dredging of important major harbors containing even moderately contaminated sediments could be severely constrained. The feasibility of capping at the FADS should be explored as soon as possible, preferably by using materials from the Blue Circle Atlantic and General Electric projects.

A serious drawback of the site designation process to date is that the EPA staff involved have not included any of the individuals who review permit applications for dredged material disposal. We believe that the experience of those individuals most familiar with the types of materials and projects that have been proposed for disposal at the FADS would add to the process immeasurably. In Region II of the EPA, the permit review staff is the contact point regarding ocean disposal matters. My staff and I believe that similar utilization of the EPA permit review staff in Region I would be highly desirable. By copy of this letter, I am also suggesting similar involvement by the U.S. Fish and Wildlife Service's (FWS) permit review staff.

NMFS Recommendations

In summary, the NMFS recommends that the EPA and the COE seriously reconsider the capping issue at the FADS. Specifically, we recommend the following:

1) The Blue Circle Atlantic and General Electric dredging projects should be used to test the feasibility of capping at the FADS.

2) Because of the lack of reasonable alternatives to openwater disposal, the COE, EPA, FWS, and NMFS should work together to develop a management strategy for future projects and an adequate monitoring strategy for the FADS, should that site be identified as the appropriate disposal site for this area of New England.

3) The EPA permit review staff should be included in the FADS designation review process. Their expertise has not been utilized to date, and their counsel would add immeasurably to the process.

We believe that these concerns merit your serious consideration. We are concerned that the FADS may contribute significantly to the degraded condition of Massachusetts Bay, and that the potential exists for significant adverse effects on living marine resources. Better management could minimize the risks associated with ocean disposal of dredged material at the FADS. Therefore, I suggest that appropriate staff from each agency meet in the near future to resolve these issues.

For further coordination regarding this matter, please contact Susan Mello at FTS 840-1323 or commercial 548-5123 ext. 323.

Sincerely,

Signed: Jon C. Rittgers

Richard H. Schaefer
Acting Regional Director

cc: F/NER74 - Bruce Higgins, Doug Beach, Chris Mantzaris, Tom Bigford
F/NER742 - Mike Ludwig
F/NER744 - Stan Gorski
F/NEC1 - John Boreman, Bob Murchelano, Jack Pearce
Dick Pastore, EPA Boston
Doug Thompson, EPA-WQP, Boston
Ed Reiner, EPA-WQP, Boston
Bill Lawless, COE, Waltham
Jim Bajek, COE, Waltham
Ken Carr, FWS, Concord
Nancy Hansen, FWS, Concord
Gerry Pesch, EPA Narragansett
Norm Rubinstein, EPA Narragansett
Bob Morton, SAIC, Newport
Jim O'Connell, MA CZM

FMLudwig/SMMello:7/16/86:840-1323:smm
Revised 7/22/86:BDHiggins:837-9351:beh

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northeast Region
14 Elm Street
Gloucester, MA 01930-3799

DEC 22 1986

F/NER74.SM/ML

Colonel Thomas A. Rhen
Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254

Dear Col. Rhen:

The National Marine Fisheries Service (NMFS) has reviewed your letter of October 17, 1986 that addressed NMFS's stated concerns relative to the ongoing Foul Area Disposal Site (FADS) designation process and the "capping" issue. Several events have transpired that have heightened the concerns raised in our July 24, 1986 letter. We would like to take this opportunity to clarify our concerns, respond to your October 17 letter, and note the most recent events regarding the FADS.

The NMFS continues to believe that unconfined open water disposal at the FADS of polychlorinated biphenyls (PCBs), petroleum-based hydrocarbons (PHCs), and other anthropogenically derived compounds that have been shown to be toxic, non-biodegradable, and that bioaccumulate in living organisms presents an unacceptable risk to the valuable fishery resources that inhabit Massachusetts Bay. In our opinion, the current sediment testing requirements and procedures utilized by the New England Division are not adequate to assess the suitability of dredged material containing such substances for ocean disposal. Until capping is proven to be an implementable technology at the FADS or until sediment evaluation procedures and criteria are modified to provide meaningful results, we must recommend the cessation of all disposal activities where elevated levels of halogenated hydrocarbons or hydrocarbon complexes are identified in the sediment.

We, collectively, continue to miss opportunities to determine if capping contaminated dredged material is an implementable technology at the FADS. Without this verification, the NMFS is continually forced to recommend extreme caution for all disposal actions where halogenated hydrocarbons or hydrocarbon complexes have been identified in the sediment. This position is based on the scientific literature, which documents the toxicity and bioaccumulation potential of these contaminants in the marine environment, and on the ocean disposal research that has been conducted by and for your agency.

Your letter cites time and costs as the two major reasons for delaying implementation of a verifiable capping study. However, it was our intention that the capping study be incorporated into the ongoing DAMOS survey program, and that the disposal of the Blue Circle Atlantic and General Electric

projects be timed to coincide with these planned surveys. The upcoming DAMOS survey already includes the necessary components of an initial capping survey (see enclosed work order and NMFS's comment letter), but it is too late to be useful in this regard because several months have passed since disposal. Your staff has informed us that another survey is also planned following disposal of the so-called "cap" sediment. However, without the disposal data from the original projects, this follow-up survey will provide little insight as to whether capping is an implementable technology at the FADS. The timing necessary to make these two DAMOS surveys successful relative to the capping question has passed, and it remains unclear to us why this was allowed to happen.

The contention that there was "no legitimate reason to hold up the Blue Circle Atlantic and General Electric projects . . . " because they were determined "acceptable for ocean disposal based on the bioassay/bioaccumulation test results . . ." lies at the heart of our disagreement over dredged material disposal practices at the FADS. We disagree with this statement for two reasons.

First, the NMFS believes that it is essential to the health of living marine resources and the general public to verify and implement management techniques that will reduce the risks associated with ocean disposal of contaminated dredged material whenever possible. Testing the feasibility of capping these two projects, both containing elevated levels of PCBs and PHCs, was what we considered a legitimate reason to delay dredging these projects. In our opinion, the health and edibility of fishery resources, consumed by the general public and providing a livelihood for many individuals, should have been given greater weight than the inconvenience posed to two private corporations from postponing dredging for five months. Our concerns relative to the ocean disposal of these two projects were made clear in our July 24, 1986 letter and our individual project letters to the Regulatory Branch Chief (May 21, 1986 and June 9, 1986).

Secondly, bioassay/bioaccumulation results alone seem to be the deciding factor for determining the acceptability of dredged material for ocean disposal. We believe that this type of decision-making process is inadequate for several reasons, and that it is contrary to the guidance outlined in the 1977 implementation manual. The implementation manual, "Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters," authored jointly by the COE and EPA, states,

> "This manual provides technical guidance to the fullest extent practical on implementation of the criteria. Yet technical evaluations can provide only part of the input to the decision-making process. Many of the criteria do not concern subjects amenable to quantitative evaluation. In such cases objective, qualitative decisions must be made. Indeed, the decision on granting of a permit is ultimately subjective."

It is clear that bioassay/bioaccumulation testing was intended to be part of the decision process, but not the sole criterion for decision making. Overemphasis on applicant-generated sediment test results in the decision-making process is a serious matter of concern, particularly when the sediments

contain PCBs, PHCs, or other synthetic organics known to be toxic at low levels and to accumulate in living organisms.

A recent Waterways Experiment Station (WES) report (McFarland et al 1986) outlines the problems associated with current sediment testing protocol for PCBs. PCBs are a group of 209 different possible configurations of chlorinated biphenyl compounds that differ in the number and position of chlorine atoms. Some of these are of little biological consequence, whereas others are extremely toxic and persistent in the environment. The WES study indicates that current sediment testing procedures are not only inadequate for estimating sediment PCB levels, but also do not indicate the biological significance of any PCBs present. These testing procedures rely on the comparison of sediment PCBs with the various commercially produced Aroclor standards. The WES report notes, "PCBs that entered the environment as identifiable Aroclor mixtures are altered by these physical, chemical, and biological processes and cannot be properly identified by comparison with Aroclor analytical standards." McFarland et al. (1986) further note that it is "erroneous and misleading" to continue to attempt to characterize PCBs from environmental samples, i.e., water, sediments, and organisms, using Aroclor standards.

Your letter refers to the fact that the DAMOS FADS site investigations have not shown any sediment or benthos degradation <u>outside</u> the designated disposal site. This comment implies that environmental degradation from disposal activities is limited to the designated disposal area, which we would agree is an acceptable situation. Our concern is that this is not the case, and that the FADS is a source of contaminants to Massachusetts Bay food webs. The Boehm (1984) study indicated that PCB and PAH levels in sediments from a sampling station located in proximity to the FADS were much higher than other stations in Massachusetts Bay. Chemical analyses of the FADS surface sediments, conducted under the DAMOS program, indicated that the FADS sediments were higher in heavy metals than other northern disposal sites (SAIC 1985). Since these contaminated sediments are not being isolated from the biota, and since the disposal area, according to DAMOS investigations, supports populations of "Stage I" benthic communities, "which are a major food source" for juvenile fish, it is likely that contaminants are remobilized and bioaccumulated into benthic organisms and fish. The fact that juvenile fish feed at the FADS is of particular concern since many synthetic organic compounds are toxic at low levels, and because the bioaccumulation and toxic-response process for many of these contaminants appears to be additive. This situation affects not only these juvenile fish, which apparently are being exposed to contaminants at an early life stage, but also the larger commercially-sought individuals that prey on juveniles. Although contaminated sediments disposed at the FADS may not be physically moved into areas outside of the site, contaminants remobilized and bioaccumulated into the flesh of juvenile fish can be.

Your letter further states that benthic tissue analyses conducted both in and outside the disposal area have not shown "any significant problems associated with contaminant uptake." It is our understanding that a within-FADS sample of benthic organisms large enough to conduct PCB analyses has not been obtained. Similarly, we have seen no data to support the statement that contaminants in the "Stage I" benthic organisms at the FADS site are "low." The NMFS considers the incorporation of toxic, non-biodegradable synthetic

organics into fishery resources to be a "significant problem" facing the the Nation's fisheries. We note that "low" levels of many contaminants can produce lethal and sublethal effects in fishery resources. Additionally, we must consider the additive effects of bioaccumulation of these substances over time.

In summary, the NMFS wishes to reaffirm our dissatisfaction with the present dredged material disposal procedures at the FADS. In our opinion, the disposal of contaminated dredged material, as currently conducted, presents an unacceptable risk to the fishery resources that inhabit or frequent Massachusetts Bay. The contaminated nature of the sediments of Boston Harbor and its environs, the inability of the current sediment testing procedures to assess the ecological significance of sediments proposed for ocean disposal, and the potential for significant adverse effects on fishery resources from unconfined aquatic disposal of contaminated sediments, makes testing the feasibility of capping at the FADS a critical part of the site designation process. Without clear evidence that capping can work, and without our collective commitment to use capping routinely at a continuously monitored site, we must object to the unconfined aquatic disposal of dredged sediments containing elevated levels of halogenated hydrocarbons or other potentially toxic synthetic organic compounds.

In view of the significance of the problems outlined in this and our July 24, 1986 letter, and the site designation schedule, which calls for a decision on the FADS by October 1988, it seems appropriate for us to meet to discuss these issues, and to define methods to resolve them expeditiously. We would be glad to provide the appropiate forum. For further coordination regarding this issue, please contact me or my Management Division Chief, Mr. David Crestin, at (617) 281-3600.

Sincerely,

Richard H. Schaefer

Richard H. Schaefer
Acting Regional Director

Enclosures

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Management Division
Habitat Conservation Branch
Sandy Hook Marine Lab
Highlands, NJ 07732

April 5, 1988

Ms. Gwen S. Ruta, Chief
Environmental Evaluation Section
U.S Environmental Protection Agency
J F.K Federal Building
Boston, MA 02203-2211

Dear Ms. Ruta

We have reviewed the preliminary scope, provided in your January 26, 1988 letter, for the Environmental Impact Statement (EIS) on the Foul Area Dredged Material Disposal Site (FADS) in Massachusetts Bay. This letter identifies those issues that we believe require in-depth analysis, and replaces our letter dated March 18, 1988.

As you know, we have worked with the Environmental Protection Agency (EPA) and the Corps of Engineers (COE) since 1985 to design endangered species surveys at FADS, and have reviewed relevant draft technical documents As staff and budget limitations allow, we will continue to provide assistance regarding living marine resources and habitats The COE recently provided several of the contractor's draft reports to review, partially in support of the Endangered Species Act consultation requirements. We will provide you with a copy of our comments on these documents when we have reviewed them.

The proposed EIS should assess the fate and effects of past disposal activities at FADS on Massachusetts Bay biota and habitats. The assessment should thoroughly characterize the disposed materials as they relate to the transport and resuspension processes active at FADS, so as to provide an estimate of the total contaminant loading and area affected by past disposal activities. Also, this analysis should provide the basis for assessing the risk to commercially harvested resources, endangered species, and public health from continued use of the FADS. Similarly, reasonable projections of future disposal activities and their likely environmental effects should be developed.

The EIS should analyze the availability, efficiency, and environmental effects of alternatives to ocean disposal at FADS, and discuss the various mitigation methodologies available for each disposal option, including deep water capping at FADS. A detailed management and monitoring plan should be developed prior to designation of FADS or any other site.

SPECIFIC COMMENTS ON SCOPE

We offer the following comments and recommendations on the EIS outline provided with your January 26, 1988 letter.

Chapter 2. Alternatives: It appears that the only alternatives being considered are the proposed action, i.e., designation of FADS, and no action. The EIS should provide a complete analysis of the availability and environmental consequences of alternative dredged material disposal sites and methods.

Chapter 2.C.1.a.2. Location in relation to breeding, spawning, nursery, . . . : This is an essential section for which we have seen no information to date. Emphasis should be placed on commercially valuable species (e.g., lobster, flounders), important forage species (e.g., sand lance), sensitive life stages, and habitat requirements.

Chapter 2.C.1.a.4. Type and quantities of wastes . . . : A complete characterization of the dredged material that has been dumped at the site to date is a critical component of assessing FADS. This section should contain detailed information on the quantity of sediment disposed annually, the disposed material's physical characteristics (% volatile solids, grain size), contaminant levels (PCBs, PAHs, mercury, cadmium), and the bioavailability of sediment contaminants as indicated through sediment testing. The sediment quality parameters should be related to the quantity data. The analysis should assess the potential uptake of disposed contaminants by the organisms living in and near FADS, and relate this cumulative bioaccumulation process to effects to commercially harvested fishery resources. Predictions on the quantity and quality of sediments likely to be disposed within the next 10 years, and their environmental effects, should also be developed.

Chapter 3. Affected Environment: The FADS is located in a semi-enclosed system comprised of Massachusetts and Cape Cod Bays, bounded by the coast and Stellwagen Bank. This entire system should be considered the affected environment, not just the immediate FADS vicinity. The EIS should characterize other actions that affect this environment, such as the Boston Harbor wastewater effluents, so as to assess cumulative impacts to the Bay ecosystem.

Chapter 4. Environmental Consequences: The environmental effects sections should discuss the effects of the specific materials disposed, and should focus on significant issues such as contaminant release and bioaccumulation. The draft reports we have reviewed have done neither.

For example, the Environmental Consequences Section of Science Applications International Corporation's (SAIC) Physical Oceanography Report states that one should assume that disposed fine silt particles remaining in suspension after disposal will be dispersed beyond the disposal site margins. The Report further suggests that this dispersal is insignificant, but dispersal offsite is discussed only in terms of a single disposal event and suspended sediment load. The more biologically significant issues of persistent contaminant inputs and the cumulative effects of many disposal events are not discussed. For this observation to be meaningful, the physical oceanography data should be related to the types and quantity of disposed sediments, so as to predict the total area affected by dispersed sediments and the potential contaminant uptake by organisms within the affected zones.

Similarly, although the SAIC Technical Report provides site-specific data on water quality, sediment chemistry, and contaminant levels in resident biota for a period of 2 years, there has been no attempt to relate these observations to the disposed wastes or the disposal events that occurred between sampling dates. All of the data should be synthesized into one cohesive analysis so that we can assess the environmental consequences of disposal activities at the FADS

Chapter 4.D.1. Fishing Industry This section should include any effects on the quality of the harvest, e.g., increased contaminant levels or pathologies in fish and shellfish, effects on the public perception of the edibility and safety of consuming fish products, and the direct loss of fishing grounds or habitats

Chapter 5. Management Considerations The development of a site-specific management and monitoring plan for the FADS is critical for two reasons First, the ability to manage disposal, both spatially and temporally, is essential to minimizing adverse effects on organisms from disposal of contaminated sediments. This concern is heightened at the FADS by the proximity of harvestable fishery resources Second, the management of disposal at FADS has been an area of controversy between the Federal resource agencies and the COE for several years. This controversy should be resolved, if at all possible, by the EPA during this EIS process.

For further coordination regarding this matter, please contact Susan Mello at (617) 548-5123 For coordination relative to endangered species, please contact Tracey McKenzie at (401) 782-3200.

Sincerely,

Stanley W. Gorski
Assistant Branch Chief

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

August 9, 1988

B Higgins

Mr. William Lawless, Chief
Regulatory Branch
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

Dear Mr. Lawless:

We appreciate the opportunity to review the SAIC Physical Oceanography and Technical reports prepared for the Foul Area Disposal Site (FADS) site designation process in Massachusetts Bay. As you know, we are especially concerned that dredged material may degrade the aquatic environment and adversely affect the organisms that live there. A copy of this letter has been sent to the Environmental Protection Agency to aid them in the development of the Draft Environmental Impact Statement for the FADS.

GENERAL COMMENTS

The FADS is in a low-energy environment, but, unlike most dredged material disposal sites in the Northeast, it is in relatively deep water (90 meters). The greater water depth at FADS may encourage contaminated sediment dispersal into the water column during disposal, and preclude a successful capping program. Since the FADS is within Massachusetts Bay, where there are fish and shellfish populations, marine mammals, and endangered species, it is essential that dredged material disposal at FADS be managed to confine any adverse environmental impacts to within the authorized disposal site.

We understand that these reports are only part of the FADS documentation. However, it is essential that they provide a more comprehensive synthesis and analysis of sample results, and that they focus on significant issues. Tables and figures indicating the date, volume disposed, and specific location of disposal events since 1982 are needed to properly interpret the data. We are particularly troubled by the reinterpretation and omission of data and related discussions in the revised Physical Oceanography Report. This diminishes the credibility of the document.

SPECIFIC COMMENTS

Physical Oceanography Report

Section II.1.1., pg. 92: The discussion regarding fine silt particles remaining in suspension following disposal focuses only on suspended sediment load. However, it ignores the more significant issue of contaminants, such as PAHs and PCBs, likely to be associated with fine-grained sediments. The fate of sediment-associated contaminants that remain in the water column and are dispersed off-site merits discussion.

Section II.1.2, pp 94-95: This section emphasizes the necessity of tight navigation control during disposal for proper site management. We agree that it is "reasonable to expect that a taut-wired buoy will be deployed" and that "restriction of the disposal operation to a 50 meter radius is possible." However, tight disposal control at the FADS seems to have been a rarity, not the norm, despite the reported presence of a Corps inspector at each dumping. Information presented in DAMOS reports indicates that only the 1983 SUGAR ISLAND disposal project conformed to the strict management standards in that 90% of the disposal occurred within 50 meters of the buoy. Disposal operations from November 1985 to January 1987, 2 to 4 years after the successful SUGAR ISLAND operation, occurred as far as 300 meters from the disposal buoy (Bajek et al. 1987). More restrictive disposal positioning must be assured if containment and mitigation of disposal impacts are to be possible.

Pg. 95, last para.: The conclusions in this paragraph are different than the conclusions drawn in the earlier version of this same report based, presumably, on the same data. The earlier report indicated that, primarily due to water depth "even small amounts of material will cover the same bottom area as larger volumes. Consequently it would take essentially the same amount of material to effectively cap 10,000 m^3 of contaminated material as 100,000 m^3 . . . ." This conclusion questions the ability to routinely manage contaminated material disposal at the FADS (if the capping issue were resolved), since large volumes of clean material for capping are not readily available.

The revised version of the same paragraph concludes that improved navigation control could reduce the bottom area covered by disposal operations, and completely sidesteps the above-mentioned volume issue. Further, no data are provided to support the contention that tighter controls would lead to a smaller disposal impact area than the "DGD Buoy" 500-m radius mound.

Pg. 96, para. 1: The alternate approach for dealing with contaminated sediments outlined here, i.e., mixing and dilution of clean and contaminated sediments, post-disposal monitoring, followed by capping if unacceptable levels of bioaccumulation are discovered later, appears unrealistic, costly, and does not provide for adequate protection of marine resources. This

approach would not effectively sequester contaminants from biota, and would only seek to cap contaminated sediments after it was too late. We note that the New York Corps District's 1983 environmental impact statement that assessed dredged material disposal alternatives concluded that the mixing approach to disposal was infeasible.

Why was the last paragraph in the original version of this section, which discussed the lack of any significant substrate consolidation at FADS, deleted? Since the Section title is "Mound Formation/Substrate Consolidation," it seems an appropriate topic to be discussed here. More importantly, substrate consolidation, or the lack of it, has a bearing on in-place volume estimates at the disposal site. If substrate consolidation is minimal at FADS, Bajek et al.'s (1987) estimate of in-place volume, which assumed 22% consolidation, appears unreasonable. The conclusion that there was consensus between the estimated disposal volume and the volume detected through the REMOTS survey may be unjustified. This raises concerns that there may be a serious offsite loss of dredged materials.

Technical Report

The results of the sediment, water, and body burden analyses should be discussed with some historical perspective. For example, levels of mercury, cadmium, and PAH levels in shrimp at the Mud Reference Site were all significantly higher in January than in September 1985. What quantities and types of materials were disposed between these two sampling dates, and could they have affected the data?

It is unclear why all stations and parameters were not sampled on all sampling dates. For example, why were sediment PAH levels sampled only at the Mud Reference Site in June 1985 and not at other stations or during other sample dates? The lack of other sample points severely limits our ability to make comparisons between time periods and areas.

Section II C.2, pg. 57: We agree that additional investigation of PCBs in *Nephtys* in and around the FADS is necessary since 2 of the *Nephtys* body burden samples showed levels of 121 and 519 ppb of Aroclor 1254. However, we strongly disagree with the conclusion on pg. 61 that these levels are insignificant since they are well below the Food and Drug Administration's 2.0 ppm guidelines for edible fish and shellfish. The scientific literature indicates that the major source of PCB accumulation in natural populations of fishes is diet, and that PCBs accumulate rapidly to high tissue concentrations (NOAA/FDA/EPA 1987).

Section III A.3, pg. 104: The FADS BRAT discussion concludes, based on a single season and limited fish samples, that disposal activities have altered the benthic community, and that this alteration represents a trophic value enhancement for resident fishes, particularly juveniles. If this were true, disposal of contaminated material at FADS would create the undesirable situation where fish are attracted to, or spend more time in, areas where sediment and benthos have higher contaminant levels than surrounding areas. This "trophic value enhancement" cannot be viewed as a benefit in light of the inability to sequester contaminated sediments at the FADS, as well as the migratory nature of most consumable resources found at the FADS. If increased contact and feeding at FADS increases the probability that sediment-associated contaminants will accumulate in finfish, it will be necessary to cease disposal at the FADS.

In summary, many of the questions regarding the fate and effects of contaminated sediments disposed at the FADS remain unanswered. The data indicates that elevated levels of contaminants are present in the sediments and some resident benthic biota at the FADS. Our concerns regarding the effects and trophic transfer of these contaminants, the fate of contaminants dispersed offsite during disposal, and our ability to effectively manage disposal at FADS remain unresolved. We recommend that the noted deletions and modifications of the Physical Oceanography Report be seriously reconsidered, and that the implications of continued disposal of contaminated dredged material disposal at the FADS be fully explored. For further coordination, please contact Susan Mello at (508) 548-5123.

Sincerely,

Stanley W. Gorski

Stanley W. Gorski
Assistant Branch Chief

cf: EPA - Boston, Gwen Ruta, Ed Reiner
FWS - Concord, Ken Carr
MA CZM - Judy Pedersen
MA DMF - Leigh Bridges
F/NER745 - McKenzie

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington D C 20230

Office of the Chief Scientist

November 15, 1989

Ms. Ann Rodney
U.S. Environmental Protection Agency
Region I
J.F.Kennedy Federal Building
Boston, Massachusetts 02203-2211

Dear Ms. Rodney:

Enclosed are comments to your *Draft Environmental Impact Statement Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site*.

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

Sincerely,

David Cottingham

David Cottingham
Director
Ecology and Environmental
Conservation Office

Enclosured

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
ROCKVILLE MARYLAND 20852

NOV 13 1989

MEMORANDUM FOR: David Cottingham
Ecology and Environmental Conservation Office
Office of the Chief Scientist

FROM: Rear Admiral Wesley V. Hull, NOAA
Director, Charting and Geodetic Services

SUBJECT: DEIS 8910.11 - Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site

The subject statement has been reviewed within the areas of Charting and Geodetic Services' (C&GS) responsibility and expertise. Since safety of navigation is one of C&GS' primary concerns, this proposal was examined with that in mind and any other impact this activity may have on C&GS interests.

The disposal site is located in deep water and does not appear to pose a threat to surface navigation. Furthermore, it is already shown on NOS nautical chart 13267 and requires no further charting action.

However, C&GS feels obligated to note that the previous industrial waste site referred to in Section 1.1.1, "Site History" of the main report, also is identified as a "FOUL AREA EXPLOSIVES" on NOS chart 13267. The omission of any reference to explosives in the site history section of the report is somewhat puzzling and C&GS wonders whether it was intentional. C&GS realizes that dumping in this area has been almost continuous since the 1940's and perhaps the explosive area therefore was no longer considered to be of significance.

Should there be any need for further information about this response, please contact Mr. Erich Frey, Mapping and Charting Branch, N/CG22x2, WSC1, room 804, Nautical Charting Division, NOAA, Rockville, Maryland 20852, telephone 301-443-8742.

cc:
N/CG1x24 - Baugh
N/CG17 - Spencer
N/CG22x2 - Frey

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Region
Management Division
Habitat Conservation Branch
One Blackburn Drive
Gloucester, MA 01930-2298

November 15, 1989

Paul G. Keough
Acting Regional Administrator
U. S. Environmental Protection Agency
JFK Federal Building
Boston, MA 02203

Dear Mr. Keough:

The National Marine Fisheries Service (NMFS) has reviewed the Draft Environmental Impact Statement (DEIS) for the Massachusetts Bay Dredged Material Ocean Disposal Site (MBDS) designation. We believe that this DEIS is deficient and should be redrafted and re-released. We have previously commented to your agency and the New England Division Army Corps of Engineers regarding disposal activities at this site. Rather than restate these issues, we incorporate our previous comments by reference and have attached the pertinent correspondence.

As documented in the DEIS, Massachusetts Bay is home to populations of commercially and recreationally harvested finfish and shellfish, such as American plaice, winter flounder, witch flounder, cod, redfish, haddock, silver, red, and white hake, pollock, lobster, scallop, shrimp, and Jonah and rock crabs. Also present are endangered and threatened species, such as sea turtles, humpback, fin, and right whales, and protected species such as seals, dolphins, and other toothed whales. As the conservation and management of these fishery resources and protected species are the primary responsibilities of the NMFS, we are concerned that disposal site(s) designated for dredged material from the metropolitan Boston area provide reasonable and feasible disposal management options for handling contaminated harbor sediments. To date, disposal options which would protect these living resources, and the commercial fishing industry have been, at best limited.

The most frequently-used option for disposal of contaminated sediments from the Boston area over the past 8 years has been unconfined, and largely uncontrolled, open water disposal at the MBDS. Since contaminated sediments disposed at MBDS have not been isolated from marine organisms, bioaccumulation of contaminants and trophic transfer within the marine food chain may be occurring. The limited data collected and reported in the DEIS indicate that some benthic organisms within the disposal site have significantly

elevated levels of polychlorinated biphenyls and polyaromatic hydrocarbons in their tissues. Since, as the DEIS notes, about 80% of the fishery resources within the MBDS vicinity are demersal, we believe that there is unacceptable potential for contaminant transfer to commercially harvested species from direct sediment contact and dietary uptake. In this regard, it is particularly disturbing that the DEIS indicates that the quality of some sediments at the MBDS is similar to sediments in Quincy Bay, an area for which the Environmental Protection Agency has issued warnings regarding fish consumption. NOAA and FDA have been obligated to take similar actions at the MBDS. These were described in the January 3, 1980 Federal Register. It is unfortunate that the ramifications of those Federal actions are not fully discussed in the DEIS. We have repeatedly expressed concern, during the review of individual disposal permit applications and throughout the designation process, about the adverse effects that disposal practices at MBDS could have on fishery resources. These concerns continue to be ignored.

The lack of suitable, resource-protective options for contaminated dredged material disposal has been a major source of contention among the federal resource agencies (NMFS, U.S. Fish and Wildlife Service, and EPA) and the Corps of Engineers during individual permit review. Regrettably, the DEIS does not resolve this controversy and needs to investigate alternatives. The major conclusion of the DEIS is that the status quo is the only solution. It does not explore suitable alternatives nor does it address the significantly elevated levels of contaminants in both surficial sediments and organisms at MBDS. The DEIS does not identify nor discuss any other disposal sites, despite the noted limitations of the MBDS, the presence of other historically-used disposal sites within the MBDS vicinity, and the identification of potential sites by the Third Harbor Tunnel Project and the Massachusetts Office of Coastal Zone Management. In this respect, we believe that the DEIS fails to meet the minimum requirements of the National Environmental Policy Act (NEPA).

In fact, we consider this designation process to be similar to that used by the Army Corps of Engineers (ACOE) in its designation of the Western Long Island Sound Disposal Site (WLIS XII). In a recent court decision, Huntington v. Marsh, (869 F.2d 1134, 2d Cir. 1988) the 2d Circuit Court affirmed the Federal District Court's decision that the EIS for WLIS designation was inadequate under NEPA, in part, because it failed to address alternatives to the site. The Court required the ACOE to redraft the EIS. Specifically, the decision requires the ACOE to evaluate the availability of alternatives to ocean disposal, including upland disposal sites and remedial measures to reduce the need for dredging. The EPA should accept the clear precedent established by this case and apply it to the alternatives investigation for the MBDS.

NMFS expected that EPA would use the designation opportunity to seek environmentally acceptable solutions to the dredged material disposal problems of the Boston area. Instead, the EPA defers resolution of these problems to other entities. Specifically, the DEIS suggests that the analysis of disposal alternatives should be conducted at the individual permit review stage, and that the ability to manage and cap contaminated sediments will be assessed in the future, as will be the appropriateness of the reference site for dredged material testing. We and other resource agencies have been seeking resolution of these issues which have been unresolved for the past 8 years. Our experience has been that the individual permit review process does not lend itself to resolution of these management issues. As evidence of this, the MBDS remains the option of choice for contaminated dredged material from the Boston area, despite indications that Massachusetts Bay is being degraded and that the state is embarking on a multi-billion dollar effort to clean up inner Massachusetts Bay. The DEIS indicates to us that we are justified in our concerns for harm to occur to living marine resources from disposal practices at MBDS.

The DEIS lacks any sufficient plan or strategy to effectively manage the MBDS. In a recent occurrence, the fishing boat "ITALIA" hauled up four barrels of highly acidic material in the vicinity of the MBDS. One of the barrels broke through the net and spilled its content on the deck. At the Coast Guard hearing it was evident that this was not an isolated incident. In fact, it seems to happen more often than not. The DEIS only notes that the MBDS was an industrial waste site pre - 1976. Because of the frequent occurrence and high potential for fishermen to pick up industrial waste a more detailed discussion is warranted in the DEIS. This discussion should concern: the type of materials disposed at this site; the exposed nature of this material; the potential for fishermen to continue to haul this material aboard their vessels; the potential health hazards to the public; and the potential impacts to marine resources. We suggest exploration of methods in which suitable dredged material(s) would be used to isolate the industrial wastes and reduce the Public risks associated with this area of the Bay.

The DEIS lacks a substantive discussion of the Stellwagen Bank area becoming a National Marine Sanctuary. As you are aware, a portion of the MBDS is within the boundaries of the proposed Stellwagen Bank Sanctuary. If this site becomes a marine sanctuary it is possible that disposal activities at the MBDS will be restricted. The DEIS must discuss this option in detail.

Finally, we have received your November 6, 1989, request for concurrence with your determination that the MBDS designation is not likely to adversely affect endangered species pursuant to Section 7 of the Endangered Species Act, as amended. We have not had time to fully analyze the basis for your conclusion. The NMFS, in response to an ACOE request for formal consultation has drafted

a biological opinion that tentatively concludes that use of the site for the projects specified by the Corps is not likely to jeopardize the continued existence of any endangered or threatened species under our purview. Certain conservation recommendations are being developed in the ACOE opinion that apply to activities at the MBDS, and should be considered in your Section 7 consultation. To expedite these conclusions, we urge you to join the ACOE efforts and conduct a joint Section 7 consultation. To facilitate this, please contact Doug Beach at (508) 281- 9254.

In conclusion, we find that the DEIS for this project fails to meet the minimum requirements of the NEPA. In light of this, we believe that the document should be redrafted and re-submitted as a DEIS. The redraft should include a thorough review of alternative disposal options, conduct a risk assessment, address cumulative effects of other actions within the MBDS, and investigate possible remediation of existing MBDS conditions.

It is also important to note for the record that the public hearing conducted on the final designation of the MBDS is open to challenge on the issue of sufficient public access. The meeting was held on November 1, 1989, at the Transportation Building in Cambridge, Massachusetts, at 7:00 p.m. The parking lot adjacent to the facility was chained prior to 7:00 p.m. The front doors to the Transportation Building were closed and locked at 6:30 p.m. No signs were posted in the lobby directing attendees to another entrance, or to the appropriate floor and room number. Anyone arriving after 6:30 p.m. would have had to know about rear entrances to the building and parking lot in order to find his or her way to the public meeting.

Sincerely,

Thomas E. Bigford

Thomas E. Bigford
Branch Chief

Attachments

I. General NEPA Comments

At Chapter 1.1, Purpose (p. 1), EPA states "the purpose of the Draft Environmental Impact Statement ("DEIS") is to present information which will be used to determine whether to continue use of the Massachusetts Bay Disposal Site ("MBDS"), formerly the Foul Area Disposal Site, for ocean disposal of dredged material." In the same paragraph, EPA states that Section (1)(d)(2) of a 1974 EPA policy statement regarding environmental impact statements specifies that EIS's must be prepared in connection with ocean disposal site designations under the Marine Protection, Research, and Sanctuaries Act ("MPRSA").

Later, at Chapter 1.2 Need for Action (p. 7), the DEIS notes that: "final designation of the MBDS as a permanent Ocean Dredged Material Disposal Site ("ODMDS") would provide a site of suitable size to accommodate the regional disposal needs of areas from Gloucester to Plymouth, Massachusetts and other areas where use of the site is economically feasible and environmentally acceptable."

From these statements, it is unclear whether EPA is proposing to evaluate the continued use of the Massachusetts Bay Disposal Site as an interim dredged material disposal site (as document titles imply), or is proposing to designate MBDS a permanent ocean disposal site, pursuant to Section 102(c) of MPRSA and Ocean Dumping Regulations at 40 CFR Section 228.5.

The proposed action should be clearly identified in this section of the document. Otherwise, correct inference of EPA's intended action is difficult. Additionally, the document should indicate whether an environmental impact statement was prepared when EPA granted interim site designation status for MBDS (or Foul Area Disposal Site) in 1977. If so, reference in the present document to such impact statement would be useful to the reviewing public.

Chapter 2, Alternatives Including the Proposed Action, at page 11, does not discuss alternatives to the designation of MBDS as a permanent disposal site. EPA makes clear that proposed individual disposal events must undergo an analysis of location and method alternatives prior to receiving permit approval. Regarding the designation of MBDS itself, however, EPA states that Ocean Dumping Regulations at 40 CFR Section 228.5(e) require the agency to, whenever feasible, designate sites that have been historically used. Therefore, the DEIS document purports to examine the "feasibility" of continued use of the MBDS; it does not examine alternatives to this continued use. Moreover, EPA states: "Only if this study shows that the existing site is not suitable for continued use will other sites in the area be investigated for potential designation." (p. 12). This statement clearly contradicts NEPA regulations at 40 CFR Sections 1502.1 and 1502.14, which requires in particular that the DEIS "rigorously explore and objectively evaluate all

reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."

Recommendations. NOAA recommends that EPA prepare a supplemental draft environmental impact statement which fully considers and discusses alternatives to the proposed action.

Among the alternatives, the supplemental DEIS should consider establishing boundaries for a dredged material disposal site that coincide with the previously-used "industrial waste" disposal site, located one nautical mile west of the currently-proposed MBDS. The current DEIS document does not discuss the reasons for moving the disposal site marker "A" buoy, which was present from August 1963 through January 29, 1975. EPA should consider the feasibility of future consolidation of disposed materials at one site, rather than prolonging the expansion of the area over which these materials are disposed. Consolidation may provide benefits in terms of "capping" the previous industrial waste disposal site, and may also avoid the possible direct conflict with national marine sanctuary boundaries which will likely be established within the next year.

II. Relationship of the Massachusetts Bay Disposal Site Project to the National Marine Sanctuary Program (Title III, Marine Protection, Research, and Sanctuaries Act of 1972)

The following section discusses the relationship between Titles III and I of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended.

A. Authority. Title III establishes the National Marine Sanctuary Program (NMSP), whose mission is "to identify, designate and manage areas of the marine environment of special national significance due to their conservation, recreational, ecological, historical, research, educational, or esthetic qualities." (15 CFR Section 922.1(a)). To achieve this mission, the goals of National Marine Sanctuaries are to:

1) provide enhanced resource protection through comprehensive and coordinated conservation and management that complements existing regulatory authorities;

2) support, promote, and coordinate scientific research on, and monitoring of, site-specific marine resources;

3) enhance public awareness, understanding, appreciation and wise use of the marine environment; and

4) facilitate multiple uses, to the extent compatible with the primary objective of resource protection.

A primary factor evaluated during consideration of Sanctuary boundaries is adequate protection of the system's resources. Within the context of ensuring the comprehensive and coordinated conservation and management referenced above, Title III (Section 304(c)) and implementing regulations (15 CFR Section 922.11) authorize the Secretary of Commerce to regulate, consistent with the purposes for which the Sanctuary was designated, the exercise of leases, permits, licenses, or rights of access or subsistence use in existence at the time of the Sanctuary's designation. Further, Title III allows the Secretary to assess civil penalties for violations of Sanctuary regulations, including prohibitory regulations.

NOAA may also designate, as part of a Sanctuary, "buffer zones" surrounding especially sensitive areas, to further ensure system protection. With reference to the proposed MBDS, and in anticipation of the Congressionally-mandated NEPA process for the Stellwagen Bank National Marine Sanctuary, NOAA recommends that the boundaries of the two projects not overlap, and that a "buffer zone" between sites be established, in the event that dredged material disposal activities continue at MBDS.

NOAA also notes the use of "reference sediment" by EPA and the Corps of Engineers for comparison with test sediment. The reference site currently used for testing (as well as sites "A" and "C", noted in Figure 5-2, p. 220), occurs within the study area for the proposed Sanctuary. If final Sanctuary boundaries encompass these areas, then sediment removal activities may also be subject to regulation or prohibition under Title III of MPRSA.

Attachments

designation in the Federal Register; this notice shall include the text of the final implementing regulations and shall also advise the public of the availability of the *final* management plan and the final EIS

(b) The designation and regulations shall become final and take effect after the close of a review period of forty five (45) days of continuous session of Congress, computed in accordance with section 304(b)(4) of the Act, beginning on the date of publication of the Federal Register notice in paragraph (a) of this section unless

(1) The designation or any of its terms is disapproved by enactment of a joint resolution of disapproval consistent with section 304(b)(3) of the Act, or

(2) In the case of a national marine sanctuary that is located partially or entirely within the seaward boundary of any state, the Governor(s) of the affected state(s) certifies to the Secretary that the designation or any of its terms is unacceptable, in which case the designation or the unacceptable term shall not take effect in the area of the sanctuary lying within the seaward boundary of the state(s)

(c) If the Secretary determines that the actions in paragraph (b) of this section affect the sanctuary designation in a manner that sanctuary goals and objectives *cannot be fulfilled, the* Secretary may withdraw the entire designation If the Secretary does not withdraw the designation, only those terms of the designation not disapproved under paragraph (b)(1) of this section or not certified under paragraph (b)(2) of this section shall take effect

§ 922.35 Coordination with States.

(a) The Secretary shall consult and cooperate with affected states throughout the national marine sanctuary designation process In particular the Secretary shall

(1) Consult with the relevant state officials prior to selecting any site on the SEL as an Active Candidate pursuant to § 922 30, *especially concerning the* relationship of any site to state waters and the consistency of the proposed designation with a federally approved state coastal zone management program For the purposes of a consistency review by states with a federally approved coastal zone management programs, designation of a national marine sanctuary is deemed to be a Federal activity which, if directly *affecting the state's coastal zone, must* be undertaken in a manner consistent to the maximum extent practicable with the approved state coastal zone program as provided by section 307(c)(1) of the *Coastal Zone Management Act of 1972,* as amended, and implementing regulations at 15 CFR Part 930, Subpart C

(2) Ensure that relevant state agencies are consulted prior to holding any public hearings pursuant to § 922.31(i)(2)

(3) Provide the Governor an opportunity to certify the designation or any of its terms as unacceptable as specified in § 922.34(b)(2)

Subpart D—Implementation After Designation

§ 922 40 General.

(a) The Secretary shall implement the management plan, and applicable regulations, including carrying out *surveillance and enforcement activities,* and conducting such research and education as are necessary and reasonable to carry out the purposes and policies of the Act.

(b) Consistent with the sanctuary management plan, the Secretary shall develop and implement a site specific contingency and emergency-response plan designed to protect the sanctuary resources The plan shall contain alert procedures and actions to be taken in the event of an emergency such as a shipwreck or an oil spill

(c) Where essential to prevent *immediate, serious and irreversible* damage to sanctuary resources, activities including those not listed in the designation may be regulated within the limits of the Act on an emergency basis for an interim period not to exceed one hundred and twenty (120) days, during which time an appropriate amendment of the terms of the designation shall be sought by the Secretary

(d) Every five years, or sooner, the Secretary shall evaluate the substantive progress toward implementing the management plan and the goals of a *designated sanctuary, especially* the effectiveness of site specific management techniques

§ 922 41 *Enforcement procedures.*

The consolidated civil procedure regulations, set forth at 15 CFR Part 904, shall apply to all enforcement matters under the Act.

Appendix 2 to Part 922—National Marine Sanctuary Program Site Identification and *Selection Criteria for Marine Areas with* Qualities of Special National Significance

Background

The Site Evaluation List (SEL) was established in 1983 (48 FR 33568, August 4, 1983) Only sites on the SEL may be considered by the Secretary for subsequent review as "Active Candidates" for designation

The original SEL was based on the then existing Marine Research, Protection, and Sanctuaries Act, which provided that national marine sanctuaries could be designated for their conservation, recreational ecological or esthetic values It consisted of twenty nine (29) marine sites with high natural resource values identified and recommended *for inclusion on the SEL* by regional resource evaluation teams in accordance with the National Marine Sanctuary Program s mission and goals and *then existent site identification and selection* criteria (48 FR 24290, May 31, 1983) The Marine Sanctuaries Amendments of 1984 (Pub L No 98-498) amended the Act to add additional qualities—historical research or education—which must also be considered when selecting sanctuary sites

Areas of nationally significant research and educational qualities were considered in establishing the original SEL These qualities are inherent in sites possessing significant conservation, recreational, ecological, or esthetic value Therefore, additional areas of significant research and educational values will not be reconsidered at this time, except as provided in § 922.21 of the regulations

Sites possessing nationally significant historical resources were not specifically considered when establishing the original SEL There are no historical sites on the SEL The existing SEL now needs to be amended to add areas of the marine environment possessing historical qualities of special national significance Thus the existing site identification and selection criteria have been amended to incorporate more specific criteria to identify and select areas of the marine environment possessing historical qualities of special national significance

Site Identification and Selection Criteria

The following criteria are grouped into four categories (1) Natural resource values (2) human use/historical resource values, (3) potential activity impacts; and (4) management concerns The criteria under each category reflect concerns significant to *the National Marine Sanctuary Program* and are designed to ensure that sites recommended to NOAA for SEL consideration have high natural resource and *human resource values*

In selecting sites for the SEL, NOAA also considers the extent information on the site is available, existing and potential activity impacts and *management concerns* (as presented in sections III and IV, below). NOAA s selection of sites for the SEL is only the first of several determinations before *sanctuary designation or subsequent* rejection of the site as not qualified for sanctuary status

At the SEL stage NOAA s prime focus is on the site s natural resource and *human use/* historical resource values The presence of such high values is a requisite or "minimum" requirement for NOAA s further consideration since the Marine Protection, Research, and Sanctuaries Act emphasizes the protection and management of marine areas which are of special national significance based on the site s conservation, recreational ecological, historical, research

educational or esthetic qualities Other more specific issues are factored into NOAA's decision whether to select a site as an Active Candidate (see Subpart C of the regulations)

To determine if an area possesses historical values of special national significance and otherwise meets the Sanctuary designation standards specified in Section 303 of the Act, certain definitions and criteria are included in this appendix (see II F) for use in evaluating these potential sites for listing on the SEL in accordance with § 922.22 of the regulations

I Natural Resource Values

A. Subregional Representation

The area under consideration is representative of the biogeographic subregion in which it is located

Examples This criterion would apply to an area containing species assemblages which are especially characteristic of the Oregonian subregion of the British Columbian region Another example would be an area *containing species assemblages* which are especially characteristic of the Floridian or American Atlantic Antillean subregion of the West Indian region

B Community Representation

The area under consideration is significant in relation to the ecological communities which are found within the specified habitat type or within the biogeographic region or subregion (i e on a macroscale, communities as assemblages of species populations within a prescribed area or habitat)

Examples (1) The wide spectrum of marine habitats in the Channel Islands National Marine Sanctuary in California created by accentuated bottom relief, varied bottom substrates and gradation in water depth from island shorelines to deep coastal basins support a variety of ecological communities

(2) Coral reef, grass bed soft bottom, and open bay habitat areas in the Key Largo National Marine Sanctuary support a variety of ecological communities associated with the east Florida reef tract

C. Biological Productivity

The area under consideration is significant in relation to its level of primary and/or secondary production.

Examples (1) East Breaks at the edge of the continental shelf off Corpus Christi, Texas is characterized by intense local upwelling, high primary productivity, and exceptional fish production

(2) In the Gray's Reef National Marine Sanctuary much production may be imported outcroppings of limestone rocks may serve to entrap, conserve, and circulate detritus and plankton which provides energy *sources for reef invertebrates*, which in turn support marine fisheries and sea turtles

(3) In the Channel Islands National Marine Sanctuary, the cold waters of the California current flowing south meet the warm waters of the *California Counter Current flowing* north to create upwellings of cold nutrient rich waters that enhance the biological productivity of the area

Note This example also meets Criterion I F

(4) In many cases coral reefs are not only energetically self sustaining (i e they produce locally enough food to support the community), but they are also specifically organized to entrap, hoard, and recycle materials received from the surrounding waters (i e products that are imported and conserved)

D Biotic Character/Species Representation

The area under consideration is of special interest because it supports

(1) Ecologically limited species

(2) Ecologically important species or

(3) Unique species associations or biological assemblages

Examples (1) This criterion would apply to marine habitat areas upon which ecologically limited species (e g threatened endangered rare, depleted endemic, or peripheral species) are dependent during all or part of their lives

(2) This criterion would apply to marine areas containing species which contribute in a significant way to the maintenance of a specified ecosystem found in the region or subregion, such as the Channel Islands Marine Sanctuary, which supports one of the most varied assemblages of marine mammals and seabirds in the world

(3) The waters of Point Lobos California support a unique assemblage of kelp sea urchin abalone, and sea otters

(4) Submarine canyons support unusual biological communities of soft corals crustaceans and fish and are known as "pueblo villages"

(5) This criterion would also apply to wide sandy bottom areas which are characterized by low productivity but unique species composition, such as certain areas off central *Texas*

E. Species Maintenance

The area under consideration is important to life history activities including special feeding, courtship breeding birthing/nursery resting/wintering and migration areas

Examples (1) The waters off Point Reyes and the Farallon Islands provide deep and shallow water feeding areas for a wide variety of marine organisms including seabirds, marine mammals, and marine fisheries The Farallon Islands support the largest seabird rookeries in the contiguous United States and are used, along with the *mainland* by California sea lions harbor seals, and elephant seals for hauling out and pupping purposes Whales including several endangered species and porpoise pass through the sanctuary on annual migrations

(2) *The waters around certain Hawaiian* Islands are important wintering birthing/nursery and perhaps courtship/breeding areas for endangered whales

(3) Spiny lobster migration routes off Florida are important for the "off shelf" movement of this species

(4) The mouth of the Mississippi River is an important brown shrimp over wintering ground

F Ecosystem Structure/Habitat Features

The area under consideration is characterized by special chemical, physical, and/or geological habitat features

Examples (1) The Florida Middle Grounds on the Gulf of Mexico continental shelf represent an unusual geological formation—a drowned *Pleistocene reef—which supports* rich and diverse reef communities

(2) Transition zones occur where two different marine systems converge—such as at coastal/marine system interfaces shelf/slope interfaces soft bottom/hard bottom ecotones or cold water/warm water current convergence zone These areas of mixing often have unique physical and ecological characteristics high production, and species diversity/population densities which are often greater than in areas flanking them For example a transition zone is formed near Cape Hatteras where cold northern waters of the Labrador Current mix with warm water eddies of the Gulf Stream/Florida Current and as a result northern and southern species mix and co exist with species endemic to the area

Note —This example also meets Criterion I C.

(3) Easternmost coastal areas of Maine—with unique bay heads and rocky coasts varied substrates derived from glacial materials extensive sub fjord character and numerous offshore islands—are matched by few areas in the world in habitat types and species diversity

II Human Use/Historical Resource Values

A. Fishery Resources of Recreational Importance

The area under consideration contains fish *and shellfish species species groups (e.g.* snapper grouper complex), or fishery habitats which are important to the recreational fishing industry/community and for which conservation and management are in the public interest.

B Fishery Resources of Commercial Importance

The area under consideration contains fish *and shellfish species species groups (e g.* snapper grouper complex) or fishery habitats which are important to the commercial fishing industry and for which conservation and management are in the public interest.

C Ecological/Esthetic Resources of Importance for Recreational Activities Other Than Fishing

The area under consideration contains *exceptional natural resources* and features which, because of their importance to nature watching and other nonconsumptive recreational activities enhance human appreciation understanding, and enjoyment of nature

Examples (1) Rocky shorelines shallow nearshore waters, and intertidal pools in the Channel Islands and Gulf of the Farallones National Marine Sanctuaries have rich and varied plant and animal life which attract many persons interested in photography and nature study

(2) The prominent topography around the Channel Islands and Gulf of the Farallones National Marine Sanctuaries provides outstanding ocean vistas

(3) The spectacular spur and groove coral reef formation in the Looe Key National *Marine Sanctuary attracts* SCUBA *and* snorkeling enthusiasts from all [illegible] the world

(4) The waters off Maui, Hawaii, are popular for humpback whale watching.

D Research Opportunity

The area under consideration provides exceptional opportunities for research in marine science and resource management.

Examples (1) The Gray's Reef National Marine Sanctuary serves as a natural laboratory or control area for research in live bottom ecology

(2) The Key Largo National Marine Sanctuary is amenable to onsite research activities for many reasons, including the diversity of resources available, the past history of scientific research and education in the area, the compatibility with similar research efforts in adjacent John Pennekamp State Park and Biscayne National Park, and the *proximity of the site to user groups. In* addition, the Carysfort Reef Lighthouse provides a unique research base from which to launch studies concerning the sanctuary environment.

(3) The *Channel Islands National Marine* Sanctuary offers a special opportunity to coordinate research with the Channel Islands National Park. Such coordination will contribute to a better scientific understanding *of the marine* environment and to more effective management by answering questions such as those related to development and use of marine resources.

E. Interpretive Opportunity

The area under consideration provides an excellent opportunity to interpret the meanings and relationships of special marine resources in order to enhance general *understanding, appreciation*, and wise use of the marine environment.

Examples. (1) Through a variety of interpretive media, including aquaria displays narrated slide shows and glassbottom boat tours a visitor to the Key Largo National Marine Sanctuary is exposed to a variety of marine and coastal ecosystems including open ocean, fringing coral reefs, patch reefs, mangroves, open bay, *and barrier islands*

(2) The Channel Islands National Marine Sanctuary provides an exceptional opportunity to interpret marine and insular ecosystem features through the use of various interpretive "hands on" techniques that go beyond traditional educational tools such as brochures and pamphlets.

F Historical, Cultural, Archeological or *Paleontological Significance*

The area under consideration contains (or is likely to contain) historical resources of special national significance.

Definitions

The term "historical" as defined in § 922.2(c) means possessing historical, cultural, archeological or paleontological significance, including sites, structures, districts and objects significantly associated with or representative of earlier people, cultures and human activities and events. The term is used in the broad sense to refer *to both pre-historic and historic periods*, to the anthropological concept of culture, and to the processes events places and objects related to the human past The phrase "special national significance" in the context of historical areas denotes those areas with historical values of unique national significance and which are illustrative of the *nation's maritime heritage*

Criteria for Identification and Selection

The site identification criteria to be used by the Marine Historical Resource Evaluation *Team to make its recommendation to the* Secretary and the criteria to be used by the Secretary for selection of recommended sites for inclusion on the SEL are the same.

To qualify for recommendation to the *Secretary and for selection for listing* on the SEL because of a site's historical values, a site must have special national significance within the meaning set forth below in paragraphs (1) and (2) and meet the *programmatic requirements set forth in* paragraph (3), to determining whether a site has special national significance, the site's contribution to the historical resources already represented in the National Marine *Sanctuary Program, if any, shall also be* considered.

(1) *Determination of Significance*—The National Historic Landmark (NHL) Program (36 CFR Part 65), administered by the *Department of the Interior, focuses attention* on properties of exceptional value to the nation as a whole. It is the Federal means of weighing the national significance of historical resources. Properties designated as *NHLs* that are not already listed on the National Register of Historic Places are automatically listed there. In addition to adding historical units to the National Park System, NHL designation is a prerequisite for determining the eligibility of historical resources for nomination to the World Heritage List.

Consistent with the Marine Research, Protection, and Sanctuaries Act directive that the management of special marine areas complement existing regulatory authorities to the extent practicable, the criteria for nomination as a NHL shall be used as the first step in evaluating the historical, cultural, archeological or paleontological significance of a marine resource (See Table 1) Sites of national significance demonstrated by their designation as NHLs, or considered in consultation with the Department of the Interior and other appropriate authorities as meeting the NHL criteria, shall be further evaluated for recommendation for selection and evaluation for addition on the SEL, in accordance with paragraphs (2) and (3), below Sites within the jurisdiction of the United States which have international significance as determined by the criteria for nomination to the World Heritage List shall also be evaluated (See Table 2).

(2) *Determination of Representative Distribution*—In addition to having national significance, a site, in order to be recommended or selected, must complement *or contribute to the desired range of* historical resources of the National Marine Sanctuary Program Consistent with the Program's mission and goals set forth in § 922.1 of the regulations, sites recommended *or selected for historical qualities must be* illustrative of the nation's maritime heritage and representative of the nation's most significant historical marine resources.

(3) *Additional Programmatic Requirements*—In addition to having special national significance to qualify for recommendation and selection *for addition to* the SEL, coordinated and comprehensive conservation and management of the site including: (a) resource protection; (b) scientific research and monitoring; and (c) public education must be *necessary in order* to derive maximum present and future public benefit from the site's resources Designation of a site as a National Marine Sanctuary must also complement existing regulatory *authorities and improve the protection and* preservation of the site's resources.

Additional Factors in Site Identification and Selection

III Potential Activity Impacts

Many marine areas are subject to human use, some of which bring adverse pressures to bear on the natural resources Where applicable, initial identification of potential marine sanctuary areas includes a summary of existing and potential human activities in these areas as well as a preliminary assessment of environmental impacts. To the extent such information is available, NOAA's selection of sites for the SEL will consider impacts of human activities on the area's *natural resource and human use values*, as well as the impacts of site selection on human activities already taking place within the site.

IV Management Concerns

A. Relationship to Other Programs

While some sanctuaries may be designed to protect resources not currently managed by other existing programs (*e.g.*, the *U.S.S. MONITOR* on the continental shelf off North Carolina), most recommendations involved cooperation with some other Federal, State, local agency or organization. *The ability of* existing regulatory mechanisms to protect the values of the area and the contribution of the National Marine Sanctuary Program to that existing management effort may be an *important factor in selecting sanctuary* candidates. Depending on the location, the resource, and the existing system, national marine sanctuary designation could either complement the status quo by filling specific gaps or form a management umbrella over a fragmented system to help coordinate and strengthen diverse, but related efforts. At different sites NOAA may work to complement other programs' efforts such as national estuarine research reserves, national parks, wildlife refuges or state preserves, among others. There may be instances where NOAA's primary contribution to protection of special *marine areas will be in the form of* enhanced public awareness through interpretive and research programs.

B. Management of a Conservation Unit

Optimum size of a marine sanctuary is an issue to be considered in potential sanctuary sites. The size or extent of a marine sanctuary should be a cohesive conservation

unit amenable to effective management given fiscal and staff constraints of the managing entities.

C. Accessibility

Since national marine sanctuaries are to be readily available for public use, when use is compatible with the sanctuary's goals and objectives, consideration should be given to factors which limit or enhance public access to a particular site.

D. Surveillance and Enforcement

Another issue to be considered when evaluating a potential sanctuary site is the degree to which the area lends itself to adequate enforcement and surveillance and the capabilities of responsible agents (*e.g.*, U.S. Coast Guard, state law enforcement divisions, or the like). This depends on the location, its size, and the types of resources involved. Consideration is also given to: (1) Degree of surveillance/enforcement presence needed in the area—light, medium, or heavy; (2) schedule—routine, prescribed, or case-by-case basis; and (3) logistics—vessels, aircraft, personnel, equipment, and budgetary requirements.

E. Economic Considerations

The designation of a national marine sanctuary may have economic effects at both local and national levels. Prior to the development of a management plan for a particular site which describes the uses and activities which may take place within a sanctuary, it is difficult to calculate fully the economic impact of sanctuary designation. It is also difficult to determine, at the SEL stage, the economic benefits of the sanctuary to society as a whole based on such considerations as public use, and research and interpretive values which will also be fully described in a management plan. Sanctuary designation may, in some cases, enhance economic value by ensuring long-term protection for commercially significant resources, such as commercial or recreational fish stocks, vital habitats, and resources which generate tourism. Conversely, a designated marine sanctuary may have negative economic impacts if management regulations unduly restrict commercial activities.

To the extent feasible, a decision to include a proposed site on the SEL will take into consideration the economic effects of sanctuary designation. As consideration of a particular site progresses through the designation process, more information will be developed and analyzed concerning the economic effects of sancturay designation.

Table 1.—National Historic Landmarks Program Selection Criteria (36 CFR 65.4)

Specific Criteria of National Significance: The quality of national significance is ascribed to districts, sites, buildings, structures and objects that possess exceptional value or quality in illustrating or interpreting the heritage of the United States in history, architecture, archeology, engineering and culture and that possess a high degree of integrity of location, design, setting, materials, workmanship, feeling and association, and:

(1) That are associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained; or

(2) That are associated importanily with the lives of persons nationally significant in the history of the United States; or

(3) That represent some great idea or ideal of the American people; or

(4) That embody the distinguishing characteristics of an architectural type specimen exceptionally valuable for a study of a period, style or method of construction or that represent a significant, distinctive and exceptional entity whose components may lack individual distinction; or

(5) That are composed of integral parts of the environment not sufficiently significant by reason of historical association or artistic merit to warrant individual recognition but collectively compose an entity of exceptional historical or artistic significance, or outstandingly commemorate or illustrate a way of life or culture; or

(6) That have yielded or may be likely to yield information of major scientific importance by revealing new cultures, or by shedding light upon periods of occupation over large areas of the United States. Such sites are those which have yielded, or which may reasonably be expected to yield, data affecting theories, concepts and ideas to a major degree.

Ordinarily, cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings and properties that have achieved significance within the past 50 years are not eligible for designation. Such properties, however, will qualify if they fall within the following categories

(1) A religious property deriving its primary national significance from architectural or artistic distinction or historical importance; or

(2) A building or structure removed from its original location but which is nationally significant primarily for its architectural merit, or for association with persons or events of transcendent importance in the nation's history and the association consequential, or

(3) A site of a building or structure no longer standing but the person or even associated with it is of transcendent importance in the nation's history and the association consequential, or

(4) A birthplace, grave or burial if it is of a historical figure of transcendent national significance and no other appropriate site, building or structure directly associated with the productive life of that person exists; or

(5) A cemetery that derives its primary national significance from graves if persons of transcendent importance, or from an exceptionally distinctive design or from an exceptionally significant event; or

(6) A reconstructed building or ensemble of buildings of extraordinary national significance when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other buildings or structures with the same association have survived; or

(7) A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own national historical significance; or

(8) A property achieving national significance within the past 50 years if it is of extraordinary national importance.

Table 2.—Criteria for Inclusion of Cultural Properties on the World Heritage List

(1) A monument, group of buildings or site which have been nominated for inclusion on the World Heritage List will be considered to be of outstanding universal value for the purposes of the World Heritage Convention when the World Heritage Committee finds that it meets one or more of the following criteria and the test of authenticity. Each properly nominated should therefore:

(i) Represent a unique artistic achievement, a masterpiece of the creative genius; or

(ii) Have exerted great influence, over a span of time or within a cultural area of the world, on developments in architecture, monumental arts or townplanning and landscaping; or

(iii) Bear a unique or at least exceptional testimony to a civilization which has disappeared; or

(iv) Be an outstanding example of a type of structure which illustrates a significant stage in history; or

(v) Be an outstanding example of a traditional human settlement which is representative of a culture and which has become vulnerable under the impact of irreversible change; or

(vi) Be directly or tangibly associated with events or with ideas or beliefs of outstanding universal significance. (The Committee considered that this criterion should justify inclusion in the List only in exceptional circumstances or in conjunction with other criteria). and

In addition, the property must meet the test of authenticity in design, materials, workmanship, or setting

(2) The following additional factors will be kept in mind by the Committee in deciding on the eligibility of a cultural property for inclusion on the List:

(i) The state of preservation of the property should be evaluated relatively, that is, it should be compared with that of other property of the same type dating from the same period, both inside and outside the country's borders; and

(ii) Nominations of immovable property which is likely to become movable will not be considered.

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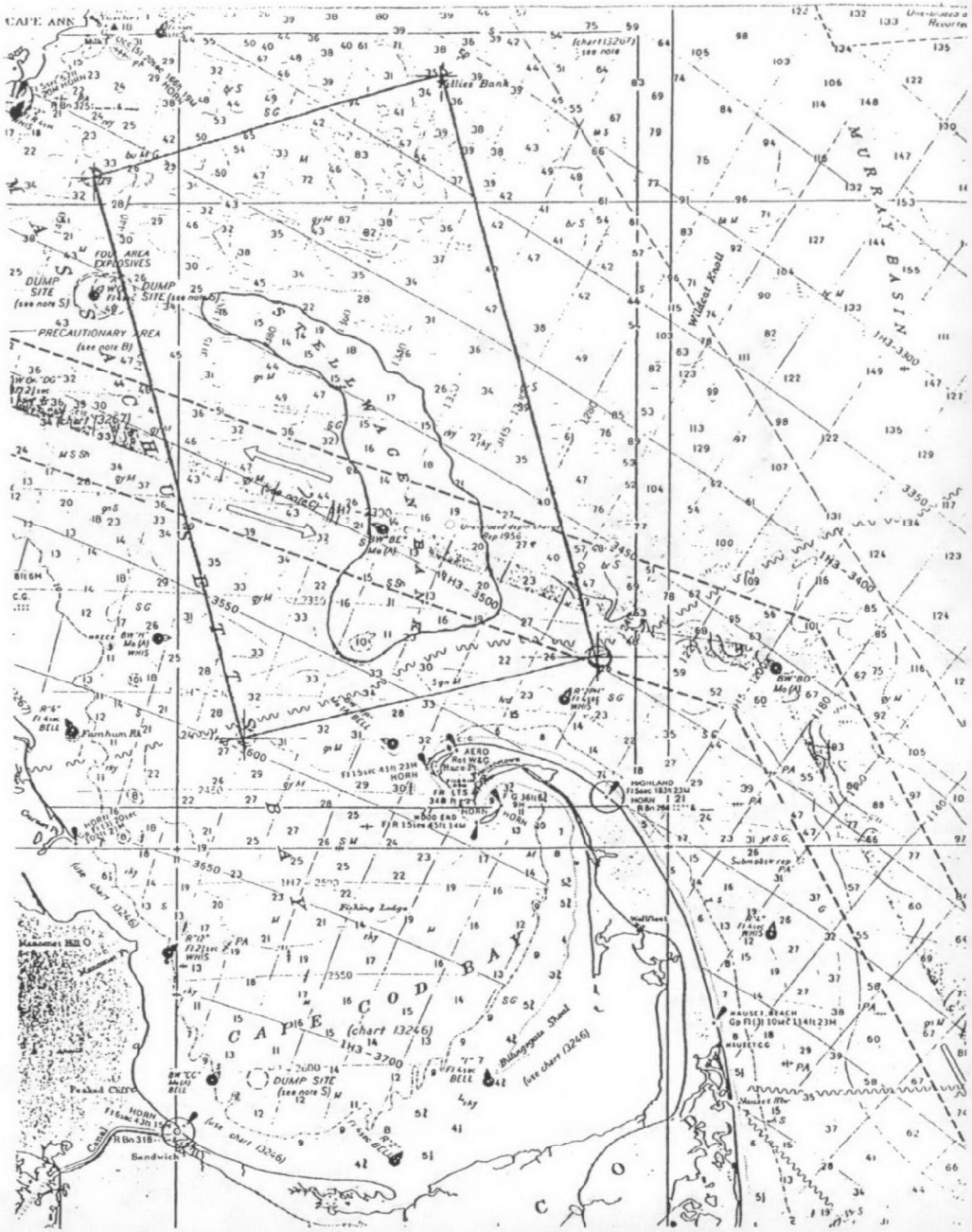

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
Washington, D.C. 20235
Marine and Estuarine Management Division

AUG 13 1990

Ms. Kymberlee Keckler
U.S. EPA, Region I
WQE-1900C
JFK Federal Building
Boston, MA 02203

RE: Supplemental Draft Environmental Impact Statement for the Designation of Dredged Material Disposal Site in Massachusetts Bay: Alternative Site Screening (July 1990)

Dear Ms. Keckler:

The Marine and Estuarine Management Division (MEMD), within the Office of Ocean and Coastal Resource Management, has reviewed the above-referenced document, with particular regard to the proposed action's effects on the designation and management of the proposed Stellwagen Bank National Marine Sanctuary (SBNMS), also located in Massachusetts Bay.

As you are aware, the initially-proposed MBDS overlapped slightly with the study area for the proposed Stellwagen Bank National Marine Sanctuary. MEMD commented in November 1989 that EPA should consider alternative sites for the proposed MBDS, including the alternative of moving the proposed MBDS one nautical mile to the west, to coincide with the previously-used industrial waste disposal site.

The advantages of this particular alternative include the defacto "capping" of previously-disposed industrial materials with dredged materials, thereby possibly reducing potential "drift" or uptake by living resources; and the elimination of disposal activities from within the boundaries of a National Marine Sanctuary. MEMD is pleased to learn of EPA's revised preferred boundary alternative (as discussed on page 34), which would place the designated MBDS over the previously-used industrial waste disposal site (and immediately outside the study area for the proposed National Marine Sanctuary).

Despite EPA's stated belief (at page 19) that continued dredged material disposal at the currently-existing MBDS would not "significantly adversely affect" Stellwagen Bank resources, there is no question that dredged material disposal does cause some adverse effects to the immediate environment, including living resources. EPA's document notes (page 13) that "adverse effects associated with dredged material disposal include the alteration of bottom substrate resulting in a modification of benthic community structure or diverse benthic faunal assemblages." Indeed, EPA's determination has been to eliminate certain areas from its Zone of Siting Feasibility (ZSF) because of the "potential danger of adversely affecting" sensitive areas by disposing of dredged material. (p. 13)

Existing regulatory authorities affecting ocean disposal activities in Massachusetts Bay are largely focused on single activities or resources. Regulations implementing a National Marine Sanctuary are designed to provide, in coordination with existing regulations, protection and management to an ocean system which has been recognized as nationally significant. Designation of Stellwagen Bank would provide a comprehensive management program accommodating multiple uses, consistent with the overall objective of resource protection. Within this context, Sanctuary management includes the authority (pursuant to Title III) to regulate the exercise of any valid "lease, permit, license, or right" consistent with the purposes for which the Sanctuary was designated.

Specific Notes

Table 2 (p. 14) fails to note the presence in the Gulf of Maine of harbor seals and gray seals. Additionally, orca whales should probably also be included in this listing.

Thank you for the opportunity to comment on this Supplemental Draft Environmental Impact Statement.

Sincerely,

Susan E. Durden

Susan E. Durden
Regional Manager
Atlantic/Great Lakes Region

cc: Tom Bigford
Brad Barr

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

COASTAL ZONE MANAGEMENT

November 9, 1989

Ms Ann Rodney
U.S. Environmental Protection Agency, Region I
J F Kennedy Building
Boston, MA 02203-2211

Dear Ms Rodney:

The Massachusetts Coastal Zone Management Office (MCZM) has reviewed the Draft Environmental Impact Statement (DEIS) on" Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site" (MBDS) The following comments constitute our review of this document

MCZM's major concerns relate to the following issues (1) there is no analysis of alternatives to the continued use of the MBDS; (2) there is no viable plan for disposal of contaminated materials, which is particularly troublesome in light of (3) the demonstrated elevated levels of PAHs and PCBs in area sediments, including samples taken from reference areas and elevated levels of these compounds in the tissues of organisms taken from the area; and (4) there does not appear to be a firm plan for monitoring the site.

Before proceeding to detailed comments, MCZM would like to point out that it is of utmost importance to recognize the window of opportunity that is now before us. Completion of the EIS will presumably lead to a Final Site Designation by EPA A basic question to be answered is whether or not the continued use of the MBDS is acceptable or whether an alternate site should be identified It must be kept in mind that Stellwagen Bank is one of the region's most productive ocean resources It supports an extremely valuable recreational and commercial fishery and provides food and haven for an abundance of marine life The continued use of the MBDS will, as we believe your DEIS demonstrates, place additional and cumulative stresses on Stellwagen Bank's resources This is unacceptable It is imperative that alternative sites be investigated If another site can be identified that has the same characteristics of the MBDS but is located well away from Stellwagen Bank, then use of that site should be pursued MCZM clearly recognizes the need to properly manage dredged material, but we also recognize the need to protect Stellwagen Bank

We believe the two objectives are compatible and obtainable. Therefore, we strongly urge your office to expand its view on this matter and provide a revised Draft EIS that fully explores alternative sites.

Our detailed comments on the Draft EIS are presented below.

1 PURPOSE AND NEED

An estimation of the amount of material originating from the towns listed in Table 1-3 should be included in order to establish the need for a regional disposal site. Areas that were last dredged prior to 1976 may contribute amounts of material in addition to those anticipated in the DEIS.

The economic analysis used to determine the feasibility of the use of the MBDS by the towns listed in Table 1-3 should be presented Towns as far south as Duxbury and Plymouth have argued that the MBDS is not within an economically reasonable distance for their needs Details of the economic analysis should be provided.

The origin of the numbers included in Table 1-1 should be added to the table. Similarly, the statement on p 3 referring to "recent testing practices have revealed should include the source of these data

2 ALTERNATIVES

The DEIS considers only the continued use of the disposal site. MCZM feels strongly that additional alternatives should be considered in detail, including the no-action alternative of not designating the site. It is not sufficient to state that this analysis should be done in connection with the permitting process, as it is unlikely that other ocean (or other) sites could or even would be evaluated in a timely manner at the time the disposal site is needed. Given the demonstration in the DEIS that levels of PAH and PCB are elevated in sediments and tissue of indigenous organisms, it is particularly important to identify alternatives for the disposal of contaminated sediments. It is also critical to establish agreed-upon numerical standards for contaminant levels in sediments Lack of such standards makes it difficult to standardize the permitting and site management process.

The last paragraph of Section 2.2 (p. 13) states that the MCZM "is currently investigating the feasibility of establishing a dredged material containment island in Boston Harbor" This statement is in error The Massachusetts Department of Public Works is proposing the use of Spectacle Island as a receptacle for both excavated and dredged material.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

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November 9, 1989

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Boston, MA 02203-2211

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The five general and 11 specific criteria for evaluation of dredged material disposal sites are listed on pages 13-14. However, there should also be a discussion of how designation of the MBDS meets (or does not meet) these criteria

3. AFFECTED ENVIRONMENT

The first paragraph of this section (p. 16) describes the origin of information used to provide the description of the affected environment The text does not clearly identify the agency (EPA or COE) that performed the "extensive site evaluation studies" that were conducted after identification of data gaps (para 1, lines 11-14). This point should be clarified here as well as in several places throughout the text where the origin of data or opinion is not referenced For example, the last paragraph on p 26 refers to side-scan sonar studies conducted on October 17 and 18, 1985, but does not say who conducted the study. Another example is on page 144, where it is not clear who conducted the interviews with fishermen in 1985

In general, greater use could be made of the extensive information contained in the Massachusetts Water Resources Authority's Secondary Treatment Facility Treatment Plan.

The section on physical characteristics is poorly written In particular, the results of the various studies on oceanographic currents should be synthesized rather than summarized. The fresh water input of the Merrimack River is significant and should be discussed in more detail.

The DEIS briefly alluded to the proposed designation of Stellwagen Bank as a National Marine Sanctuary. However, the discussion of the potential impact of the designation and use of MBDS is woefully inadequate in addressing the potential conflicts between the designation and use of the disposal site and the sanctuary Part of the ongoing NOAA review of this sanctuary nomination involves a determination of the adequacy and appropriateness of the so-called "study area boundary." Given that a portion of the disposal site is within the Stellwagen Basin, and therefore part of Stellwagen Bank's biological, chemical, geological, and physical environment, it is clearly possible that some portion of MBDS will fall within the final designated sanctuary boundary This may pose significant limitations on the use of MBDS Such limitations should be thoroughly discussed and analyzed in the Final EIS

The demonstration of elevated levels of PCB and PAH in areas outside the disposal area raises concerns about the use of the MBDS for contaminated sediments The statement on p 61 that levels of PCBs "detected off dredged material in the vicinity of MDS are comparable to levels identified " in other studies is not correct The levels reported by Gilbert (1976) (cited on page 61 of the DEIS) appear to be at least ten times higher than the levels reported in Table 3 6 of the DEIS.

Section 3.2 3 (Biotic Residues) discusses body burdens of several contaminants, and demonstrates that levels of PCBs and PAHs are elevated in the tissues of several of the species tested. MCZM's major concern with this analysis is that the appropriate species have not been tested. Tissues of the small benthic invertebrates that form the primary food item of the commercial fish species (cod, flounder and plaice) caught in the vicinity should be measured, as should the fish species themselves. The species chosen for testing (Nephtys, Astarte) may be larger and therefore easier to collect than the small polychaetes and oligochaetes that comprise 90 percent of the infauna at the MBDS, but the results of these analyses, while cause for concern, do not directly address the issue of transfer through the food chain

4 ENVIRONMENTAL CONSEQUENCES

MCZM concurs with EPA's conclusion on page 201 that contaminated sediment disposed of at MBDS may cause or contribute to adverse effects on demersal and benthic organisms, including toxicity, reduced reproductive potential, and pathological alterations in susceptible resident species Further evaluation of the potential impacts to human health must be made through analysis of species consumed by humans. Given these shared concerns, it is imperative that contaminated sediments not be disposed of at the MBDS.

Section 4.4 (Effects on Human Use) is incomplete without an analysis and discussion of the potential effects on human health resulting from ingestion of fish caught in that area Given the statement that the MBDS area is a productive fishing area, this concern must be addressed.

5 SITE MANAGEMENT

The water quality certificate mentioned in paragraph 1 of Section 5 2 3 (page 213) is issued by Massachusetts' Department of Environmental Protection, not the Coastal Zone Management Office

Additional information on EPA's concerns with the use of established reference sites (cited on page 219) should be included and discussed If EPA has some concerns with the existing reference sites, the use of reference site data as contained in the DEIS may not be appropriate. MCZM would agree that sites farther away from the MBDS, matched in grain size attributes, but with lower contaminant levels than presented for the existing reference sites, would provide better control data for monitoring the MBDS.

EPA currently considers the MBDS to be an Impact Category II site (pp. 221-222). However, data presented in the DEIS suggests that biota and sediments within the site exhibit levels of PAH, PCB and some metals that are above normal ambient levels This characteristic would suggest that the MBDS is an Impact Category I site

Section 5.4.3: What are the volumes and types of sediments that EPA would consider as necessitating monitoring the MBDS at a frequency of greater than once per year? The species selected for body burden studies should include dominant infauna selected as prey by fish and fish species consumed by humans

Section 5.4.4: The discussion of monitoring at MBDS, while interesting and appropriate in terms of the theory presented, is not definitive in terms of the monitoring that will be done at the site. Many techniques are discussed as possibilities, but the program that is proposed for the site is not clearly laid out. The Final EIS should clearly state exactly what monitoring is planned and will be carried out.

Section 5.4 5: What are the newly developed testing procedures for bioaccumulation that will be implemented? The plan for future monitoring would be more effective if presented in an earlier section, perhaps as part of the specific monitoring plan for MBDS, rather than in a section titled "Brief history "

Section 5.4.7: MCZM is particularly concerned about the disposal of contaminated material. Seasonal restrictions on the disposal of such material may not be sufficient to prevent environmental degradation Capping may not be feasible if sufficient amounts of clean material are not available at the time they are needed, as has occurred in the past. In fact, capping may not be feasible at all in the MBDS This operation has not been carried out at MBDS and as stated by EPA in the DEIS, may in fact not be a feasible management option. As part of the requested analysis of alternatives, greater effort must be made to identify disposal options for contaminated material. Use of the MBDS for disposal of clean material may be supported by MCZM, but we cannot support the use of the site for disposal of contaminated material.

6. Editorial Comments

Throughout the text, the noun "data" is used in the singular, when it fact it is a plural form of "datum"

What are the units in Table 3-6 (p. 43)?

In section 3.2.2.2.5 (page 61), the text discussion on PCBs should be consistent in terms of the units used. In one paragraph, ppm are used, whereas ppb are used in the next paragraph.

Page 101: Paranois should be Paraonis.

Page 96· Either the reported detection limits for PCBs (0 2 to 0 4 ppm), or the reported data are incorrect

Page 124: Section 3 3 4, paragraph 2 refers to "two species" of turtles in the Gulf of Maine, whereas five species are listed in Table 3-32. (The table is correct.)

In Table 3-32 and pp 143-144, "Ridleys" should be "ridley"

Page 218. Section 5.3.4, paragraph 2: It is unlikely that sediment can simulate organism response.

Several citations in the text are not included in the list of references. For example, COE, 1988 (p. 148) and MMS, 1983 (p. 149) are not given in the references. Conversely, at least one reference (Clarke and Gibsòn, 1987) was listed twice.

MCZM would like to remind the EPA of their obligation to file a Federal Consistency Determination with our office. This Determination is necessary in order to initiate a formal Federal Consistency review. We believe that the designation and use of the MBDS directly affects the Massachusetts coastal zone and we look forward to performing this review for the Environmental Impact Statement. In addition, we expect to perform Federal Consistency Reviews for permits issued for use of the site. For additional information regarding the Federal Consistency review process, contact Ms. Jane Alford, MZCM Project Review Coordinator.

Sincerely,

Jeffrey R Benoit

Jeffrey R. Benoit
Director

JRB/NJM/njm

cc: Gordon Beckett, USFWS/Concord
Chris Mantzaris, NOAA/NMFS
Sherrard Foster, NOAA/MEMD

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

COASTAL ZONE MANAGEMENT

AUG 22 1990
REGIONAL OFFICE

August 15, 1990

Ms. Julie Belaga
Regional Administrator
EPA Region I
JFK Building
Boston, MA 02203

Dear Ms. Belaga:

This letter comments on the Supplemental Draft Environmental Impact Statement (SDEIS) for the Designation of Dredged Material Disposal Site in Massachusetts Bay: Alternative Site Screening, dated July 1990. It is the opinion of the Massachusetts Coastal Zone Management (MCZM) Office that the SDEIS does not adequately address several major issues relating to the designation process. MCZM's concerns relate to the following issues: (1) the alternatives analysis is superficial, particularly with regard to sites that can accept materials unsuitable for ocean disposal, (2) there is no site specific monitoring plan, (3) there is no long term management plan, and (4) there is no documentation to shifting the site to include all or part of the industrial site (although this may be appropriate and beneficial).

This supplement was prepared because the Draft Environmental Impact Statement (DEIS) did not adequately analyze alternative sites as is required of the Environmental Protection Agency (EPA) under the National Environmental Protection Act (NEPA). Although the document augments the analysis of alternative sites, it does not distinguish between a specific site, the Massachusetts Bay Disposal Site (MBDS) formerly known as the Foul Area Disposal Site (FADS) and generalized areas such as (Northern Massachusetts Bay (NMB), Murray Basin (MB) and Southern Massachusetts Bay (SMB). This is equivalent to comparing oranges to a basket of fruit and while there are similarities, there is a need to compare oranges to oranges. Therefore, the MCZM Office recommends that a revised Supplemental Draft be prepared that addresses the following comments.

The MCZM Office has stated that the MBDS appears to be a suitable disposal site for clean dredged materials. There is a need for EPA to clearly define "clean" and to identify sites that can accept materials deemed unsuitable for ocean disposal. The Marine Protection, Research and Sanctuaries Act (MPRSA) specifically prohibits the ocean disposal of materials which "...may unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems and economic potentialities...". The definition of what is suitable for ocean disposal needs to be specifically addressed with respect to the MBDS.

Historically in this region federal agencies, environmental groups and the Commonwealth have disagreed with the interpretation of testing data (specifically, bioassay and bioaccumulation tests) and the suitability of project-specific dredged materials for ocean disposal. The recently adopted New England protocols have not been applied to a sufficient number of projects to be able to make comparisons. However, preliminary data from comparison testing of sediments using the "Green Book" (Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (ACOE) Protocols, 1977 and the new (EPA Region I and New England Division (NED)/COE) protocols suggest that sediments deemed "clean" under the 1977 protocols are failing under the new (EPA/NED) protocols (N. Rubinstein, pers. comm.). If, as projected, the new testing protocols are more sensitive, it is expected that a significant amount of dredged material will not be suitable for ocean disposal.

The MCZM continues to oppose capping at the MBDS as a "management alternative" for contaminated dredged materials. Similarly, based on the results of the Pilot Project in New Bedford, borrow pits or confined aquatic disposal sites do not appear to be viable management options either. Therefore, the document should address upland or nearshore alternatives more definitively, especially for "contaminated" or sediments.

The recommendation is to have a definitive management and monitoring chapter that is specific to the site selected, e.g., the MBDS. What is applicable in 60 feet of water is not necessarily applicable in 300 feet of water and data from other areas and projects should be interpreted appropriately in that context.

The following comments are specific to the document.

1. There were no maps in the DSEIS with bathymetric contours. This is a handicap for comparing areas/sites.

2. p. 11 It is stated that travel to an off shelf site would be economically unfeasible, but no data or calculations are given to support that statement.

3. The paragraph on upland sites ignores the work by Sasaki, 1983, Upland Dredged Material Disposal Sites prepared for MCZM; the alternative sites identified by the Massachusetts Water Resources Authority and the Massachusetts Department of Public Works. The SDEIS dismisses upland sites in a paragraph, yet both MWRA and MDPW are required to review each

parcel relative to the 404(b)(1) criteria, state regulations regarding upland and nearshore disposal. All agencies should address these issues at the same level of scrutiny and the DSEIS's cursory dismissal of upland sites is inappropriate. Upland alternatives should be practicable, i.e., those areas that can accept salt-laden dredged materials and sediments with contaminant levels unsuitable for ocean disposal. There may be differences in contaminant levels between what is acceptable for landfills under solid waste regulations and ocean disposal which should be taken into account.

4. p.13. The TRIGOM, 1974 reference is not listed in the References.

5. p.19. The reference to "evaluation of the existing reference site" implies that concerns expressed by several agencies regarding the suitability of material from the currently used reference area is subject to further evaluation, but no details are given. A specific plan for identifying clean reference sites needs to be identified.

6. Section 4. The alternative site selection was poorly done. The document failed to distinguish between comparison of a specific site, the Massachusetts Bay Disposal Site (MBDS) and general areas, Murray Basin (MB), Northern Massachusetts Bay (NMB) and Southern Massachusetts Bay (SMB). Within each of the general areas specific sites need to be identified based on appropriate physical oceanographic features, e.g., depressions and other depositional characteristics.

7. p.27. para. 3. The reference to the SMB alternative site as a spawning area for commercially important fish species and an area where whales are sighted is true for NMB, the MBDS and possibly MB. Therefore it is not appropriate to use this criteria when applied to the general alternative sites, although it is appropriate on a specific site by site basis.

8. p.28. para. 3. How can one compare resuspension data from MBDS to all of SMB without referencing the data used in the latter area? The questions of how much material is resuspended during storms and where it is transported need to be addressed on a site specific basis.

9. p.29. What references support the last sentence of paragraph and the first sentence of paragraph 5? In general there is not a good discussion of the resuspension/transport data, the quality of the data and the breadth. An analysis of existing data relative to sites would be helpful, but at a minimum the primary references are needed for the reader to draw her/his own conclusions.

10. p. 30. Some of the discussion regarding disposal at the Murray Basin site appear to be applicable to the MBDS, e.g. buoyancy of particles, dispersion over a broad area etc. What are the differences in velocity between MB and NMB and SMB (or MBDS and specific sites in MB and SMB). Is the MB depth 200-300 or 300 m?

11. p. 30. The Boston Lightship and the industrial site should be identified on maps (recognizing that the industrial site is adjacent to MBDS).

12. MCZM disagrees that data support capping at the MBDS, therefore, this should not be a management option for materials unsuitable for ocean disposal at this site.

13. p.30-31. The last sentence of page 30 that carries over to p. 31 is confusing.

14. pp. 31-32. The section on other user group impacts is confusing and compares site specific information (MBDS) with general areas (MB, NMB, and SMB). The discussion about deposition in Murray Basin is contradictory in terms of impact, contamination, etc. Recent newspaper articles dispute the claim that the MBDS and industrial site is not fished.

15. p.34 There was no documentation for the last paragraph which states that "EPA is proposing to designate the area of the industrial waste site, ... as the final boundary of the MBDS). Although there appear to be several justifiable reasons for this decision, it may not be an environmentally sound approach. The sediments in the industrial site are soft and the dredged materials (particularly clay-like clumps) may sink and displace the soft sediments causing resuspension and failing to achieve the goal of capping the area. The technical feasibility of capping the industrial site should be carefully documented before making this recommendation.

In general, the alternatives screening is an improvement over the DEIS, but there needs to be an effort to address the critical issue facing dredging and disposal of dredged material from urban harbors. The contaminant levels in urban harbors in northern Massachusetts are among the most contaminated in the U.S. (see National Oceanic and Atmospheric Administration Status and Trends Benthic Surveillance Program, 1984-86 and subsequent documents). Both the new (EPA Region I and New England Division of the Army Corps of Engineers) protocols include tests that are more sensitive. This will likely increase the volume of sediments not suitable for ocean disposal. The designation process, because it includes an alternative analysis, is an opportunity to comprehensively address disposal issues. MCZM has long been a proponent of identifying a suitable disposal site for "contaminated" dredged material and welcomes the opportunity to

work with EPA to develop a long term strategy for solving this complex problem.

MCZM would like to remind the EPA of their obligation to file a Federal Consistency Determination with our office. This Determination is necessary in order to initiate a formal Federal Consistency review. We assert that the designation of the MBDS or any other disposal site directly affects the Massachusetts coastal zone and we look forward to performing this review for the EIS. There will be a public comment period in conjunction with the review and we fully anticipate that all environmental groups and other agencies concerns will be adequately addressed before release of the EIS. MCZM is willing to review the draft final EIS document for EPA in order to work out differences in advance. In addition, we expect to perform Federal Consistency Reviews for permits issued for use of the site. For additional information regarding the Federal Consistency review process, contact Jay McKay, MCZM Project Review Coordinator.

Thank you for the opportunity to comment.

Sincerely yours,

Jeffrey R. Benoit

Jeffrey R. Benoit
Director

JB:JP:jp

The Commonwealth of Massachusetts
Division of Marine Fisheries
Leverett Saltonstall State Office Building
100 Cambridge Street
Boston, Massachusetts 02202 727-3193

PHILIP G COATES
DIRECTOR

November 10, 1989

Mr. Paul Keough
Acting Regional Administrator
Environmental Protection Agency
Room 2203
John F. Kennedy Bldg.
Boston, MA 02202

Dear Mr. Keough:

The Division has reviewed the "Draft Environmental Impact Statement for the Continued Use of the Massachachusetts Bay Dredge Material Disposal Site" and we have several comments.

Although the alternative of prohibiting further disposal at the MBDS is probably not practical, a discussion of the alternative of closing the MBDS should be incorporated in the final EIS. Further, some estimates of future use in terms of amounts of materials should be in the report, since most public disposal projects are known well in advance.

It is noted that PCB's and PAH's have been found in abnormally high levels in tissues of some invertebrates in the MBDS. It therefore should follow that studies on fish taken in the foul area should be performed to ascertain the levels of contaminants in various tissues and organs.

The Division has been under the impression that commercial fishing was legally prohibited in the MBDS, however, we have been unable to verify any legal closure to commercial fishing. In view of the amount of fish landed and reported landed from the general area of the MBDS, positive steps should be taken in future management of the area to ensure the public health is protected. Incidents like the recent case involving a fishing vessel netting toxic waste drums can only be avoided by capping the disposal site or by an "enforced ban" on commercial fishing in the area.

There is no mention in the report of significant short dumping that has occurred historically on materials scheduled for the MBDS. Future management must include positive steps by the U.S. Army Corps to have inspectors aboard each disposal trip to the site. Without "active inspection" short dumping will continue to occur.

Finally, the continued use of the MBDS as marine disposal area will undoubtedly conflict with the proposed Stellwagen Bank marine sanctuary designation. The final EIS should deal with this matter in greater detail.

Sincerely yours,

W. Leigh Bridges
Assistant Director

WLB:ms

Michael S Dukakis
Governor

Philip W Johnston
Secretary

Deborah Prothrow Stith, M D
Commissioner

The Commonwealth of Massachusetts

Executive Office of Human Services
Department of Public Health
Division of Food and Drugs
305 South Street
Jamaica Plain Mass 02130
(617) 727 2670

November 13, 1989

Ms. Ann Rodney
U.S. EPA
MEP-1900C
JFK Federal Bldg
Boston, MA 02203

RE: Draft Environmental Impact Statement for
The Massachusetts Bay Dredged Material
Ocean Disposal Site Designation

Dear Ms. Rodney:

We are attaching comments on the Draft Environmental Impact Statement of the Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site. Since we only received a copy of this document on October 26, 1989 the comments were prepared within the time constraints specified by EPA and only focus on a few points. They by no means consider all our concerns about this draft.

We also view the development of this Draft Environmental Impact Statement as an excellent opportunity for EPA to review the toxic effect on fish and subsequently on human health resulting from contaminants in the Industrial Waste Foul Area and the Dredged Material Dump Site.

We look forward to seeing the revised Environmental Impact Statement If you have any questions concerning this material, do not hesitate to contact me at 617-727-2670.

Sincerely,

Elizabeth Anne Bourque, Ph.D.
Environmental Policy Coordinator

cc: Nancy Ridley, Director, Division of Food and Drugs
Richard Waskiewicz, Assistant Director, Division of Food and Drugs

These comments of the Department of Public Health, Division of Food and Drugs focus on several points but not all points of concern with the Draft Environmental Impact Statement (DEIS) on the Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site (MBDS).

1. ALTHOUGH THE DEIS ACKNOWLEDGES THAT THE MBDS IS A PRODUCTIVE FISHING AREA, THE DOCUMENT DOES NOT CONTAIN A RISK ASSESSMENT FOR HUMAN CONSUMPTION OF FISH.

> "Based on fisheries landing data NMFS and MDMF as well as interviews with local fisherman, a viable commercial fishery appears to exist in the vicinity of MBDS". p. 113

> "NMFS Comercial catch statistics from the vicinity of MBDS indicates that the area is a productive fishery resource. Average finfish and shellfish yields for 1982-1984 from the NMFS "10 minute square" which includes the MBDS was 6,316,000 kg. Although this 10 minute square represents <3% of the NMFS statistical area (514) which includes Cape Cod Bay, Massachusetts Bay and Stellwagen Bank, it accounted for approximately 11% of total landings for the area in 1984". p.114

> "Target species of sport fisherman near MBDS include cod, cusk, haddock, mackerel, bluefish and bluefin tuna. Wolfish, flounder and polluck are also caught". p.114.

Yet the potential for bioaccumulation is clearly stated:

> "No information is available concerning the bioaccumulation of contaminants in fish at MBDS. However, potential for detectable bioaccumulation at MBDS is probably greatest for relatively resident demersal species such as witch flounder and those species feeding on benthic species. Persistent organic contaminants, such as PAH, are a bioaccumulation concern". p.199.

"... it appears that sediment contamination at MBDS may (depending upon bioavailability) cause or contribute to adverse effects on demersal and benthic organisms. These effects include toxicity, reduced reproductive potential and pathological alterations in susceptible resident species". p. 201

This lack of attention to possible seafood contamination appears to be a different approach than EPA's previous concern with this important source of risk to consumers. In addition, this possible seafood contamination is a reflection of the overall degradation to the marine environment.

2. THE DEIS CLEARLY SHOWS THAT THE SEDIMENT AT THE MBDS IS CONTAMINATED

The ambient sediment at MBDS has been altered and

"Statistical analysis revealed significantly elevated levels of copper, lead, zinc, chromium, PAH and PCB within the MBDS boundary". p.187

"Organic chemical data from MBDS indicates elevated concentrations at the disposal area on dredged material... Oil and grease levels were low (<0.5%) but statistically elevated at the disposal area in comparison with the reference sediment and unimpacted areas within the site". Executive Summary p.v.

3. THE DEIS CLEARLY SHOWS THAT THE EPA MARINE WATER QUALITY CRITERIA WERE VIOLATED NUMEROUS TIMES OWING TO DREDGED MATERIAL DISPOSAL AT MBDS

The DEIS reported modeling for dredged material disposed in 1982 and numerous violations are predicted.

"Assuming the worst case scenario of 10 percent unsettable solids, EPA predicted that WQC for acute effects (CMC) would be exceeded for copper, lead, mercury, nickel, zinc and arsenic while chronic criteria would be exceeded for copper, lead, mercury, nickel and PCB (ambient levels of mercury already exceed this criterion)....These areas of exceedance would normally be contained in the site, but may

surpass the boundary of MBDS, depending on tide, winds and location of disposal event" p. 191

Further, as measured in 1986 the levels of mercury at the MBDS exceeded the chronic EPA Marine WQC and the quantified levels of copper approximated the chronic EPA Marine WQC.

4. THE DEIS ATTEMPTS TO JUSTIFY ADVERSE EFFECTS AS TEMPORARY, OCCURING DURING DISPOSAL, YET ACKNOWLEDGES A POTENTIAL INCREASE IN THE RATE OF DISPOSAL

"Water quality impacts are temporary and limited to the period immediately following the disposal event. A few exceedances of acute and chronic water quality may occur for a limited duration over generally a small area within MBDS during disposals". p.188

"...limited WQC exceedances will occur after a disposal event. These exceedances will be for short durations. Because of the limited exposure time and the motility of the orgamisms, it is unlikely that disposal operations will cause any significant adverse effects to pelagic finfish". p. 204

At the same time there is a possibility of increased disposal at the MBDS.

"The disposal of dredged material at MBDS is anticipated to continue at the present rate or potentially increase with the advent of major construction activities proposed for the greater Boston metropolitan area". p. 186

5. THE DEIS ATTEMPTS TO MINIMIZE THE CONTAMINATION WITHIN THE MBDS BY STATING THAT IT WILL NOT AFFECT THE MASSACHUSETTS BAY OR THE GULF OF MAINE

"In summary, all exceedances of WQC will be confined to the diposal area and are not expected to have a significant effect on the water quality of Massachusetts Bay". p.186

"Phytoneuston will be exposed to elevated concentrations of organic and inorganic contaminants which may be toxic or have sublethal effects. Disposal activity could have dramatic local effects on phytoneuston, but will not have a

significant effect on Massachusetts Bay phytoneuston populations". p 191

"Even in the event that all eggs and larvae exposed to moderate concentrations of suspended sediments are killed, ocean disposal at MBDS would not have significant impact on the marine resources of the Gulf of Maine". p. 195

6. THE BOUNDARIES OF THE MBDS OVERLAP THE BOUNDARIES OF THE STELLWAGEN NATIONAL MARINE SANCTUARY PROPOSAL .

The overlap of the MBDS with the Stellwagen Bank National Marine Sanctuary Proposal is not addressed in the DEIS. Yet the basis to designate the Stellwagen Bank a National Marine Sanctuary is clear:

> "For generations, Stellwagen Bank has provided abundant commercial fisheries, supporting local and regional economies. More recently, the Bank's importance as feeding and nursery areas to endangered cetaceans has attracted thousands of people and supported a growing "whalewatch" industry ... Combined with the site's accessiblity, Stellwagen Bank draws millions of direct and indirect users of its resources annually." US Depart. of Commerce, Oct. 1989.

Further, certain activities are affected by the Sanctuary designation.

> "Where certain resources are not adequately protected by existing legislation, the Sanctuary may impose restrictions or prohibitions on harmful activities. Existing, planned or potential activities in the Stellwagen Bank area that may be subject to regulation include: sand/gravel mining; dredged soil disposal,.... Decisions regarding proposed regulations will be made during development of the draft environmental impact statement/management plan document for the Stellwagen Bank proposal." US Depart of Commerce, Oct 1989

7. NO ALTERNATIVE DISPOSAL SITE WAS CONSIDERED

The DEIS clearly states the requirement to review other alternative disposal sites before ocean disposal is chosen.

> "However, it is important to note the need for the proposed dumping as well as a full spectrum of available land-based alternatives must be evaluated before ocean diposal has been chosen as the preferred plan. Only when there is not practical alternatives available which may have less adverse environmental impact should ocean disposal be permitted". p.1

Yet no alternative site was considered in the DEIS for disposal of dredged material.

In summary, the DEIS attempts to minimize the contamination already present as well as the adverse environmental and public health effects of disposal at the MBDS. One of EPA's functions is to prevent environmental contamination including contamination of seafood. Yet EPA is proposing to add more contaminants to the MBDS which is part of and adjacent to urban embayments which rank on top of the national list of contaminated urban embayments.

The DEIS is presently incomplete and does not address the potential health risks of human consumption of fish harvested from the MBDS. Overall, the DEIS does not protect consumer health.

REFERENCE

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, (October 1989) Responses to Some Common Questions About the Stellwagen Bank National Marine Sanctuary Proposal.

New England Aquarium

Central Wharf
Boston, Massachusetts 02110-3399
(617) 973-5200

November 11, 1987

Paul Keough
Acting Administrator
U S Environmental Protection Agency, Region I
JFK Federal Building, Room 2203
Boston, MA 02203

RE: The Draft Environmental Impact Statement on the Continued Use of the Massachusetts Bay Dredged Material Disposal Site

Dear Mr. Keough,

The New England Aquarium has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed continuation of use of the Massachusetts Bay Dredged Material Disposal Site We thank the Environmental Protection Agency (EPA) for presentation of information on environmental and resource issues surrounding this proposition. However, we find there are significant gaps in information and unresolved problems within the DEIS that must be addressed

Lack of Alternatives

There is a noticeable lack of alternatives to the continued use of the Massachusetts Bay Disposal Site (MBDS) in the DEIS It is surprising that the EPA has not entertained alternative sites or different modes of disposal. There is no discussion of the potential for denial of the MBDS s continued use, and no contingency plan in the event of refusal.

Proposed Stellwagen Bank Marine Sanctuary

The DEIS should fully consider the probable designation of Stellwagen Bank as a National Marine Sanctuary, and the likelihood of restrictions being imposed to protect sensitive resources of the Bank The use of Stellwagen Basin -- directly adjacent to Stellwagon Bank -- for disposal of potentially toxic spoils, is in direct conflict with the goals of protecting and preserving the resources of this area. Sanctuary-associated restrictions will very likely preclude use of the MBDS for urban/industrial spoils, severely limiting the usefulness of the site.

Fisheries Resources

We commend the EPA for acknowledging that dumping in the MBDS must not occur during times when important species are spawning in the Stellwagen region. But even with restricted times for dumping, there is still the ongoing risk posed to fisheries from the anticipated four per cent (cumulative) resuspension of sediments every three to four years More detailed information on potential impacts from this resuspension must be presented in the Final DEIS, including an assessment of the potential for bioaccumulative effects in exposed species

Toxics Exceedences

We question EPA's acceptance of the fact that continued use of the MBDS will cause exceedances of toxics criteria Exceedences would be unacceptable, especially in light of the proposed sanctuary designation and seasonal importance of the Basin to marine life. If dumping in the Basin is to be allowed

The Aquarium is a non-profit organization as described in section 501(c)(3) of the Internal Revenue Code. Contributions are tax deductible to the extent allowed by law.

at all, strict limitations would have to be placed on the toxicity of spoils if the quality of the Bay and the populations it supports are to be protected.

Use of the MBDS for clean spoils, exclusively, is an alternative that must be evaluated. We strongly recommend that such restricted disposal be the only type of disposal considered for the MBDS. Consideration should be given to managing and disposing of contaminated spoils by some means other than ocean disposal.

Conclusion

We find that the lack of planning for alternative disposal sites and disposal techniques in the DEIS renders the document incomplete. EPA appears to be proceeding under the assumption that the MBDS continuation will be approved, obviating the need for evaluation of alternatives. To the contrary, the environmental sensitivity of the region and the proposed designation of nearby Stellwagen Bank as a National Marine Sanctuary warrant concerted evaluation of alternatives. We urge that such an evaluation be made and a revised DEIS be prepared.

Thank you for the opportunity to comment.

Sincerely,

Sharon E Dean

Sharon E. Dean
Conservation Coordinator
New England Aquarium

SED
cc: David Fierra, Dir., EPA Water Management Division
Ron Manfredonia, Chief, EPA Water Quality Branch
Kymberlee Keckler, Ocean Disposal Coordinator, EPA Water Quality Branch
Jeffrey Benoit, Dir , Mass. Coastal Zone Management Office
Arleen O'Donnell, Asst. Commissioner for Resources Protection, Mass. DEP
Neil O'Brien, Acting Dir., Division of Water Pollution Control, Mass. DEP
John Prescott, Exec. Dir , New England Aquarium

New England Aquarium

Central Wharf
Boston, Massachusetts 02110-3399
(617) 973-5200

August 22, 1990

Ron Manfredonia, Chief, EPA Water Quality Branch
U.S. Environmental Protection Agency, Region I
JFK Federal Building, WQB 1900
Boston, MA 02203

Re: *Supplemental Draft Environmental Impact Statement for the Designation of Dredged Material Disposal Site in Massachusetts Bay — Alternative Site Screening*

Dear Mr. Manfredonia,

The New England Aquarium has reviewed the *Supplemental Draft Environmental Impact Statement* (SDFIS), regarding continued use of the Massachusetts Bay Dredged Materials Disposal Site (MBDS). We thank the EPA for reviewing the feasibility of alternative sites We concur that the MBDS is an acceptable site, provided that certain issues are addressed prior to final approval of the MBDS Plan. First, decisions regarding the continued use of the MBDS must be tempered by careful consideration of cumulative impacts on the regional resources of Stellwagen Bank and the Gulf of Maine. Secondly, assurances must be given that only clean dredge spoils will be dumped at the site Finally, dumping in or near the Foul Area should be prohibited until the resident containers of hazardous/radioactive wastes are evaluated for their integrity, and the safest management option for them is determined

◆ Cumulative Impacts

The combined effects of pollution input, overfishing, etc, are taking their toll on the biological community of the region's marine environment. Decisions about the use of the MBDS have significant bearing upon the health of the entire food web of Massachusetts Bay. The New England Aquarium welcomes EPA's offer to establish an advisory committee for the MBDS, a step which will ensure that public concerns about management decisions for the MBDS will be heard We recommend that the advisory committee be involved in the process of developing a management plan for the MBDS.

The New England Aquarium further urges the EPA to lend full support to the designation of Stellwagen Bank as a National Marine Sanctuary. The proximity of a marine sanctuary to the MBDS would help enhance decisions regarding dumping within the MBDS

◆ Spoils Quality

As noted in our commentary on the initial DEIS during 1989, Stellwagen Bank's marine life could be adversely impacted by

periodic violations of toxics criteria, violations that would be facilitated by dumping contaminated spoils within the MBDS Because there appears to be a great deal of latitude for decisions about the quality of sediments, all decisions about the disposal of spoils must be based upon the most stringent interpretation of sediment quality standards possible Guarding against further pollution within Massachusetts Bay will help to ensure the health and safety of the rich biotic community of the Stellwagen Bank area, as well as the tens of thousands of people who consume fish products from the region.

◆ Management of Submerged Hazardous Wastes within the Foul Area

There is an urgent need for further assessment of hazardous waste containers (containing various toxics and radioactive materials) within the Foul Area. Although monitoring of these containers several years ago showed their integrity to be acceptable, there has been no determination of the current condition of these containers, and no assessment of the most environmentally safe management option for them. Until such time as a full assessment of the containers within Foul Area has been conducted, dumping within range of the Foul Area must be prohibited.

◆ Conclusions

The New England Aquarium does not oppose future use of the MBDS site for the disposal of clean sediments As outlined above, our concerns are focused on ensuring that dredge spoils destined for disposal within the MBDS are indeed uncontaminated, and that existing containers of hazardous wastes within the Foul Area are monitored and managed in the most environmentally safe manner. As such, the New England Aquarium recommends that no dumping of dredge spoils be permitted within the MBDS, until such time as·

- mechanism(s) are put in place (including, but not limited to, establishment of an advisory committee) to ensure that cumulative impacts on the region are considered;
- the U.S. EPA and Army Corps of Engineers (COE), with the assistance of the advisory committee, develops guidelines to ensure, that standards for approval of permits to dump dredge spoils in the MBDS are interpreted such that only the highest quality spoils are dumped at sea;
- the COE develops alternative plans for containment and/or disposal of contaminated

sediments (i.e the top 1 - 1.5m of sediments) from local dredging projects;

- procedures are enacted to ensure that no dredge spoils are dumped in the Foul Area or areas of the MBDS where containers of hazardous wastes are present, unless or until such time as it has been determined that covering these containers with new sediments will not result in a loss of integrity of the containers, and a determination is made as to the necessity of remedial actions for any of the containers present within the MBDS;

- monitoring of the containers within the Foul Area is initiated, and assurances are made that such monitoring will be continued on a regular basis.

We look forward to working with the EPA and COE on this issue as it evolves, and offer our support and expertise if requested.

Sincerely,

Robert P. Edward
Conservation Assistant
New England Aquarium

cc Julie Belaga, Administrator, U S. EPA Region I
David Pierre, Dir., EPA Water Management Division
Kymberlee Keckler, Ocean Disposal Coordinator, EPA Water Quality Branch
Jefferey Benoit, Dir , Mass Office of Coastal Zone Management
Arleen O'Donnell, Asst. Commissioner for Resources Protection, Mass DEP
Brian Donhoe, Acting Director, Div of Water Pollution Control, Mass DEP
John Prescott, Exec. Dir , New England Aquarium
Paul Boyle, Director of Programs & Exhibits, New England Aquarium

Massachusetts Audubon: North Shore
159 Main Street
Gloucester, Massachusetts 01930
(508) 283-0598 / 744 2967

November 11, 1989

Ms Ann Rodney
MEP-1900C
JFK Federal Building
Boston, MA 02203

Dear Ms Rodney,

The Massachusetts Audubon Society welcomes the opportunity to submit comments on the EPA's Draft Environmental Impact Statement (DEIS) on the "Evaluation of the continued use of the Massachusetts Bay Dredge Material Disposal Site". We believe that the closeness of this site to the important fish and wildlife habitat of Stellwagen Bank, and the long term implications of ocean disposal warrant a careful analysis of the effects of past dredge disposal in this area. We urge that the EPA submit a revised DEIS that addresses the following issues·

1. Alternatives to the use of the present Massachusetts Bay Disposal Site (MBDS) should be considered We are not convinced that the EIS has conclusively shown that the continued use of the present MBDS is entirely suitable. The MBDS is on the border of Stellwagen Bank, a particularly valuable area for fish and marine mammals As the EIS points out, the MBDS contains many of the same species of fish, marine mammals, reptiles, and birds that occur on Stellwagen Bank. Disposal has led to deterioration of the habitat and (as indicated by the modelling) occasional water quality violations. If the present MBDS did not already exist, it is likely that it would not be considered an appropriate site for future dumping. We therefore urge the EPA to examine alternate ocean sites and land disposal options.

2. The amount and fate of suspended silt that is generated by dredge disposal, and does not settle out (estimated at 3-10% of the total material) should be measured empirically, since it was critical for modeling the amount of times that water quality criteria were exceeded (Tables 4.8 - 4.9). Calculations (p154-155) show negligible impact of this fraction on the background level of suspended particles in the area, however this is from one disposal event.

Specific questions we have concerning this material·

a. Is this fine particulate fraction likely to differ in its concentration of contaminants compared to the more coarse particles?

b. What are the cumulative impacts from repeated use of the area?

3. No data is presented on the contaminant levels of bottom fish caught in the MBDS. We believe it appropriate to measure contaminants in tissue samples of those species (witch flounder, plaice) that are most likely to be consumed by humans. The revised DEIS should address whether there are health risks associated with human consumption of these fish caught in the MBDS.

4. Certain benthic invertebrates had high levels of PCB's in their tissues. Does this place predators at risk through bioconcentration?

6 An important aspect of determining potential future impacts on this site is the projected future use of the area.

The pressure to dispose of dredge material at sea will likely increase as land sites near the ocean become more scarce. This is a good opportunity to examine alternative ocean and land disposal sites that would have less potential to impact fisheries and wildlife.

Sincerely yours,

Robert Buchsbaum

Robert Buchsbaum, Ph.D.
Coastal Ecologist

Printed on Recycled Paper

References

COE, 1988. Site Evaluation Studies of the Massachusetts Bay Disposal Site for Ocean Disposal of Dredged Material. US Army Corps of Engineers, New England Division.

P.S. Angela Sanfilippo, President of the Gloucester Fishermen's Wives Association, has asked me to convey to you the opposition of that organization to any continued dumping at MBDS because of the threats to the important fisheries resources in Massachusetts Bay.

CLF Conservation Law Foundation of New England, Inc

3 Joy Street
Boston, Massachusetts
02108-1497
(617) 742 2540
Fax (617) 523-8019

August 20, 1990

BY HAND

Kymberlee Keckler
US EPA, Region I, WQE-1900C
JFK Federal Building
Boston, MA 02203

Dear Ms. Keckler:

The Conservation Law Foundation (CLF) wishes to make the following comments on the Supplemental Draft Environmental Impact Statement for the Designation of Dredged Material Disposal Site in Massachusetts Bay (Supplemental DEIS), which supplemented the Draft Environmental Impact Statement· Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site (DEIS).

(1) Alternative site screening

The alternative site screening presented in the Supplemental DEIS addresses one of the two major deficiencies of the DEIS, the failure to consider alternatives to the exisiting site, the Massachusetts Bay Disposal Site (MBDS).

The first of the two phases of analysis, the delineation of a Zone of Siting Feasibility (ZSF), defines three areas where dredged spoil disposal for the Boston area would be economically feasible and could be conducted without adversely affecting environmentally sensitive areas or conflicting with existing incompatible uses. The three areas are northern Massachusetts Bay (NMB), southern Massachusetts Bay (SMB), and Murray Basin (MB). This part of the analysis appears to be adequate.

The second phase of analysis, the evaluation of alternatives and selection of a proposed site, is confused and unclear, with inconsistent use of two different geographic scales -- the three areas and specific smaller sites within each area. The confusion is well demonstrated in Table 4 (p 25-26): its title is "Evaluation of Alternative Dredged Material Disposal Areas Within Massachusetts Bay and Gulf of Maine", but it presents a comparison of three specific sites, one for each area The difference in geographic scale is important because some of the criteria used for evaluation vary from site to site within each area, criteria such as proximity to shipping and fishing, sediment dispersal/transport, and historic use for disposal. As an example, the advantages listed for the NMB area on p. 33 include historic use, but only a small part of NMB has been used historically for dumping (MBDS and the overlapping Industrial Waste Disposal Site), so this advantage does not apply to the whole area. Furthermore, the SMB area also contains a historically used dumpsite, but this was not credited to that area's advantage in the evaluation. There is no indication that the SMB dumpsite was considered.

Compounding the confusion is the fact that the specific sites used for evaluation for two of the areas, SMB and MB, are never identified or located on a map. The reader therefore has no idea what MBDS is being compared to. Furthermore, the major reference cited for the SMB site, COE 1985, is not included in the list of references.

For these reasons, the evaluation process is inadequate and fails to provide the analysis necessary for deciding between the three alternative areas.

(2) Proposal to move MBDS one mile to west

After recommending use of the NMB area based upon a comparison of MBDS to two unspecified alternative sites, the Supplemental DEIS concludes with a three sentence proposal to move MBDS to a new location, the discontinued Industrial Waste Disposal Site, which overlaps MBDS and is centered one nautical mile to the west. The brief justification for this proposal includes "a beneficial 'defacto' capping of the industrial waste site by disposing dredged material". In our comments on the DEIS, CLF recommended that this site be investigated, but the three sentences in the Supplemental DEIS do not begin to address the issues that need to be considered.

While the idea of using future disposal of dredged material to remediate contamination from past dumping is attractive, any implementation of it at the Industrial Waste Disposal Site must carefully distinguish between two types of contamination at the site: (1) contaminated sediments from past dredged spoil disposal and (2) potential contamination from containers of low level radioactive wastes and hazardous wastes. It seems clear that the contaminated sediments will be remediated only by covering with cleaner material, since the level of contamination is much too low to justify dredging and treatment, such as is planned for the PCB "hotspot" in the Achushnet River estuary in New Bedford, MA. The containers of waste, however, may merit retrieval.

It was the presence of those containers at the Industrial Waste Disposal Site and the desire to avoid covering them with dredged spoils that was the impetus for moving MBDS one mile to the east of the Industrial Waste Disposal Site when MBDS was originally designated to receive dredged spoils on an interim basis in 1977, according to William A. Hubbard of the New England Division of the Army Corps of Engineers (pers. comm). He stated that the rationale at the time was to keep open the option of future retrieval because of uncertainty about how to deal with the containers, and that it was the Commonwealth of Massachusetts that requested offsetting the two sites. Thus the proposal of the Supplemental DEIS to move MBDS one mile to the west would undo this earlier decision with no acknowledgement or discussion of it in either the DEIS or the Supplemental DFIS.

CLF maintains that the uncertainty about how to deal with the containers of wastes persists today and that boundaries for a reconfigured dredged spoil disposal site in the vicinity of the Industrial Waste Disposal Site cannot be drawn until the uncertainty is resolved and an important question is answered: Is it advisable to cover the containers with dredged spoils? If the answer is yes, then the boundaries of MBDS should be drawn to include all of the area with the densest concentration of containers. That area has been partially mapped with side scan sonar (see attached figure), but its northern extent would have to be determined. If, on the other hand, the answer to this question is no, then the boundaries of MBDS should be drawn to exclude the area with the densest concentration of containers.

The disposal buoy for MBDS is located south of the densest concentration of containers, so ongoing disposal of dredged material appears not to be affecting the containers. Therefore, the question about whether or not to cover the containers can and should be resolved with due deliberation and opportunity for public comment.

Despite the uncertainty about the waste containers, there are good reasons to redraw the boundaries for MBDS if a careful consideration of alternative areas results in selecting a site in northern Massachusetts Bay for final designation. The eastern half of MBDS appears to be essentially pristine and unaffected by past dumping, based on the results from side scan sonar and Remots surveys and from contaminant analysis of sediments. And the northeastern sector is probably unsuitable for dredged spoil disposal because of the strong slope upwards to Stellwagen Bank. It would be desirable to limit the disposal site to areas already affected by past dredged spoil disposal (plus areas affected by past dumping of containers, if covering them is judged to be advisable) and to relatively flat areas

Conservation Law Foundation of New England, Inc.

(3) Continuing failure to address bioaccumulation of toxicants

The second major deficiency of the DEIS -- insufficient attention to bioaccumulation of toxicants -- is not addressed in the Supplemental DEIS. This concern was raised by the National Marine Fisheries Service (NMFS) in their scoping comments of April 5, 1988 and by several commenters to the DEIS, CLF and NMFS included. It is clear that past disposal practices have resulted in elevated concentrations of heavy metals, PCBs and PAHs in sediments at MBDS, and the few samples taken of benthic invertebrates show significant bioaccumulation of PCBs and PAHs. Except for a few flounder specimens taken recently, for which the results have not yet been reported, no samples of lobsters or bottom-feeding fish from MBDS have been analysed to find out how far up the food chain these persistent toxicants have moved and what concentrations have been reached in edible seafood.

This continues to be an important gap in the information needed to assess the advisability of continued disposal of dredged spoils at or near MBDS. We know from experience at New Bedford Harbor and at Boston Harbor that these contaminants have adversely affected the marine life and the edibility of seafood in those two places. We do not know how much of a threat dredged spoils present to the marine resources of Massachusetts Bay.

Therefore we do not agree that the DEIS has established that there are "no significant effects from either existing operations or future use of the site" (Supplemental DEIS, p. 34). We repeat our request that the Final EIS address the issue of bioaccumulation of persistent toxicants, and we maintain that the EIS will be inadequate if it fails to do so.

Thank you for your consideration of these comments.

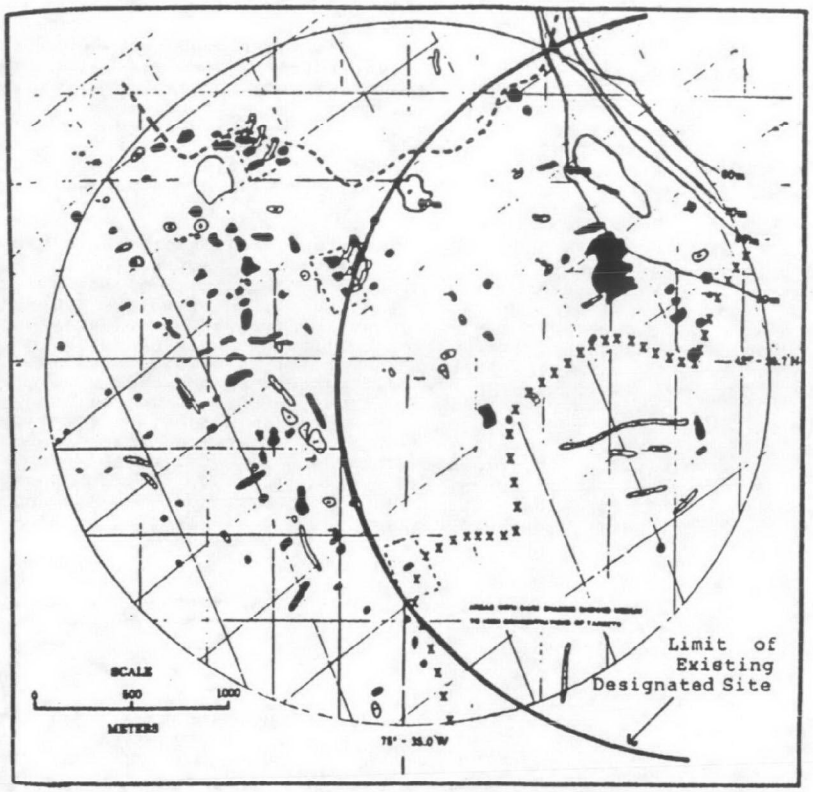
Sincerely,

Eleanor M. Dorsey

Eleanor M. Dorsey
Staff scientist

Attachment

Figure 3.A.2-48 Distribution of sediment facies at MBDS as determined from side scan sonar and REMOTS surveys. (See section 1.2.4 of report for detailed description of sediment types.)



----- : southern boundary of uniform bottom containing a large number of hard targets.

xxxxx : northern boundary of uniform bottom containing a few dredged material deposits.

: areas of medium to high densities of targets.

Figure 3.A.2-49 Analysis of side scan sonar survey in the vicinity of MBDS indicating locations of high reflectance

source: Hubbard, Penko + Fleming. 1988. Site Evaluation Studies of the Massachusetts Bay Disposal Site for Ocean Disposal of Dredged Material. US Army Corps of Engineers, New England Division.

Center for Marine Conservation
Formerly Center for Environmental Education Est 1972

Jack Sobel, Director
Marine Protected Areas Program
Center for Marine Conservation
Suite 500
1725 DeSales Street, NW
Washington, DC 20036

Paul G. Keough
Acting Administrator
Region #1
U.S. Environmental Protection Agency
JFK Federal Building
Boston, MA 02203

COMMENTS ON THE "DRAFT ENVIRONMENTAL IMPACT STATEMENT" FOR THE MASSACHUSETTS BAY DREDGED MATERIAL DISPOSAL SITE DESIGNATION

Dear Mr. Keough:

I am writing to comment on the "Draft Environmental Impact Statement (DEIS)" on the Massachusetts Bay Dredged Material Disposal Site (MBDS). I heard you speak last week at the Growth Management Forum at Tufts University where you criticized private interests and other agencies for their unwillingness to comply with the National Environmental Policy Act (NEPA) and pledged continued tough implementation and enforcement of NEPA by your agency. Although these words sounded good and were no doubt well-intended, EPA's stated policy that the agency is not compelled to follow NEPA and Council on Environmental Quality requirements with regards to completion of EIS's raises questions about the agency's commitment to the NEPA process. This is particularly relevant with regards to the recently released DEIS on the MBDS which I believe is clearly in violation of both NEPA and EPA's own regulations and procedures for designating ocean disposal sites.

I would like to state from the start that I do not necessarily oppose the designation of the MBDS. Rather, I have serious questions about the designation and feel strongly that the DEIS does not provide the necessary information for either the public or a decision-maker to properly evaluate this action. I am particularly concerned about the agency's failure to consider any alternatives to designation in the DEIS and the justification that has been given by EPA employees for this failure.

NEPA clearly requires that federal agencies discuss in detail alternatives to a proposed action in an EIS so that a decision-maker can consider them along with the proposed action in determining a course of action (NEPA Sec. 102(2)(C)(iii)). The implementing regulations issued by the Council on Environmental Quality (CEQ) make this responsibility even clearer, "...(The EIS) shall inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts..." (CFR 1502.1); "(The alternatives) section is the heart of the EIS...it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options...In this section agencies shall rigorously explore and objectively evaluate all reasonable alternatives...devote substantial treatment to each (reasonable) alternative...so that reviewers may evaluate their comparative merits. (CFR 1502.14). These implementing regulations also clearly state that "EIS's shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made." (CFR 1502.1.).

The DEIS for the MBDS is seriously deficient with regards to these requirements and a host of others as well. It is clearly a document meant to justify a decision that has already been made (which it also fails at) and not to objectively assess alternatives. From discussions with EPA personnel, I understand that EPA's rationale for not fulfilling these requirements stems from EPA policy spelled out in the Federal Register on May 7, 1974 [FR 39(89)] and based on a Federal Court of Appeals ruling that EPA is not bound by NEPA to prepare EIS's for its environmentally protective activities and therefore need not adhere to NEPA requirements if it voluntarily elects to prepare an EIS. The Appeals Court ruling in no way justifies EPA's current failure to complete a valid EIS. To begin with, there is general agreement that the exemption derived from the decision does not apply to all EPA actions. A strong argument can be constructed that this decision would not apply to the designation of a disposal site since it is not an environmentally protective activity. However, even if one accepts that the court decision does apply to this EIS, it still does not justify non-compliance with NEPA.

The fallacy in EPA's attempt to use this court decision to avoid NEPA requirements involves the same Doctrine of Functional Equality which was used to decide the court case. The court decision was based on the argument that the purpose of NEPA was to incorporate environmental planning into the federal decision-making process and that EPA as an agency created to protect the environment could develop its own procedures for doing so in carrying out environmentally protective measures provided that they were functionally equivalent to NEPA requirements. However, such measures must be functionally equivalent. Since the EIS is a critical part of the NEPA process and the alternatives section is the heart of an EIS, it is inconceivable that EPA's actions could be considered functionally equivalent to a NEPA required EIS; nor can the other procedures used by EPA in attempting to designate this site be considered functionally equivalent to NEPA.

1725 DeSales Street, NW Washington DC 20036 (202) 429-5609 Telefax (202) 872-0619

Furthermore, EPA's failure to consider alternatives to the proposed action is also in violation of its own procedures. Possibly in recognition of the above arguments, EPA issued procedures for the "voluntary" preparation of EIS's for certain of its actions including the designation of disposal sites on October 21, 1974 [FR 39(284)]. Regardless of its reason for issuing these procedures, EPA is presumably bound to follow its own procedures. These procedures are "in general accordance with CEQ's Guidelines of August 1, 1973" which implement NEPA. EPA's own procedures require EIS's in general to "(Include) Alternatives to the proposed action. Describe and objectively weigh reasonable alternatives to the proposed action, to the extent such alternatives are permitted by law. The analysis should be sufficiently detailed to reveal the Agency's comparative evaluation of the beneficial and adverse environmental, health, social, and economic effects of the proposed action and each alternative, including the uncertainty associated with the evaluation." These general alternative requirements continue for some length and can be found in Section 3 of these procedures. Section 4(b) of the procedures requires that "the following specific alternatives also be included: alternative types of dumped materials; alternative amounts of material; alternative frequencies of dumping; alternative dumping techniques; alternative dumping sites within and outside the proposed areas; and the use of multiple sites to reduce dumping at individual sites."

CEQ's Guidelines for implementing NEPA state that the alternatives section is the "heart of an EIS" and EPA's procedures are in "general accordance' with CEQ's Guidelines. The alternatives section of the 200 plus page MBDS DEIS is 1 1/2 pages long. I believe that the 1 1/2 pages devoted to the heart of this document is indicative of its adequacy. In order to fulfill its purpose and comply with both NEPA and EPA's own procedures, considerable rewriting of this document is necessary.

With regards to the alternatives section, I think that all of the alternatives required to be discussed should be considered. I feel that consideration of alternative dumping sites both within and outside the dumping area and alternatives regarding the amount and type of material are of particular importance. EPA personnel have argued that they need not consider alternative sites because they are required to designate historical sites if feasible. This argument is not valid for two reasons. The first is that historical sites are to be preferred only if no other site is environmentally preferable. Unless alternatives are evaluated, such a judgment can not be made. Even EPA's own Ocean Dumping Site Designation Handbook recognizes this and develops a three phase process to ensure that alternatives are considered and that the most environmentally acceptable site is designated. However, this Handbook and the three phase process outlined in it seem to have been ignored in this designation process. Why was this process not followed? Was a Zone of Siting Feasibility determined? If so, what was it

and why wasn't it mentioned in the DEIS? If not, why wasn't it? Were sensitive and incompatible areas for dumping identified and eliminated from consideration? If so, what areas were these? Above all, why were additional candidate sites not selected, evaluated and a determination made as to which was most environmentally acceptable? The second point is that other historically used sites such as the industrial waste site just to the West of the proposed site and other previously designated disposal sites need to be considered.

The argument which EPA has forwarded that this DEIS need not consider alternatives unless it is determined that the site in question is not feasible is totally invalid. The term feasible has been defined by EPA to include being the most environmentally acceptable which as discussed above cannot be done without considering other sites. The other argument forwarded by EPA for not considering alternatives is that alternatives will be considered during the permitting process. This is totally absurd. Even if it is true that alternatives will be considered at that time, this would not relieve EPA of its responsibility to consider them during designation.

EPA's Ocean Dumping Regulations contain both general and specific criteria to be used in the selection of disposal sites. The general criteria (40 CFR 228.5) state that "(a.) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interferences of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries..." and that "(b.) Location and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient sea water levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery." Under specific criteria, the regulations continue to state that the selection of disposal sites will consider "(2.) Location in relation to breeding spawning, nursery feeding or passage areas of living resources in adult or juvenile phases;...(7.) Existence and effects of present and previous discharges and dumping in the area...(8.) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean...(11.) Existence at or in close proximity to the site of any significant natural or cultural features of historic importance."

The MBDS lies within a few kilometers of Stellwagen Bank. Stellwagen Bank is currently an active candidate for marine sanctuary status and is likely to be designated in the near future. This fact alone should have received careful consideration and discussion in the DEIS rather than the cursory paragraph that was spent on it. EPA's justification for not

considering it further was that it has not yet been designated. This explanation is unacceptable. While not yet a marine sanctuary, Stellwagen Bank is clearly an area of "existing (and extremely productive) fish and shellfisheries", "a geographically limited fishery and shellfishery", and "(an important) breeding, spawning, nursery, feeding, and passage area for a (tremendous assortment) of living resources (including several endangered whale species) in adult and juvenile phases", "an area of special scientific importance, recreation and other legitimate uses of the ocean", and "an area of significant natural and cultural features of historic importance."

EPA's criteria require a careful discussion of such an area in an EIS focusing on the designation of a disposal site in close proximity to it and a discussion of possible impacts. A mere paragraph mentioning that Stellwagen Bank is not yet a sanctuary is simply not sufficient. Even if EPA wasn't already bound to consider alternative sites, the existence of a site such as Stellwagen in such close proximity to MBDS would necessitate such consideration. Certainly this area deserves more than a brief dismissal.

Furthermore, although somewhat cryptically written, the document does contain information that impacts from current dumping do extend outside the disposal site for distances of up to several kilometers. Elevated levels of heavy metals including copper and other toxins are found in sediments at considerable distances from the site and are believed to be due to drift of smaller particles of dumped dredge material. Such impacts could threaten the resources of Stellwagen Bank and need to be more directly addressed and alternatives to the site that would be environmentally preferable must be considered. Such alternatives should include moving the site further to the West to the degree that impacts on other areas do not become a problem. Also, areas well to the east of Stellwagen Bank such as Wilkinson Basin should be considered.

I recognize that Region 1 EPA has a well earned reputation for its efforts to protect New England's environmental quality. However, I believe the concerns raised about this DEIS need to be addressed to match that reputation. I trust that EPA will address them and the resulting EIS will do justice to that reputation and be a model for others to follow.

Sincerely,

Jack Sobel

Jack Sobel
Director, Marine Protected Areas

Center for Marine Conservation

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Jennifer McCann
Center For Marine Conservation
1725 DeSales st., NW
Washington, DC 20036

August 20, 1990

Gwen Ruta
Chief of Marine and Esutarine Division
Region #1
U.S. Environmental Protection Agency
JFK Federal Building
Boston, MA 02203

Dear Ms. Ruta:

I am writing on behalf of the Center for Marine Conservation (CMC) to comment on the "Supplemental Draft Environmental Impact Statement (SEIS)" for the Designation of the Dredged Material Disposal Site (MBDS) in Massachusetts Bay Although CMC is not necessarily opposed to the dumping of clean spoils at the Foul site we continue to have concerns regarding the proposed designation In particular the failure of EPA to consider a number of required alternatives in either the DEIS or SFIS violates EPS's own established procedures and raises questions on the adequacy of available information for making an informed decision. It is also essential that further studies on the existing contaminants in the Foul area and the affects of capping these containers take place before this area can be permanently designated as the Massachusetts Bay Dredged Material Disposal site If studies reveal that capping of this area should not occur, dumping at this site should not take place and appropriate remediation for existing contaminants should follow In addition, wherever the dump site is located, a management plan with strict regulations concerning such items as the dumping volume, cleanliness, frequency of dumping and material types should be developed and enforced A monitoring program should also be implemented to follow potentially adverse effects of continued dumping Construction of a contained site to hold waste that is, according to the strict regulations, too contaminated to be ocean dumped should begin immediately

Presently, inadequate information is known about the radioactive and hazardous waste containers and other dumped waste in the Foul site and throughout Massachusetts Bay including their contents, condition and how they are affecting the marine environment. According to published documents including several from EPA, dredged sediments, explosives, toxic wastes, construction wastes, abandoned vessels and radioactive waste make up the majority of the past dumped waste in Massachusetts Bay. In 1980, Dr. Roger Mattson testified at a hearing before the Subcommittee on Oceanography of the House of Representatives that the majority of the Massachusetts Bay dumping appears to have been done within two overlapping sites, the Massachusetts Bay Disposal Site, and the Foul Site. An estimated 90,000 radioactive waste containers were dumped somewhere between Gloucester to Plymouth and out to Georges Bank from approximately 1946-1970.

The most recent study to verify that there is no leakage of these radioactive containers in Massachusetts Bay was done in 1981 and 1982 by the EPA, NOAA and FDA. The study identified where containers were located in the Foul Site. It also identified that it was likely there were containers of radioactivity in the area and that they were not leaking. This study was done nearly ten years ago A study to test if there is any leaking from these containers should be done on a regular basis.

In 1987 a preliminary assessment of the area was completed by The Superfund Program. Its results recommended that no further action would be taken on the site. This decision was based on incomplete and limited knowledge of the waste present on site. There is no known summary of the quantities and types of hazardous wastes dumped overboard, but according to Robert Margolis' 1990 report on "Two Ocean Disposal Sites in Massachusetts Bay: Past and Future Actions Under the Superfund", carcinogens, toxic heavy metals and toxic organic compounds have been documented. In addition, most hazardous waste was probably packaged less securely than the low level radioactive wastes which were embedded in 4-5 inches of reinforced concrete

What was dumped and especially what condition this waste is in now is virtually unknown. Leaking of these radioactive and contaminated containers can occur at any time and harm the marine environment. It is imperative to begin and continue monitoring and studies of this area on a regular if not ongoing basis to know the progress these contaminants may have on the marine environment. With more studies to identify such things as the conditions of these existing containers and also the affects of capping, a responsible decision can be made on whether the capping of these contaminants is appropriate remediation for these containers or the easiest way to deal with the problem and the beginning of a possible catastrophe The Gulf of the Farallones is presently dealing with the problem of the leakage of radioactive containers. Leakage has contaminated nearby sediments and fish.

Hazardous and radioactive waste containers are not the only

Center for Marine Conservation

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Jennifer McCann
Center For Marine Conservation
1725 DeSales st., NW
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August 20, 1990

Gwen Ruta
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Presently, inadequate information is known about the radioactive and hazardous waste containers and other dumped waste in the Foul site and throughout Massachusetts Bay including their contents, condition and how they are affecting the marine environment. According to published documents including several from EPA, dredged sediments, explosives, toxic wastes, construction wastes, abandoned vessels and radioactive waste make up the majority of the past dumped waste in Massachusetts Bay. In 1980, Dr. Roger Mattson testified at a hearing before the Subcommittee on Oceanography of the House of Representatives that the majority of the Massachusetts Bay dumping appears to have been done within two overlapping sites, the Massachusetts Bay Disposal Site, and the Foul Site. An estimated 90,000 radioactive waste containers were dumped somewhere between Gloucester to Plymouth and out to Georges Bank from approximately 1946-1970.

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In 1987 a preliminary assessment of the area was completed by The Superfund Program. Its results recommended that no further action would be taken on the site. This decision was based on incomplete and limited knowledge of the waste present on site. There is no known summary of the quantities and types of hazardous wastes dumped overboard, but according to Robert Margolis' 1990 report on "Two Ocean Disposal Sites in Massachusetts Bay: Past and Future Actions Under the Superfund", carcinogens, toxic heavy metals and toxic organic compounds have been documented. In addition, most hazardous waste was probably packaged less securely than the low level radioactive wastes which were embedded in 4-5 inches of reinforced concrete.

What was dumped and especially what condition this waste is in now is virtually unknown. Leaking of these radioactive and contaminated containers can occur at any time and harm the marine environment. It is imperative to begin and continue monitoring and studies of this area on a regular if not ongoing basis to know the progress these contaminants may have on the marine environment. With more studies to identify such things as the conditions of these existing containers and also the affects of capping, a responsible decision can be made on whether the capping of these contaminants is appropriate remediation for these containers or the easiest way to deal with the problem and the beginning of a possible catastrophe. The Gulf of the Farallones is presently dealing with the problem of the leakage of radioactive containers. Leakage has contaminated nearby sediments and fish.

Hazardous and radioactive waste containers are not the only

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The development of an advisory committee composed of members from the scientific and marine studies communities is also looked upon favorably. This committee could assist and assure that management of this area is functioning properly

We cannot continue to use our oceans as a dumping basin that can handle anything. It too has a limit of what it can take

Sincerely,

Jennifer McCann
Marine Protected
Areas Specialist

Center for Coastal Studies

A Private Non Profit Organization for Research and Education in the Coastal Environment

59 COMMERCIAL STREET • BOX 826 • PROVINCETOWN • MASSACHUSETTS 02657 • (508) 487 3622

August 16, 1990

Kymberlee Keckler
US Environmental Protection Agency
JFK Federal Building
Boston, MA 02203-2211

Dear Ms. Keckler,

Thank you for the opportunity to comment on the Supplemental Draft Environmental Impact Statement regarding the designation of the Massachusetts Bay Disposal Site.

The Center for Coastal Studies is a research and conservation institution located in Provincetown, Massachusetts. For the past fifteen years, scientists from the Center for Coastal Studies have been involved in research projects related to the ecology of Massachusetts and Cape Cod Bays; most of this research has focused on the whales that inhabit the region throughout the year and the integrity of the ecosystem that supports these animals. Ongoing studies funded in part by the National Marine Fisheries Service include population studies of humpback whales, Megaptera novaeangliae , fin whales, Balaenoptera physalus , and feeding ecology of North Atlantic right whales, Eubalaena glacialis.

Our concerns as they relate to dredged material disposal, therefore, are based on our knowledge of the Massachusetts Bay ecosystem and the niche occupied in it by marine mammals.

After reviewing the alternative sites proposed by the EPA, we support the idea of maintaining the MBDS at the existing site, where the shallower water depth will allow for easier monitoring. We would encourage a more stringent monitoring program than currently exists, with monitoring of sediment dispersal, heavy metals, hydrocarbons and other pollutants conducted by the EPA with oversight by NOAA and a local Citizens Advisory Group. Since the Supplemental DEIS does not adequately address some of the concerns originally expressed by NMFS regarding continuation of this site and its potential impact on fisheries resources, we would strongly support a monitoring program in which NOAA/NMFS plays a strong role.

Since existing regulations allow for considerable variation in the quality of dredged materials that are permitted for dumping, we would like to stress that any spoils taken to the site should be approved for disposal under the most conservative approach possible. Standards which are considered acceptable for offshore deepwater areas are not necessarily acceptable for an inshore environment with high fishery concentrations.

We would at this time oppose extending the location of the MBDS westward to coincide with the area of the industrial waste site in order to use clean dredged material as a cap for the industrial site. As expressed in the original DEIS, capping of any site remains a controversial approach to mitigation. Although testing results may at some future point change our standing on this issue, we believe no capping of the industrial waste site should occur until the following problems are clearly resolved:

1. The exact location, number, and content of the barrels of hazardous material that have been disposed of at the industrial site remain unknown, and further studies should be conducted to locate these barrels and determine their condition before the dumping of additional material is undertaken;

2. Testing of the sediments surrounding the industrial site to determine possible contamination should be conducted prior to any attempt at capping, and we would strongly encourage the EPA, NOAA, and the Commonwealth to attempt to obtain Superfund support for such testing. Apparently the Foul Area was added to the list of potential Superfund sites in 1981, at which time no action was taken;

3. Should a capping operation eventually begin, we concur with NOAA's belief that dredged spoil disposal should result in a sediment cap of at least six inches to prevent to the greatest possible degree sediment transport from oceanographic processes and from sediment reworking by benthic organisms.

We understand that it is highly unlikely that any dredged material from the Boston Harbor area will pass EPA standards for disposal of clean dredge spoils. We would therefore strongly support a different containment site, preferably a non-marine site located a safe distance from any fishery resources or endangered marine mammal habitats, and would once again urge the EPA and COE to use conservative standards when issuing permits for disposal of Boston Harbor materials.

Both the MBDS and the industrial waste site are likely to be located either inside or just outside of the proposed Stellwagen Bank National Marine Sanctuary. Whether they are specifically included in the sanctuary or not, any contamination at the site has the potential to impact sanctuary resources. We would therefore urge that any Citizens' Advisory Board include the NOAA Stellwagen Sanctuary Manager if/when sanctuary designation occurs.

We also support the decision of the Stellwagen Sanctuary Coalition Steering Committee which suggests that both the industrial waste site and the MBDS be included within sanctuary boundaries. EPA supports the view that the MBDS should be located outside of sanctuary boundaries, while at the same time noting that "dredged material disposal at the existing MBDS will not significantly adversely affect the marine resources of Stellwagen Bank." The DEIS assures that "the combination of the COE's permitting process, adequate disposal site monitoring, use of the revised dredged material testing protocol, evaluation of the existing reference site, and continuing research programs will ensure proper management of the site", yet there appears to be

a conflict with the additional statement that "the actual area of Stellwagen Bank has been excluded from the ZSF (Zone of Siting Feasibility) to protect marine fisheries resources and threatened or endangered species."

If indeed the MBDS represents no threat to sanctuary resources, then there should be no objection to including it within the proposed boundaries. If the threat does exist, then locating the MBDS inside the sanctuary will permit additional monitoring of potential impact.

We would strongly urge that seasonal disposal criteria for the site also be adopted. Coastal phytoplankton blooms reach a peak period in the early spring, and sediment dispersal during this period with its associated increase in turbidity and decreased light penetration, could have an adverse impact on phytoplankton production. Decreased phytoplankton production is likely to result in lowered zooplankton production, or an overall shift in species composition of the plankton. Should this occur, even on a temporary basis, it has the potential to affect the single food resource of the North Atlantic right whales in this area. calenoid copepods of the genera Calanus and Pseudocalanus. In the case of species literally teetering on the brink of extinction, as is the northern right whale, any negative impact on food resources, however slight, may be hazardous to their future recovery.

I hope that these comments are useful.

Sincerely,

Karen L. Steuer

Karen L. Steuer
Director of Conservation and Educational Programs
Center for Coastal Studies

August 10, 1990

U.S. Environmental Protection Agency, Region 1
Marine and Estuary Protection Section
John F. Kennedy Federal Building (WQE-1900)
Boston, MA 02203-2211

Dear Sirs:

On behalf of the International Wildlife Coalition, representing a membership of 110,000, we offer the following comments pertaining to the Supplemental Draft Environmental Impact Statement for the Designation of Dredged Material Disposal Site in Massachusetts Bay.

The International Wildlife Coalition is a non-profit wildlife organization with key interests in the research and protection of marine mammals, sea turtles and their habitats, particularly in New England waters.

After reviewing the Supplemental DEIS, we have concluded that the continued disposal of dredged materials at the Massachusetts Bay Disposal Site ("MBDS"), historically termed the Foul Area, should not be allowed. We believe that ocean disposal guidelines specified within the Marine Protection, Research and Sanctuaries Act ("MPRSA") have not been fully addressed.

Hence, we believe that the continued use of the MBDS has the potential to negatively impact ecological systems within the marine environment for the reasons stated below:

1) Essential in situ studies required to fully understand and address the physical and biological processes that occur at the MBDS are not available. Data on wind speeds, directions and durations pertinent to resuspension rates of disposed materials have not been recorded for the MBDS area. The DEIS utilized wind measurements taken at Logan Airport for 1981. The DEIS indicates that the use of this data may have underpredicted actual sediment resuspensions at MBDS because speeds at Logan are lower than at MBDS and 1981 was a relatively calm year with respect to wind speeds.

Detailed on-site information concerning potential physical disturbances caused by currents and waves is also unavailable. There is a need to address the modes of sediment transport and erosional rates for disposed materials of varying composition. Data pertaining to biological factors operating at MBDS are unsatisfactory. Studies evaluating the stabilizing and/or destabilizing effects of bioturbation are inconclusive. Also incomplete are studies pertaining to the occurrence and abundance of fish eggs, larvae and fish communities at MBDS and the effects of environmental stresses on these marine species.

2) The long-term effects of material previously disposed at MBDS are impossible to accurately predict because the exact location and chemical composition of materials has not been effectively monitored or managed. Prior to the 1940's, MBDS and surrounding waters were used for unregulated dumping of materials of unknown composition. As a result, the chemical composition of the majority of materials disposed at MBDS was not analyzed; this resulted in the disposal of some dredged material that were considered "contaminated". Furthermore, the lack of appropriate disposal controls in the past has resulted in the presence of dredged materials beyond the MBDS boundary and uncategorized industrial material within the MBDS boundary.

3) Unavailability of necessary data to corroborate EPA's conclusion that the majority of contaminated materials disposed at MBDS are physically and biologically contained on-site. Studies at MBDS indicating the distribution, abundance and present levels of contamination of phytoplankton and zooplankton have not been done. The DEIS indicates that during disposal activities, there is the potential for prolonged exposure of neuster organisms to halogens, organohalogens and heavy metals. More specifically, LMC exceedances for copper, lead, mercury, nickel, zinc and CCC exceedances of copper, lead, mercury and PCB are expected. At present, no information exits concerning the physical absorption and bioaccumulation of these chemical contaminants by phytoplankton, zooplankton and ichthyoplankton.

Similar information on the demersal and pelagic community has been attempted, but is incomplete. The DEIS also acknowledges the lack of quantitative or conclusive data concerning sediment contamination and the associated effects on these organisms. In general, effects including toxicity, reduced reproductive potential, bioaccumulation and pathological alterations in resident and transient marine organisms utilizing MBDS is lacking. The cosmopolitan and migratory nature of many fish species requires that more detailed analysis of marine species, especially preferred prey-species for marine mammals (sand lance, mackerel and herring), be conducted.

4) Due to its close proximity to Stellwagen Bank, disposed materials at MBDS have the potential to degrade or endanger an environmentally sensitive area. Stellwagen Bank, a glacial

deposit of sand and gravel in the southwest Gulf of Maine, is located 5.5 km to the east of MBDS. This unique bathymetric feature supports a rich level of biological productivity and diversity. It is the preferred habitat of many endangered and threatened species, including marine mammals and marine turtles.

The north Atlantic right whale, a critically endangered species, utilizes waters of Cape Cod Bay and Massachusetts Bay generally from late-winter to early-spring. During these months, the abundance, distribution and movements of individual right whales are not well documented due to reduced sighting effort combined with inclement weather conditions offshore. Research indicates that this area may be a critical habitat with respect to the breeding success of the population. Furthermore, the large proportion of mother/calf pairs sighted in early spring suggests that southern New England waters may also be an important, though temporary, nursery area.

Potential summer use of this area as a critical feeding and nursery area was indicated by documented sightings during 1986. In response to shifts in prey abundance, 174 individual right whales were sighted in Massachusetts Bay and Cape Cod Bay (Mayo pers. comm.). Many of these whales were mother/calf pairs who stayed in the area for extended periods of time.

Five species of marine turtles (4 are endangered and 1 is threatened), are known to reside in New England waters, primarily during the summer and fall months. Past research indicates that these waters are important feeding areas for many turtle species, especially young Ridley's turtles and leatherbacks (Prescott, pers. comm). However, little is know about the abundance, small-scale movements or critical areas utilized by marine turtles during their residency.

Demographic information on marine turtles is probably inaccurate (with population estimates biased downward), due to their limited detectability at sea. Because sea turtles in New England waters are typically juveniles (except for the leatherback), their small size is not conducive for detectability by shipboard or aerial surveys. Research on adult female Ridley's, migrating to and from their nesting beaches, indicates that these individuals spend the majority of their time beneath the surface. Small size and long dive times, combined with reduced water clarity and surface glare can alter visibility and therefore, reliability of species identification and counts.

Species identification and counts are also obtained from stranding information on cold stunned turtles which wash ashore on Cape Cod beaches during late fall and early winter; not all stranded turtles are accounted for (as a result of offshore currents, extensive marshlands and inconsistent human effort) (Prescott, pers. comm.). Many regard marine turtles in New England waters as "waifs" which are lost to the population and, therefore, are of little concern. However, present numbers of sea turtles are very low and this dictates that we pay more attention to small losses in any area of their range.

5) NMFS commercial catch statistics indicate that the waters surrounding the MBDS represent a productive fishery resource. Many of the recreational and commercial activities occurring in the area are based on the observations or takes of marine organisms. Examples include but are not limited to whalewatching and commercial fishing for bluefin tuna.

Both whales and tuna are highly mobile pelagic species whose movements and distribution can vary seasonally and yearly, depending upon water temperature and prey-species availability. Although the DEIS indicates that MBDS does not presently represent a crucial area for either whales or tuna, this region could become an important habitat in the future. Furthermore, the Supplemental DEIS indicates that MBDS is just to the west of the high-use boundry for commercial fishing and sportfishing. Any degradation of resources in the MBDS region could negatively affect the commercial activities (hence, the economic livelihood) of many New Englanders.

6) Ocean disposal activities at MBDS have the potential to impact a marine sanctuary currently under review. The National Oceanic and Atmospheric Administration ("NOAA") is reviewing Stellwagen Bank for designation as a national marine sanctuary. The Stellwagen Bank Steering Committee, the EOA for the Commonwealth of Massachusetts and the Gloucester Fishermen's Wives separately recommended boundaries that include MBDS. If Stellwagen Bank is awarded sanctuary status with boundaries including MBDS, than increased monitoring and management of disposal activities at MBDS or the complete halt to all such activities may occur.

The International Wildlife Coalition does not recommend the continued use of MBDS as a repository of dredged materials. If continued use of MBDS is deemed the best alternative, then we believe that the precautionary measures listed below must be taken to more fully insure the health of the marine environment.

1. If the boundary of MBDS is extended to include portions of

the Industrial Waste Site, then hazardous material previously disposed in these areas must be studied. The location and abundance of drums which contain radioactive and toxic material must be determined as well as the degree of leakage from such containers. Drums containing hazardous waste which pose as a threat to marine resources must be removed before further use of the area is allowed to continue

2. NOAA should be involved in the evaluation and categorization of candidate disposable dredged material and should be instrumental in monitoring disposal activities.

3. A Citizen s Monitor Group should be created to help monitor and assess disposal activities at MBDS. If Stellwagen Bank is given sanctuary status and MBDS is included within its boundaries, then the manager for this sanctuary should be a member of this group.

4. On-site comprehensive studies evaluating physical, chemical and biological processes are required to fully assess impacts of disposal activities at MBDS to marine resources Data pertaining to physical processes, such as wind and current measurements, are required to more accurately determine not only the degree of material transport during disposal activities, but also the rates of resuspension and erosion for disposed materials Research indicating the abundance and distribution of planktonic species and the degree of bioaccumulation of toxins in marine organisms must be conducted in order to assess the degree of trophic transfer within the marine food chain.

5 Ongoing studies monitoring and assessing disposal activities at MBDS are required to more fully evaluate impacts to resident and transient marine organisms, especially those endangered or threatened. To date, data does not indicate that the MBDS area is a critical habitat for any species of sea turtle or cetacean, including the Ridley s turtle and the north Atlantic right whale. However, seasonal and annual variability in sighting data for many of these species indicates this area could berome a critical habital in the future.

Thank you for the opportunity to comment.

Sincerely,

Carol Lynn Danton

Carol Lynn Danton
Project Coordinator

Carole A. Carlson

Carole A. Carlson
Cetacean Biologist

International Wildlife Coalition

Give Nth

Cetacean Research Unit

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WWP-WQB

U.S. Environmental Protection Agency, Region I
JFK Federal Building
Water Quality Branch
Boston, MA 02203

November 10, 1989

To Whom it May Concern,

We have carefully reviewed the Draft Environmental Impact Statement entitled "Evaluation of the Continued Use of the Massachusetts Bay Dredged Material Disposal Site," and would like to offer commentary. Specifically, we would like to address the potential impact of continued use of the Massachusetts Bay Disposal Site (MBDS) to endangered cetaceans that are found in and around the site.

The Cetacean Research Unit (CRU) has been studying the distribution, ecology, demography, and behavior of baleen whales along the New England coast since 1979. During that period, our studies have centered around the waters containing and adjacent to northern Stellwagen Bank. This study area also includes the MBDS. We feel that our research from which much of the information contained in the DEIS is drawn, makes us well qualified to assess baleen whale distribution in relation to the site, and the potential effects of the proposed action on these endangered species.

Fin whales (Balaenoptera physalus) are the most abundant endangered cetacean found in the MBDS. Although absolute numbers of humpbacks seen in the MBDS are higher than fin whales, these data come from directed searches for humpbacks and will tend to under-represent fin whale abundance. However, our data does not always indicate that residency time in and around MBDS is minimal (DEIS, pg. 141). While it is true that many individuals move out of the area after 1-7 days, residency in the vicinity of MBDS of up to three months has been documented. The difficulty in identifying individual fin whales probably results in an under-representation of residency times, although the degree of this effect remains unknown.

Localized movements of fin whales around the northern Stellwagen/MBDS is clearly tied to movements of prey. Exact prey varies - from 1979-1985, sand lance were clearly preferred; in

P O. Box 159 * Gloucester MA 01930 * 508 281 6351
A non-profit organization emphasizing whale research and education

1986 and 1987, however, significant levels of feeding on copepods (Calanus finmarchicus), small mackerel (Scomber scombrus), and euphausiids (Megancytiphanes norvegica) were seen. This clarifies the statement that schooling fishes are preferred prey; while true much of the time, it is not an absolute, as implied in the DEIS. This is significant - even in years when humpback whales (Megaptera novaeangliae) moved away from the northern Stellwagen/MBDS area, significant use by fin whales was still observed. Many of the sightings during 1986-7 were in the MBDS area.

While humpback whales are not found around the MBDS as consistently as fin whales, there is still significant habitat use in the area. The DEIS states that "Concentrations of whales are usually greatest in summer and early fall and lowest in winter and early spring." While we do not question that the period of mid-November to late March is one of little humpback use of the MBDS area, sightings at any point between April and mid-November have been documented. In 1985-1989 inclusive, significant aggregations were seen on northern Stellwagen during April, even in years of near absence during summer months (1986 -1987).

During the periods that humpback whales have been abundant on northern Stellwagen, smaller numbers of whales were frequently seen in the immediate vicinity of the MBDS. These were, at various times, adults making foraging transits from the Bank, juveniles that may be excluded from the larger feeding groups around the Bank, and mother/calf pairs. It is the latter group that were most frequently seen in the immediate vicinity of the MBDS in the 1988-9 field work. Large feeding groups have been sighted in the immediate vicinity of MBDS as well.

While the DEIS indicates that survey data for right whales (Eubalaena glacialis) exists only from 1985 (pg. 142), it in fact exists only since 1985. Spring surveys carried out by our organization suggest that right whales are regularly sighted during April of each year. However, the heavy concentration of 20-30 animals seen near the MBDS in 1985 has not recurred in subsequent years.

Data collected since 1985 has also shed new light on right whale summering habitats. During 1986, when humpback whales virtually abandoned the area during summer (due to a lack of suitable sand lance concnetrations) right whales established residency during the mid-July to early-October period. At least 19 different individuals were identified in the northern Stellwagen/ MBDS study area during that period, including four cow/calf pairs. While a few animals were transient, many were resident for most, if not all, of the period. While this represents an anomaly during the recent studies on cetaceans in this area, its historical incidence remains unknown. Further, just under 50% of right whale sightings during the summer of 1986 were in the immediate vicinity of the MBDS.

During the same period, sei whales (Balaenoptera borealis) were frequent in and around the same regions as right whales. The similar prey preferences of the two species (primarily copepods) often cause them to be sympatric. At least 29 individuals were identified during the same period as the right whale influx. No sei whales have been seen around the northern Stellwagen/MBDS area since. This species is historically known to undertake periodic area invasions to exploit locally available prey patches, and the 1986 episode seems to fit that description. However, the Final Environmental Impact Statement (FEIS) should reflect this occasional heavier use.

In general, the species descriptions in the DEIS are difficult to interpret. Having been involved in the studies that are used to describe endangered species use of the area, we are aware of what "quadrant 2" or "quadrant 1" is, but they only receive a brief description in the fin whale summary (pg.141 of the DEIS). If this data is to be used, a better description should be incorporated. Further, it should be noted that the directed aerial and shipboard survey data set consists of only three surveys, and not a detailed data set. At the least, the above information needs to be included in the DEIS, and the information on the area used by endangered cetaceans more clearly stated. We have attached copies of distribution plots for humpback, fin, and right whales prepared by the Manomet Bird Observatory from CRU sighting data. We suggest they be included in the FEIS.

In assessing the effects of the proposed plan on threatened and endangered species (Section 4.3.4, pg. 205), the DEIS notes that "All physical, chemical, and biological effects associated with disposal activities are spatially confined to within the MBDS designated area." As has been briefly discussed in the DEIS, and in more detail above, this area also receives moderate and, at times, heavy use from endangered whales. Further, the DEIS states "Contaminant impacts to prey items of whales are not anticipated since these species do not inhabit the deep water silt/clay bottom of MBDS." However, sand lance (the major humpback and fin whale prey) do inhabit bottom sediments on a regular basis. Whether or not they use the bottom in the MBDS is unknown; it is well documented that they both make heavy use of northern Stellwagen sediments, and have been seen in large aggregations in and around the MBDS.

We are concerned that the potential heavy use of the MBDS by endangered cetaceans or their prey may result in the retention and possible bioaccumulation of pollutants. Work done in several different areas, including the Rhode Island lab of the Environmental Protection Agency, has demonstrated the sensitivity of marine mammals to toxins. Results have been similar in all areas and species studied; cetaceans have consistently demonstrated the highest levels of any mammals in a variety of pollutant levels (DDT

- 450-1830 ppm in common dolphin (Delphinus delphinus); PCB - 420 - 450 ppm in harbor porpoise (Phocena phocena); Mercury - 1,272 ppm in killer whale (Orcinus orca)). Pollutant levels are highest in young animals and adult males; adult females are able to dump some of the toxin load to young through lactation (documented in pinnipeds, several small odontocetes, and fin whales). The effect of these pollutant loads on cetaceans is unknown; however, a population of beluga (Delphinapterus leucas) in the Gulf of St. Lawrence, carrying a heavy toxin load, is now showing signs of reduced viable reproduction and increased mortality. Regarding humpback whales specifically, the Draft National Recovery Plan on humpback whales suggests that "Contaminants such as pesticides, PCB's, hydrocarbons, heavy metals, and others, could affect survival of humpback whales" (pg. 52).

The current levels of toxins in any of the endangered species of cetaceans using the MBDS on a regular basis is unknown. However, the DEIS points out that disposal station sediment concentrations of PCB's average 0.414 ppm, far above that of 0.061 ppm found on Stellwagen Bank. While continued dumping of dredge spoils is presented as being only for "clean" spoil, the degree of accuracy with which that can be determined may be questionable (see the comments submitted by National Marine Fisheries Service). Hence, we feel that the risk of continued exposure of these endangered species to potentially elevating levels of sediment contamination in and around important habitat is not adequately addressed in the DEIS.

Regarding a decision on the proposed action to continue use of the MBDS, we feel that the no effect conclusion stated in the DEIS is presumptuous and insupportable in regard to endangered cetaceans. Before such a decision can be made, an assessment of pollutant levels in several of these species needs to be conducted. Results from such work will make it possible to better determine whether the risk of potential increased exposure to contaminated sediments is a real and serious threat to species viability and/or recovery. To determine whether MBDS activities present threats to these species we suggest that such tests allow a comparison between control individuals and those that that spend some period in Massachusetts Bay and/or the MBDS. Given the extensive and coordinated sighting histories of many individual humpback, fin, and right whales around the Gulf of Maine, and the opportunity to obtain lipid samples from a wide range of living individuals using biopsy sampling programs, such a comparison is quite feasible and realistic. We suggest that the Environmental Protection Agency work in coordination with existing research groups and permitted activities to obtain results pertinent to assessing the risks of proceeding with the proposed activity.

We thank the Environmental Protection Agency for the opportunity to comment on the DEIS. If there are any questions regarding the information contained in this commentary, please feel

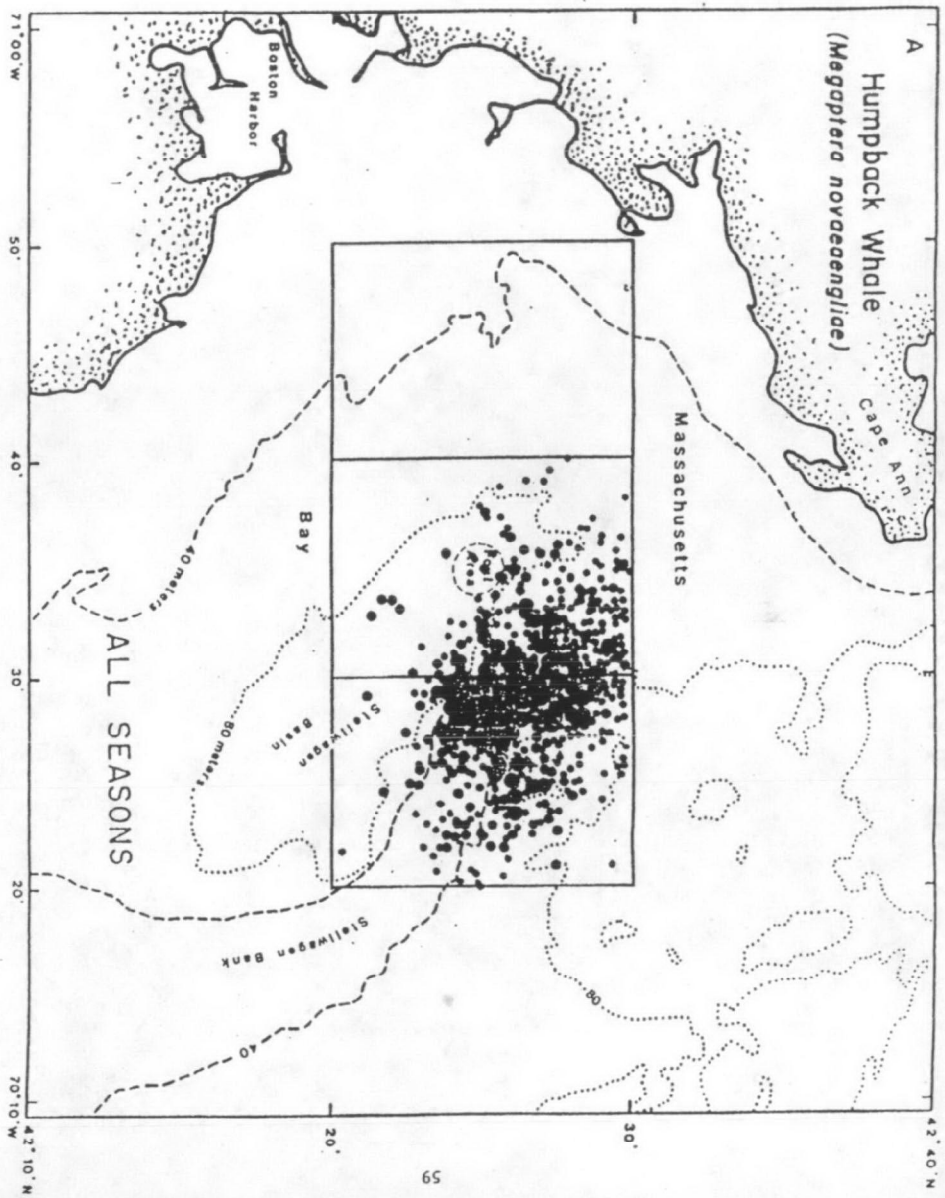
free to contact us. We look forward to seeing the suggested changes incorporated into the FEIS.

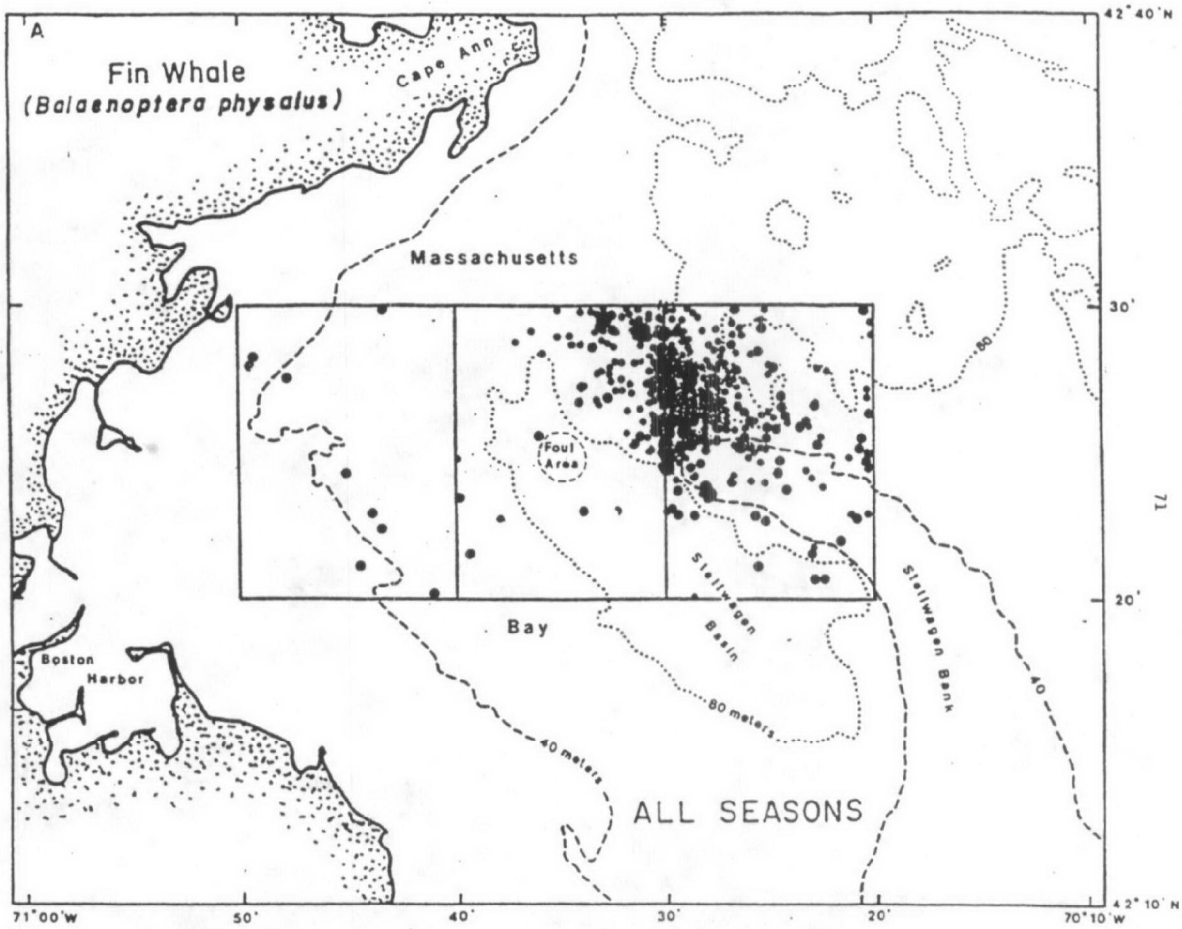
Sincerely,

Mason Weinrich
Director

enclosures

cc: Doug Beach, National Marine Fisheries Service
Sherrard Foster, National Marine Sanctuary Program
Dr. Thomas French, Massachusetts Dep't. of Fish & Wildlife
Sen. John Kerry
Sen. Ted Kennedy
Rep. Gerry Studds




A
Fin Whale
(Balaenoptera physalus)
Cape Ann
Massachusetts
Foul Area
Stellwagen Basin
Stellwagen Bank
Bay
Boston Harbor
80 meters
40 meters
40
80
ALL SEASONS
42°40'N
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20'
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30'
20'
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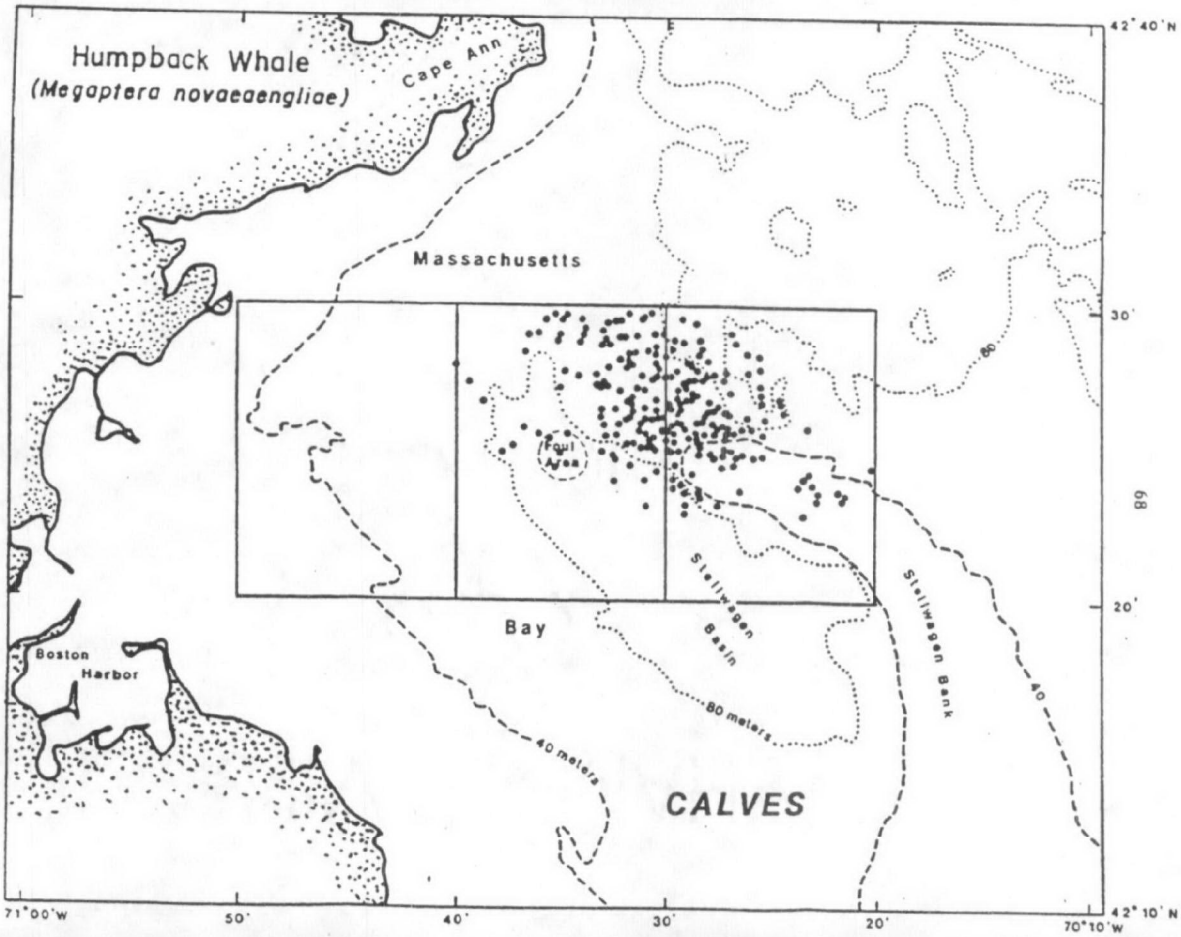
71


Humpback Whale
(Megaptera novaeangliae)
Cape Ann
Massachusetts
Foul Area
Stellwagen Basin
Stellwagen Bank
Bay
Boston Harbor
80 meters
40 meters
40
80
CALVES
42°40'N
30'
20'
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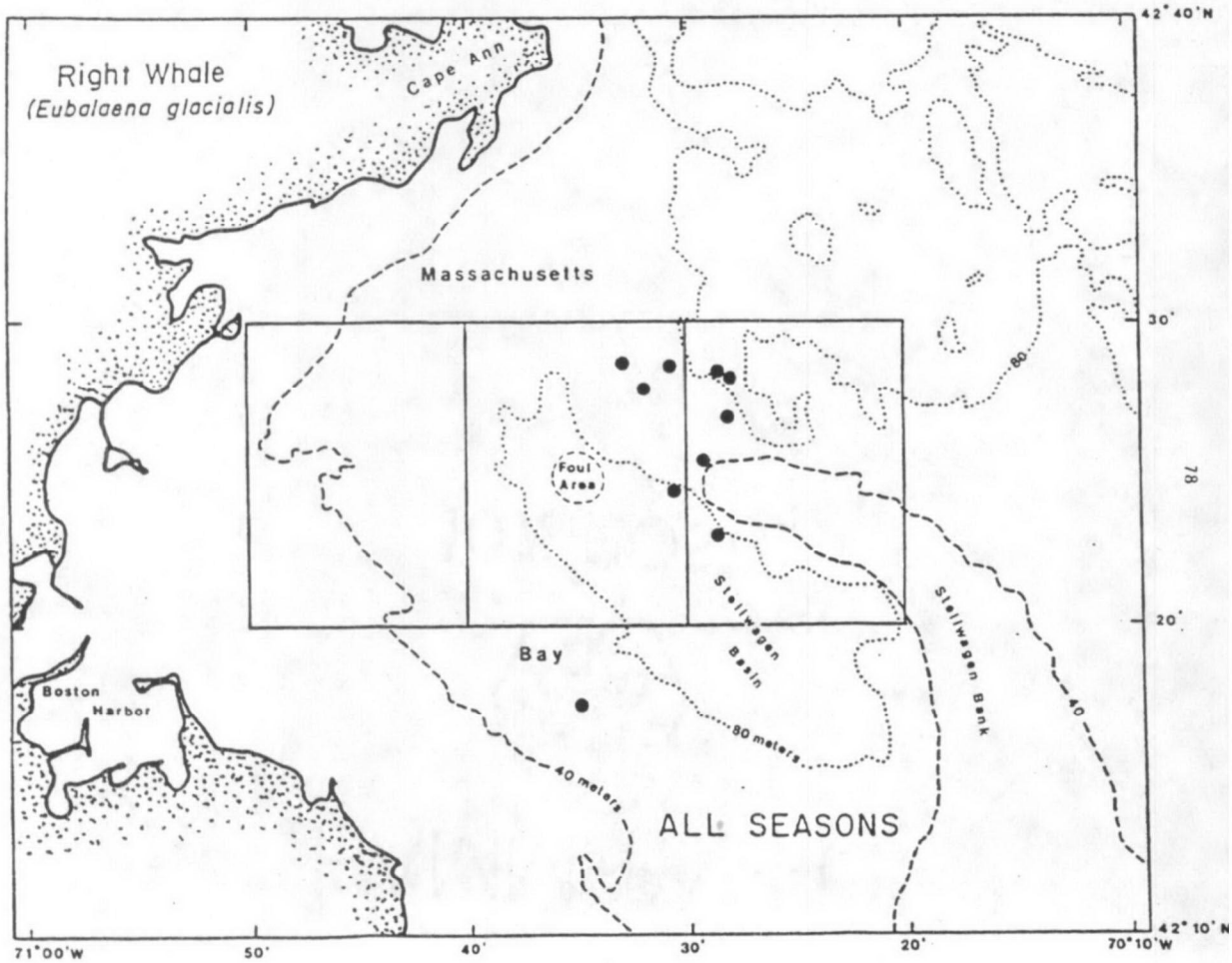
71°00'W
50'
40'
30'
20'
70°10'W

68


Right Whale
(Eubalaena glacialis)
Cape Ann
Massachusetts
Foul Area
Stellwagen Basin
Stellwagen Bank
Bay
Boston Harbor
80 meters
40 meters
40
60
ALL SEASONS
42°40'N
30'
20'
42°10'N
71°00'W
50'
40'
30'
20'
70°10'W

Save the Harbor
Save the Bay

FOUNDED IN 1986

August 20, 1990

Kymberlee Keckler
US EPA Region I, WQE-1900 C
JFK Federal Building
Boston, MA 02203

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Dear Ms Keckler

Save the Harbor/Save the Bay is a non-profit environmental group with over 2,500 members in the greater Boston area We are committed to the clean-up of Boston Harbor and the protection of Massachusetts Bay. We would like to make the following comments on the Draft Environmental Impact Statement for the Designation of Dredged Material Disposal Site in Massachusetts Bay (Supplemental DEIS), which expanded the Draft Environmental Impact Statement· Evaluation of the Continued Use of the Massachusetts Bay Dredged Disposal Site

1.) Save the Harbor/Save the Bay is deeply concerned about the lack of information in this DEIS regarding the historical dumping of radioactive, hazardous, and chemical wastes in this area, and the effect this dumping has had, and will have in the future, on this site The United States House Subcommittee on Fisheries, Wildlife, and the Environment held two hearings on the subject of Radioactive Waste Dumping in the Ocean in 1980 and 1981. From these hearings there are records of over 4,008 containers of radioactive wastes including low level radioactive wastes, a nuclear submarine part, and source materials such as uranium and thorium that have been dumped at the proposed dredged disposal site. The site was used for dumping at least since 1946 (from testimony), if not earlier, yet records only exist from 1952. From the testimony, the radioactive material was a small percentage of the total containers dumped in this area, leading one to believe there are many thousands of barrels of chemical and hazardous wastes dumped in this area (some of which have been transported by fishermen trawling) Current studies (Vertical Profiles of Radionuclides, Selected Metals, and Hydrocarbons in Massachusetts Bay Sediments by Wade, Hunt, Bothner, Jones and Boehm, Draft Report 1989) show a core sample of sediment at station 70° 32 W, 42° 24 N in the vicinity of the proposed dredge disposal site showing levels of 239, 240 Pu at 3 5 times expected levels, and 210 Pb (decay of 226 Ra) at three times expected levels. This core also shows significant levels of PCBs and DDTs

We strongly urge the office of Radiation Programs, EPA, in Washington to do a thorough testing and study of the proposed dredge disposal site before it is open for further dumping. It is not clear if it is prudent to dump on top of the barrels and contaminated sediments, and that issue has to be throughly studied by qualified personnel through radioactive testing and predictions of the future of those barrels The DEIS on page 33 states in its conclusions "no significant adverse effects from past material disposal" as one of the advantages of this site. We do not believe the study is sufficient to state that.

2) Save the Harbor/Save the Bay is also concerned about the lack of information on how the bioaccumulation of the heavy metals, toxics, and radioactivity might, or might not, be moving up the food chain in this area, and whether further disposal will, or will not, stop bioaccumulation. Bottom feeding fish and lobsters have to be evaluated, and it has to be clear if dredge spoils really "cap" contaminants in the area. Contaminated dredge spoils should not be allowed to be ocean disposed at this site because of the fisheries in this area.

Based on these factors we believe that the EIS does not adequately address our concerns, and that we can not support the designation until these concerns have been addressed.

Thank-you for the opportunity to comment.

Sincerely,

Sheila Lynch-Benttinen

Sheila Lynch-Benttinen
Vice-President

cc Hon. Gerry Studds, EOEA, CZM, CLF

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UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

BOSTON REGION

In the Matter of:

PUBLIC HEARING:

RE: EPA'S DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE EVALUATION OF THE CONTINUED USE OF THE MASSACHUSETTS BAY DREDGED MATERIAL SITE.

Conference Room 120
U.S. Transportation Building
Kendall Square
Cambridge, Massachusetts

Wednesday
November 1, 1989

The above entitled matter came on for hearing, pursuant to Notice, at 7:06 p.m.

BEFORE: Ron Manfredonia, Chief
Water Quality Branch
Environmental Protection Agency
Region 1

Kymberlee Keckler, Staff Engineer
Environmental Protection Agency
Marine and Estuarian Protection Program

APPEARANCES, *Continued:*

Gwen Ruta, Chief
Environmental Protection Agency
Marine and Estuarian Protection Program

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P R O C E E D I N G S

COMMENCED (7:06 p.m.)

MR. MANFREDONIA: Well, I guess we will get started.

Good evening.

My name is Ron Manfredonia. I'm chief of the Water Quality Branch at EPA, Region I in Boston. I have been designated by the acting Regional Administrator, Mr. Paul Keough, to serve as the Hearing Officer for tonight's public hearing on EPA's draft environmental impact statement on the evaluation of the continued use of the Massachusetts Bay Dredged Materials site.

With me this evening, to my right, is Kymberlee Keckler, who is a staff engineer in EPA's Marine and Estuarian Protection Program. And to my left is Gwen Ruta who is the chief of that section.

The proposed designated site is located approximately twenty two miles east of Boston in Massachusetts Bay in ninety meters of water and is two nautical miles in diameter.

EPA's draft EIS concludes that the designation of the Massachusetts Bay Dredged Materials site appears to be appropriate and is of suitable size to accommodate the regional disposal needs of

Massachusetts communities from Gloucester to Plymouth.

The intensive oceanographic evaluations performed at the site indicate that the continued use of the site for dredged material disposal will not have any significant adverse environmental impacts.

EPA believes that the material deposited at the site remains in place, and since the area has previously been used for disposal of dredged material, such a designation would not degrade additional areas of the ocean.

As scientific understanding of oceanographic processes evolves, the management of the site will be continually reassessed.

The EPA draft environmental impact statement was made available to the public on September 29, 1989. During the forty five day comment period, we will welcome and encourage any and all written comments you may have on our document. Written comments may be addressed to Ann Rodney, EPA Region I, WQE, 1300C, JFK Federal Building, Boston, Mass. 02203.

After the forty five day comment period, EPA will review and evaluate the comments given tonight along with any written comments we receive on or before November 13, 1989.

Please note on the inside cover page of the draft EIS, that it's stated that the comment period ends November 6th. Due to the filing of this draft EIS on September 29th of this year, the comment period has been extended to allow for a full forty five day comment period.

EPA is scheduled to publish the final environmental impact statement which will contain a summary of the oral and written comments received during the forty five day comment period and EPA's response to those comments. After publication of the final environmental impact statement in the spring of 1990, another comment period will take place to allow for public reaction to EPA's final recommendations.

Soon after the close of the final comment period, EPA will issue a record of decision, formalizing the Agency's final decision.

This public hearing is being recorded for the public record. This is an informational, nonadversarial hearing under the National Environmental Policy Act and the Clean Water Act. And as such, I will not permit cross examination of the EPA representatives or commentors. No questions will be permitted except for the purposes of clarification.

As you walked in, there was a sign up sheet for people who would like to speak this evening. If you would like to speak but have not signed up, feel free to do so.

The following normal protocol for public hearings, I will now call upon federally elected officials or their representatives who would like to entertain any comments.

(No response)

MR. MANFREDONIA: State elected officials.

(No response)

MR. MANFREDONIA: Locally elected officials.

(No response)

MR. MANFREDONIA: Federal agencies.

Yes.

MR. MANTZARIS: Chris Mantzaris, National Fisheries Services.

I have just a brief statement. We will be sending in an official comment at a later date.

As I was reviewing your document, I noticed there was a lack of attention paid to the potential for the Stellwagen Bank area to become a marine sanctuary.

If, right now, the Stellwagen Bank area is in the process of -- the NOAA people are gathering

information to determine -- to develop an environmental impact statement to determine whether or not that area should become a marine sanctuary.

If it does, and there is a probability that it will, there is a likelihood that some of the activities at the ---- area can be restricted and even phased out over time.

So, I think any environmental impact statement should reference the fact that there is a potential for that to become a marine sanctuary area, and a discussion followed as to what impacts would result from having such a sanctuary and what implications it has.

Thank you.

MR. MANFREDONIA: Thanks, Chris.

Any other federal officials?

(No response)

MR. MANFREDONIA: State officials?

(No response)

MR. MANFREDONIA: Local officials?

(No response)

MR. MANFREDONIA: Okay.

With that, we have one individual who signed up, Mason Weinrich.

MR. WEINRICH: I represent an organization in Gloucester called the Satation [phonetic] Research Unit, which has been doing the research on the Balean [phonetic] whales, particularly in the northern Stallwagen Banl region for ten years now, starting in 1979.

And, in reviewing the draft environmental impact statement, it's our feeling that not enough attention was paid to the use of the area by Humpback and Finback whales, nor the potential for severe impact on those animals.

The evidence for impact is as follows: first of all, our data for a number of years has indicated that there are some transient feeding animals through that area in the case of both endangered Humpback and Finback whales. The residency time is usually not great in that area, although there are certain times where there are, as the impact statement notes.

It does not note the fact that that is a major transit zone to and from the northern and southern end of Stallwagen Banl, which has a number of animals passing through it.

It does not note that the area is more heavily used by Finbacl whales than Humpbacl whales.

And most importantly, it fails to point out the ---- of marine animals, particularly satations, to environmental toxins. Research work is being done at the EPA's Rhode Island lab that show now that the PCB levels and the DDT levels in certain marine mammals that frequent the Massachusetts Bay area and the intra New England area have high contaminant levels already in their blubber tissue and their fat tissue.

It has also been shown through studies in this area and in other areas throughout the world that marine mammals tend to accumulate those and can not deal with those as well. Further, that females will dump that toxin load to their offspring through nursing.

Given that in the areas of the MBDS, there are areas that already have elevated to, for instance, .414 ppm PCBs which is known to be one of the things that severely impacts marine mammals.

I think that that needs to be noted in a thorough FEIS.

The other thing that needs to be coordinated, I think, with this -- and needs to be noted in the environmental impact statement -- is the fact that the National Fisheries Service is now in the process of coming up with a national recovery plan for

Humpback whales and Right whales which does address this area, and in fact, it addresses the toxins themselves.

And it states-- The draft states, and I quote, 'Contaminants such as pesticides, PCBs, hydrocarbons, heavy metals and others could effect survival of Humpback whales.' So, coordination with the National Recovery Team should also be a part of the FEIS.

Thank you.

MR. MANFREDONIA: Mason, could you identify who you represent?

MR. WEINRICH: The Satation Research Unit, Gloucester, Mass.

MR. MANFREDONIA: Okay. Thank you.

I don't have anyone else who has signed up to offer any comments. Is there anyone who wishes to make a statement?

MR. WILEY: I just have a question.

MR. MANFREDONIA: Please just identify who you are.

MR. WILEY: Sure.

Dave Wiley. I'm with the Marine Mammal Research Center.

Are superfund-- Is superfund funding being used for any of this project?

MR. MANFREDONIA: I said earlier that we weren't going to entertain questions, but I will answer that. No.

MR. WILEY: So it doesn't have to meet any of the criteria for superfund disposal?

MR. MANFREDONIA: Do you mean the disposal of the dredged material?

MR. WILEY: Yeah.

MR. MANFREDONIA: In one aspect.

MR. WILEY: I just know that there are certain criteria for disposal of materials that are being used, are being dumped through superfund funding. I was curious if this disposal situation did meet those criteria.

MR. MANFREDONIA: Well, the EIS refers to a protocol that EPA and resource agencies have developed which will regulate the type of material that can be disposed of at the site.

That in itself will be the guiding criteria by which -- what material can be disposed.

MR. WILEY: Are there copies of that available?

MR. MANFREDONIA: This EIS?

MR. WILCY: Yes.

MR. MANFREDONIA: Sure, just leave your name and we will get you a copy.

Anyone else?

(No response)

MR. MANFREDONIA: What I would like to do then is, let's recess for about ten minutes and then I will reconvene. If no one shows up, then we will call it a night.

Off the record.

(A short break off the record.)

MR. MANFREDONIA: On the record.

Well, it's 7:30 p.m. Let me simply ask, is there anyone else who wishes to speak relative to the issue before us.

(No response)

MR. MANFREDONIA: Okay.

With that, I would like to thank everyone for attending this evening's hearing.

As I said earlier, the comment period closes November 13th and we would certainly welcome any and all written comments you have on EIS by that time.

Thank you, again. Have a good evening.

(The public hearing adjourned at 7:30 p.m.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings before: THE ENVIRONMENTAL PROTECTION AGENCY in the Matter of:

PUBLIC MEETING

Place: Cambridge, MA

Date: 11/01/89

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above entitled proceeding.

E. Pedersen Reporter	11/01/89 Date
L. Madi Transcriber	11/13/89 Date

APPENDIX B

EPA's COMMENT LETTERS ON THE BOSTON HARBOR
FEDERAL DREDGING PROJECT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

June 12, 1991

Philip R Harris, Colonel
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

Dear Colonel Harris:

We have reviewed the Navigation Improvement Study Dredge Material Disposal Plan Supplement to Feasibility Report and Supporting Documentation for Boston Harbor, Massachusetts dated August 1990 regarding a proposal to dredge 2.25 million cubic yards of material from the Reserved Channel and the Mystic and Chelsea Rivers in light of its suitability for ocean disposal at the Massachusetts Bay Disposal Site ("MBDS"). We are concerned with i) the suitability of this material for open water disposal in Massachusetts Bay, ii) the preferred disposal alternative proposed, namely, disposal at the MBDS with capping, and iii) the alternatives analysis Our concerns are discussed below.

As stated in our letter to you dated December 10, 1990, we believe that the testing procedures were conducted in accordance with the national and regional testing protocols Recent data from our research laboratory in Narragansett shows that there is no apparent correlation between ammonia and sulfide concentrations and their contribution to toxicity In fact, the lowest toxicity, 5%, was found in containers with the highest ammonia concentrations As a result, we disagree with your reasons for dismissing actual test data because "the amphipod bioassays may not be valid"

The testing results indicate that dredged material from this project is unsuitable for unrestricted open water disposal as greater than 20% mortality in Ampelisca abdita over reference material was demonstrated in the Mystic and Chelsea Rivers and the Reserved Channel and greater than 10% mortality of Macoma nasuta over reference material was shown in the Mystic River Bioaccumulation of cadmium, chromium, and lead in Macoma nasuta was also exhibited in statistically significant concentrations Moreover, the detection limits achieved for the polycyclic aromatic hydrocarbons ("PAHs") were much higher (500 to 4500 ppb) than those jointly recommended by EPA and the COE in the regional testing protocol (20 ppb). We believe that the high detection limits may have concealed any detectable bioaccumulation of PAHs Furthermore, the detection limits used were at concentrations well over those shown to cause biological effects Given the magnitude of the mortality and bioaccumulation exhibited in these sediments we do not believe that these sediments are acceptable for unrestricted open water disposal at the MBDS

Secondly, as stated in EPA's Draft Environmental Impact Statement ("DEIS") for the designation of a disposal site in Massachusetts Bay (which received COE concurrence), the " viability of capping as a mitigation measure at the MBDS remains uncertain " Moreover, the COE, as a cooperating agency, assisted EPA in generating a list of unresolved issues related to the feasibility of capping as a management option (DEIS, p 229)

EPA has investigated the modeling effort employed by the COE, namely use of the DAMOS model to demonstrate that capping is a viable management option at the MBDS. We question why the more refined model, ADDAMS, was not used EPA believes that the ADDAMS model may be a more realistic model because it includes additional variables, such as, dispersion of fines and tidal current ellipses. Furthermore, the DAMOS model only simulates the convective descent and dynamic collapse phases of the disposal The passive transport and dispersion phase, in which

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fines can travel significant distances before settling to the bottom, does not appear to be considered by the DAMOS model. We believe that failure to consider this phase will underpredict the spreading of the deposited material and overestimate the predicted cap thickness Additionally factors such as surface waves, bathymetry, and water intrusion into the dredged material plume were not considered by the DAMOS model

Use of the ADDAMS model predicted that 7% of the dredged material released did not settle in the mound. The DAMOS model did not provide such results We question how water quality would be affected by having 7% of the dredged material disposed remain in the water column We are concerned that such sediments may result in water column toxicity while in suspension, or benthic toxicity if settled and not properly capped

EPA remains concerned that some of the most crucial unresolved issues regarding capping at the MBDS have not been resolved or even addressed by the COE These unresolved issues include, but are not limited to:

i) whether the contaminants in the underlying strata diffuse through the cap;

ii) whether capping is feasible at the depth of the MBDS,

iii) whether the studies used to demonstrate that capping is a viable management option accurately reflect actual disposal operations;

iv) whether unacceptable effects occur during disposal as a result of dispersion of fine material;

v) whether intrusion of water to the dredged material plume causes enough dispersion to prevent formation of an effective mound,

vi) stability of a cap during severe storm events;

vii) identification of the thickness of an effective cap (including the depth of a cap needed to isolate the contaminated material from bioturbation),

viii) whether the percentage of fines present in the dredged material is the predominate contribution to the grain size distribution, therefore making the material more inclined to disperse,

ix) whether the fines which might be dispersed during descent constitute the most contaminated portion of the dredged material, and

x) whether a mound of fine silt (presuming one can be so created) can be effectively capped and isolated by large clumps of cohesive clay

The MBDS represents an open ocean environment EPA does not believe that the MBDS can be logically compared to much shallower disposal sites within Long Island Sound In deeper water currents and stratification may have more pronounced effects on the bottom distribution of disposed sediments In shallow water, currents have little effect on the trajectory of the descending plume Larger offsets may be expected in deeper water, which may reduce the accuracy of capping Moreover, we believe that the COE did not adequately address the effects of stratification on settling velocities or the area of lateral spreading.

It seems logical that the amount of sediments remaining in suspension after a disposal event is likely to increase with increasing water depths The sediments remaining in suspension are those on the edge of the plume, which are not subjected to the downward draft of the overall dump Because the plume diameter increases linearly with depth, the outside area of the plume increases as the square of the depth, and as a first approximation, the amount of sediment remaining in suspension can be assumed to also increase as the square of the depth Thus, it appears that a doubling of the water depth would quadruple the amount of sediment remaining in suspension EPA acknowledges that this estimation is dependent on many factors, including grain size, and should be verified with field measurements

We therefore strongly disagree with the decision to cap these sediments via sequencing of dredging operations, as we continue to believe that the efficacy of this option has yet to be proven. Moreover, EPA does not believe that premature theories related to capping should be tested on large volumes of contaminated material. Until these questions are answered and the appropriate data obtained, we cannot allow disposal of such material at the MBDS.

Thirdly, we do not believe that a **full spectrum** of alternative means of disposal has been thoroughly investigated We recommend that the COE consider **combinations** of different disposal alternatives for different materials Such alternatives may include use of the 94,000 cubic yards of rock as construction aggregate or for artificial reef creation, and use of the native marine clays as landfill cover and capping material In light of the timeliness of this project, EPA believes that it is imperative that major construction projects, including the Third Harbor Tunnel/Central Artery Project and the Massachusetts Water Resources Authority's new treatment plant at Deer Island, be coordinated so that a comprehensive evaluation of alternative methods of disposal can be conducted and an environmentally favorable solution to the disposal problem achieved We strongly encourage you to investigate alternative disposal locations, including the upland alternatives evaluated for the THT project and confined aquatic or subaquatic disposal sites. Moreover, we request that you consider inclusion of plans for a **regional** containment facility for contaminated dredged material since this project is one of the largest proposed in recent years and may represent the majority of material going to such a facility

Because of the toxic characteristics of these sediments, the uncertainty associated with capping as a mitigation measure, and the inadequacy of the alternatives analysis, EPA objects to this proposal We look forward to the meeting regarding capping proposed for this summer and to discovering a mutually acceptable solution to the disposal problem Please do not hesitate to contact Kymberlee Keckler of my staff at (617) 565-4432 or FTS 835-4432 should you have any questions

Sincerely,

Ronald G Manfredonia, Chief
Water Quality Branch

cc Vernon Lang, USFWS, Concord, NH
Christopher Mantzaris, NMFS, Gloucester, MA
Judith Skinner, MACC, Marblehead, MA
William F Lawless, USACOE, Waltham, MA
Terrance S Fleming, USACOE, Waltham, MA
Thomas J Fredette, USACOE, Waltham, MA
Judith Pederson, MCZM, Boston, MA
Eleanor Dorsey, CLF, Boston, MA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

September 27, 1991

Joseph L. Ignazio, Director
U.S. Army Corps of Engineers
New England Division
Planning Directorate
424 Trapelo Road
Waltham, MA 02254-9149

Dear Mr. Ignazio:

This letter is in response to your request dated August 16, 1991 asking EPA to voice any technical concerns related to capping at the Massachusetts Bay Disposal Site ("MBDS"). Many of our concerns have already been recorded in EPA's Draft Environmental Impact Statement ("DEIS") for the designation of a disposal site in Massachusetts Bay and in our letter to you dated June 12, 1991, a copy of which is attached. We have compiled a list of some of the unresolved issues related to capping in deep water open ocean environments and have summarized them on Attachment A. We may have additional questions related to capping at the MBDS in the future.

The MBDS represents an open ocean environment. EPA does not believe that the data collected regarding capping at shallow disposal sites within Long Island Sound can be logically compared to the MBDS. In deeper water, currents and stratification may have more pronounced effects on the bottom distribution of disposed sediments. In shallow water, currents have little effect on the trajectory of the descending plume. Larger offsets may be expected in deeper water, which may reduce the accuracy of capping.

It seems logical that the amount of sediments remaining in suspension after a disposal event is likely to increase with increasing water depths. The sediments remaining in suspension are those on the edge of the plume, which are not subjected to the downward draft of the overall dump. Because the plume diameter increases linearly with depth, the outside area of the plume increases as the square of the depth, and as a first approximation, the amount of sediment remaining in suspension can be assumed to also increase as the square of the depth. Thus, it appears that a doubling of the water depth would quadruple the amount of sediment remaining in suspension. EPA acknowledges that this estimation is dependent on many factors, including grain size, and should be verified with field measurements.

The water content of the dumped material mound can be expected to increase with increasing water depth, leading to less favorable conditions for isolation of

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contaminants. Higher mound water content results in larger mound spreading, more mixing of the contaminated material with the overlying cap and a larger amount of contaminated pore water expelled during consolidation of the mound. EPA believes that this issue should be investigated.

EPA continues to believe that the efficacy of capping at the MBDS has yet to be proven. Consequently, we do not believe that it can be relied upon as an appropriate management strategy at this time. We look forward to discussing these issues at the meeting scheduled for October 15, 1991. Please do not hesitate to contact Kymberlee Keckler of my staff at (617) 565-4432 or FTS 835-4432 should you have any questions.

Sincerely,

For Ronald G. Manfredonia, Chief
Water Quality Branch

Attachments

cc: Vernon Lang, USFWS, Concord, NH
Michael Ludwig, NMFS, Milford, CT
Christopher Mantzaris, NMFS, Gloucester, MA
William F. Lawless, USACOE, Waltham, MA
Terrance S. Fleming, USACOE, Waltham, MA
Thomas J. Fredette, USACOE, Waltham, MA
Judith Pederson, MCZM, Boston, MA
Sally Newbury, CLF, Boston, MA
Eleanor Dorsey, CLF, Boston, MA
Judith Skinner, MACC, Marblehead, MA

ATTACHMENT A

UNRESOLVED ISSUES RELATED TO CAPPING AT THE MBDS

1. Does entrainment of water into the dredged material plume cause enough dispersion to produce an ineffective mound?

2. Is the percentage of fine grain sized dredged material so high that the material tends to disperse? How does water content affect dispersion and turbidity flow?

3. Can the studies conducted in 18 to 35 meters of water be applied to the MBDS where depths average 90 meters?

4. Is capping feasible at the depth of the MBDS?

5. Does water column stratification affect settling velocities or the area of lateral spreading on the seafloor? Would restricting disposal to periods without water column stratification significantly reduce the amount of fine grained material remaining in suspension?

6. Are risks to the marine ecosystem worse than those associated with upland or other options?

7. Are risks associated with handling contaminated material threatening enough to preclude dredging? Have the pollutants or the concentrations of these pollutants which trigger such a reaction been identified?

8. Do unacceptable effects occur during disposal as a result of dispersion of fine material?

9. Do contaminated sediments which do not settle in the disposal mound result in water column toxicity anywhere while in suspension, or benthic toxicity when settled and not properly capped?

10. How do the crosscurrents present at the MBDS affect dispersion and the creation of a mound?

11. Is all of the dredged material in a disposal barge discharged at the dump site? Is the barge cleaned of remnant material at the disposal site? If not, have potential impacts of disposal of such material outside of the disposal site been assessed?

12. What are the physical constraints with respect to weather, seastate, and sediment characteristics limiting the feasibility of capping?

13. Do the fines dispersed during descent constitute the most contaminated portion of the dredged material?

14. Do the contaminants in the underlying strata diffuse through the cap?

15. Is there sufficient understanding regarding how contaminants of concern partition into a marine water column?

16. What is the composition, both physical and chemical, of the dredged and capping materials?

17. Is the concentration of contaminants (or their bioavailability) in the pore water altered by dredging or disposal operations?

18. How will the areal extent of the uncapped material be determined (i.e., how will the disposal mound footprint be mapped)?

19. Given that a thin "apron" of dredged material surrounds the mound after disposal and covers an extensive area of the seafloor that cannot be mapped by the available methods, can this apron be adequately capped in addition to the mound itself?

20. What are the dimensions of the area of the seafloor affected by disposal of a single barge of dredged material?

21. What is the stability of a cap during severe storm events?

22. Has the thickness of an effective cap (including the depth of a cap needed to isolate the contaminated material from bioturbation) been identified? If so, how was it determined?

23. Can a mound of fine silt (presuming one can be so created) be effectively capped and isolated by large clumps of cohesive clay (as proposed for the federal Boston Harbor Navigation Improvement project)?

24. Is "clean" material available in sufficient quantity and appropriate grain size in the same time period that the "contaminated" dredged material is proposed for ocean disposal?

25. Will the mound created be dense enough to support an effective cap?

26. How is a determination made on the effectiveness of a capping operation (i.e., how do you tell if the capping material has completely and uniformly covered the disposal mound)?

27. By what procedure or mechanism will the materials be delivered to the seafloor? Will sediments be emplaced close to the seafloor using a diffuser or allowed to freefall through the water column?

28. Will a borrow pit be constructed to receive the contaminated sediments and the overlying clean capping sediments?

29. What monitoring programs (for contaminant migration and physical conditions) will be in place during mound construction and capping operations?

30. What are the long-term monitoring and remedial plans after mound construction and capping?

31. Will there be plans to monitor the site after storms (i.e., Nor'easters) in addition to the routine monitoring proposed?

32. What actions will be taken if follow-up monitoring shows that the capping operation has been unsuccessful?

33. What is the accuracy of the methods used for both monitoring and detection of the disposal mound? How will this affect volume estimates and impact assessments for dredged material which is dispersed or resuspended?

34. What are the costs of monitoring a capped disposal mound to check for inadequacies in the cap? What are the costs for repairing any such inadequacies? Who would be responsible for these costs? Who would ensure that monitoring would be conducted into the indefinite future as would probably be required?

35. Do the studies used to demonstrate that capping is a viable management option accurately reflect actual disposal operations?

36. Has a mass balance been conducted relating volumes of materials disposed, materials dispersed, and concentrations of contaminants?

37. Have studies relating various water depths, water content, currents, stratification, and grain sizes been conducted to determine how much material remains in suspension following a disposal event? Have these studies identified where the disposed material ultimately results?

38. How are the differences between the volume of material dredged and the volume of disposed dredged material after consolidation accurately calculated?

39. Based on characteristics of the dredged and capping materials, have mound consolidation and cap adjustment been modelled?

40. What effect does seastate have on sediment characteristics in a disposal barge during transit to a disposal site?

41. What models or other methods have been used to determine that the proposed capping methods will be effective (including those used to calculate mound dimensions, cap thickness, and susceptibility of the cap to erosion)?

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

NMS

REPLY TO
ATTENTION OF

November 9, 1990

Regulatory Division
CENED-OD-R

Ms. Sherrard C. Foster
Marine and Estuarine Management Division
NOAA
Suite #714
1825 Connecticut Ave., NW
Washington, DC 20235

Dear Ms. Foster:

Thank you for the opportunity to review the Preliminary Draft EIS and Management Plan for the proposed Stellwagen Bank National Marine Sanctuary. The EIS provides a good summary of the complex factors and issues that surround the designation. However, we still have several questions and comments with regard to the draft (enclosed). Although we have been coordinating with your office and Massachusetts CZM on preparation of some sections of this document, these comments result from being able to review the nearly complete document for the first time. We realize that these comments have not been provided in time to be incorporated into the publication draft, but hope that they will help in preparation of the final.

As the comments emphasize, we strongly believe that existing regulations for management of dredged material are adequate and that further regulation is unnecessary. We feel that implementation of new regulations should only occur after exhaustive analysis and understanding of the existing regulations has been accomplished. Furthermore, the Environmental Protection Agency is in the process of revising the Ocean Dumping Regulations and NOAA coordination in this process may be a better alternative to effect regulatory changes if NOAA believes any are needed.

Please do not hesitate to contact Dr. Tom Fredette of my staff if you have any questions or comments about our response. He can be reached at 617/647-8563.

Sincerely,

William F. Lawless, P.E.
Chief, Regulatory Division
Operations Directorate

CF: Brad Barr, MACZM
Kymberlee Keckler, EPA - Region I

Comments on
Preliminary Draft
DEIS and Management Plan
Proposed Stellwagen Bank National Marine Sanctuary

Executive Summary

Page 1, paragraph 5. We recommend inclusion of a statement indicating that all of the listed activities have a potential for impacting proposed Sanctuary resources. As presently written the paragraph suggests that only gravel mining and dredged material disposal have this potential.

Page 2. The document states that "existing regulatory authority affecting the proposed sanctuary area (Appendix B) will be unaffected by Sanctuary designation." However, the EIS states that disposing or discharging of material or substances will be regulated by NOAA under the terms of the designation. We have not had the opportunity to review Appendix B and therefore cannot provide any detailed comments. In our view, the need for supplemental regulation beyond that already provided by other agencies (EPA, COE) deeply involved in this regulatory arena needs to be clearly demonstrated in the EIS.

PART ONE: INTRODUCTION

Purpose and Need for Designation

Page 9. The purpose of sanctuary designation is to insure coordinated and comprehensive management of the resource. The existing regulations and regional management programs serve a similar purpose. To avoid imposing unnecessary additional regulations, we recommend that the EIS address with more specificity why the existing laws and regulations are inadequate to protect living and nonliving sanctuary resources.

PART TWO: SANCTUARY MANAGEMENT PLAN

I. Management Plan.

B. Sanctuary Goals and Objectives.

Page 12. One of the objectives of the resource protection program is the "establishment of cooperative agreements and other mechanisms for coordination among all the agencies participating in Sanctuary management". We concur that these agreements should be a high priority objective for achieving resource protection.

Page 12. We agree that research should be focussed on those areas needed to resolve specific management issues and that the sanctuary should "encourage information exchange among all agencies and organizations conducting management-related research in the Sanctuary".

The Corps has been conducting site specific research in the vicinity of Stellwagen Basin for over 20 years and has accumulated extensive biological, chemical, and physical oceanographic data of the area around the Massachusetts Bay Disposal Site (MBDS). The results of our research has been that disposal of dredged material deemed suitable for ocean disposal at MBDS has not resulted in significant adverse impacts to the marine environment. We believe that the existing regulatory framework provides sufficient safeguards to the Stellwagen system.

We are always interested in finding better ways to evaluate and manage dredged material disposal. EPA and the Corps have recently revised the testing protocol for open water disposal of dredged material. This publication represents over 20 years of active research by EPA and the Corps. Our DAMOS program continues to monitor disposal activities at MBDS. We look forward to coordinating work with your office on research.

II. Sanctuary Setting

Page 14. We note that the preferred alternative is entirely outside of State waters and within Federal waters. It would be useful to the reader to note that whether or not CZM has jurisdiction beyond the three mile limit is under legal discussion among the agencies.

Page 15. Note that water depths listed here (60 - 120 feet) do not correspond to those listed on page 14 (120 - 300 feet).

Page 20. The report indicates that bottom currents in the basin area are generally 18 cm/sec. Our data (COE, 1987) indicates that mean current velocities at depth (82 meters) are generally less than 10 cm/sec. Velocities on the order of 20 - 25 cm/sec can be seen during storm events.

The document states that the overturning of tide generated internal waves has been recorded at depths of 80 meters but does not give any indication of the significance of these findings with respect to sediment mobility. More than a decade of COE monitoring activities at MBDS have shown the sediments within the basin to be very stable and undisturbed.

Page 68. It would help to clarify whether the reference to the "Plan" (paragraph 3) refers to the Right Whale Recovery Plan or the Sanctuary Management Plan.

Page 72-74. Dredged material disposal. We recommend that existing regulatory procedures used to evaluate the suitability of dredged material disposal be discussed in this section. Also it would assist the analysis if the results of COE's Site Evaluation Study and EPA's EIS documents were presented. Briefly summarized these findings are 1) No significant environmental impacts have been observed at MBDS 2) impacts are listed as category II, 3) the alternatives analysis identified the MBDS as the most practicable ocean disposal alternative.

III. Action Plan

A. Overall Management and Development Context.

Page 83. We concur with the statements, that sanctuary research should be tailored to specific issues affecting Sanctuary resources and this will involve cooperation and coordination with agencies with regulatory responsibilities for the Stellwagen Bank area." We recommend that the Sanctuary study disposal activities during the first five years following designation. At the end of this period the information should be reviewed to determine whether additional Sanctuary oversight is warranted.

Page 84. Existing management programs include the Cape Cod Commission, MACZM, Mass Ocean Sanctuaries Program (DEM), NEP CCMP for Boston Harbor, Cape Cod Bay, and Mass Bay, and the Gulf of Maine Initiative. We agree that an office may be needed to coordinate Sanctuary concerns with these other programs.

B. Resource Protection

Page 86. We cannot comment on the Designation Document (Appendix A) and Sanctuary Regulations (Appendix B) as they have not yet been released for our review. We understand that Appendix A describes the relationship between the proposed Sanctuary's regulatory program and other regulatory programs. Since we are a Federal agency with regulatory jurisdiction within waters of the US as well as MBDS we are very interested in reviewing these portions of the EIS.

Page 87. The statements made here and elsewhere in the document regarding prohibited discharges are inconsistent with the current presentation in the regulatory alternatives discussion for dredged material which state there is a prohibition.

C. Research

Page 91. Agencies with jurisdiction over activities in and near the sanctuary should be involved in the development of the research agenda for the Sanctuary. The Corps requests that it be a member of the Sanctuary Advisory Committee that will formulate the Annual Sanctuary Research Plan.

IV. Administration

Resource Protection. MEMD will coordinate efforts to protect and manage Sanctuary resources with other Federal State, regional and local agencies. In the case of dredged material disposal, EPA and the Corps would continue to regulate activities at MBDS using the Title I authority. These activities are presently coordinated with NOAA Fisheries and FWS. Under the proposed designation these activities would also be coordinated with NOAA (MEMD) through an on-site Sanctuary manager. A Sanctuary Advisory Committee (SAC) would advise the Sanctuary Manager on the effectiveness of Sanctuary regulations. The Sanctuary Manager would evaluate the overall progress of the sanctuary program and report these findings to MEMD. MEMD would monitor the effectiveness of existing Sanctuary regulations and promulgate changes where necessary. As we indicated earlier and based on the above described coordination, we do not see a need for additional regulatory oversight on the disposal of dredged material.

Research. The Corps requests participation on the SAC relating to research issues.

PART THREE: ALTERNATIVES

Page 108 - 111. To assist in the analysis of alternatives, we feel that the relationship of each Alternative boundary to MBDS be clarified. This will be a topic of interest to many readers and we recommend it be presented under the discussion of each Alternative, rather than the brief statement made under Alternative #3. To clarify this issue and to assist in the analysis of alternative boundary alignments, it would be helpful to illustrate on a figure where the existing and proposed disposal sites are in relation to the western boundaries of each of the proposed alternative sanctuary limits.

Page 121-123. Disposal of Dredged Materials.

The discussion of the regulatory alternatives for dredged material seems to be written from the perspective that MBDS is included within the preferred alternative. Our interpretation of the preferred Alternative #2 is that MBDS is outside of the proposed Sanctuary limits.

We believe this section should be written from the perspective of actions to be taken under the preferred boundary alternative scenario. As written this section also seems to be in conflict with statements made in several other places in the document that discharges of all kinds are being prohibited within the Sanctuary (e.g., Executive Summary, Pages 87 and 145).

As two examples we cite below statements from Alternatives 1 and 2 and indicate how they could be misinterpreted. We recommend this wording and that for Alternatives 3 and 4 also be clarified.

Alternative 1 states "disposal of dredged materials would continue at MBDS, or anywhere else in the Sanctuary..." suggesting that MBDS is also inside the boundaries of the preferred alternative when based on our interpretation it is not.

Alternative 2 states "...disposal of dredged materials would continue at MBDS, subject to the conditions of existing authorities. However, disposal of dredged material would be prohibited elsewhere in the Sanctuary. This Alternative recognizes use of the MBDS as a pre-existing use of the area within the Sanctuary... This entire paragraph leads the reader to the impression that MBDS is within the preferred boundary alternative.

In the last sentence of the discussion of Disposal of Dredged Materials on page 123 it states that EPA would "be forced to suspend disposal activities at MBDS..." if it were found that disposal activities were "causing demonstrated injury to Sanctuary resources..." We recommend that the sentence be reworded to state that EPA would "be required to suspend or modify disposal activities at MBDS... As discussed earlier, there may be wide range of management options that could be employed to avoid observed impacts. Such management actions may be sufficient to solve the problem and are already available under existing regulations.

PART FOUR. Environmental and Socioeconomic Consequences of Sanctuary Designation.

Page 139. We disagree with the assertion that while Title I provides adequate protection to the immediate vicinity there is "...no particular consideration given at the time of permit application to the marine system... without a comprehensive perspective of the cumulative effects of such activities". Impacts of dredged material disposal to Sanctuaries are considered. Cumulative impacts of Federal actions are investigated in NEPA and the permit evaluation processes.

Page 140. We recommend further analysis and clarification of why the no-action alternative is negative with respect to sand and gravel mining. Any proposal for sand and gravel mining would be subject to existing regulations. This activity is similar to regulations on alteration of the seabed which depend on the permit process.

Page 140. We recommend further clarification of whether the taking of seabirds is a problem in the sanctuary. This needs better resolution before a determination is made that the no-action alternative would have negative impacts.

Page 141. We feel further explanation needs to be made for why existing regulations are inadequate to protect historical and cultural resources.

Page 145-146. We disagree that additional regulation of dredged material disposal is warranted either outside of or within the Sanctuary. The Title I regulations provide specific references to cumulative impacts and Marine Sanctuaries and we are unaware of any reason why the guidance and flexibility

available under the regulations are insufficient to meet this purpose. It is not clear how NOAA certification of the COE permit process will achieve the anticipated benefits to water quality. Title I does allow an assessment of impacts to marine sanctuaries and cumulative impacts are evaluated during the NEPA and permit review processes of which NOAA is already a participant.

Although the Corps welcomes NOAA involvement in the process in an advisory role, we believe that the imposition of regulatory oversight of the process is premature. NOAA must first determine if existing regulations are inadequate to protect sanctuary resources using the two conditions spelled out in the EIS [i.e., a) there is a progressive movement of material to the sanctuary and b) the material is having negative impacts on sanctuary resources]. To our knowledge neither of these conditions have been met. We site our own studies (COE, 1987) and EPA's DSEIS (1989) and SEIS (1990) on the designation of the MBDS. We look forward to working with the Sanctuary Staff and EPA to monitor conditions in the area. Should future monitoring studies indicate that there are potential or recognized impacts to the sanctuary, then we would discuss the need for actions that are already possible under the existing regulations. These could include modification of disposal procedures (method of disposal, time of disposal, etc.), modification of the types or quantities of material disposed, intensified monitoring, or other measures deemed necessary. There are already regulations in-place that allow a very wide range of management actions should the need be demonstrated.

APPENDIX C

ENDANGERED SPECIES CONSULTATION SUMMARIES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

NOV 29 1989

COPY

Mr. Ronald G. Manfredonia, Chief
Water Quality Branch
U.S. Environmental Protection Agency
J.F. Kennedy Federal Building
Boston, MA 02203-2211

November 22, 1989

Dear Mr. Manfredonia:

This responds to your November 6, 1989, request for concurrence that designation of the Massachusetts Bay Disposal Site (MBDS) will not jeopardize threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service. As proposed, the MBDS, located 22 nautical miles off-shore from Boston, will be designated for continued use as a disposal area for dredged material, primarily of harbor origin from Gloucester to Plymouth, Massachusetts.

As indicated in the September 1989, Draft Environmental Impact Statement, (DEIS) several federally listed threatened and endangered whale and sea turtle species occur in the Gulf of Maine. As you are aware, the conservation of endangered whales is the responsibility of the National Marine Fisheries Service, while the protection and management of sea turtle (terrestrial) nesting habitat is the responsibility of the Fish and Wildlife Service. The conservation and Section 7 purview of sea turtles in marine waters are also the responsibility of the National Marine Fisheries Service (NMFS). Since no sea turtle nesting habitat is at issue, it is therefore appropriate for EPA to continue consultation with the NMFS regarding this proposal and potential effects on these species.

Two Federally listed bird species administered by the Fish and Wildlife Service that are closely tied to the Massachusetts marine environment are the endangered roseate tern, (Sterna dougallii dougallii) and the threatened. piping plover (Charadrius melodus). While terns feed primarily over shallow coastal and tidal waters, roseate terns are known to sometimes forage off-shore in association with schools of predatory fish, such as bluefish, which drive small schooling prey to the surface. An historic nesting colony of roseate terns at Thatcher Island, near Rockport has been long abandoned, and the nearest active breeding location is a small colony at Plymouth Beach. Due to the absence of any nearby nesting colonies of this species in Massachusetts Bay, at most only minimal and sporadic use of the MBDS by foraging roseate terns could be expected.

It is unlikely that the piping plover, which feeds primarily in on-shore and tidal habitats remote from the disposal area, would be demonstrably affected by continued use of the MBDS. Therefore, although the continued use of the MBDS will exacerbate the already troubled condition of the Massachusetts Bay environment, we concur with your evaluation that designation of the MBDS will not jeopardize endangered or threatened species under the jurisdiction of the Fish and Wildlife Service.

This response relates only to endangered species and our mutual responsibilities pursuant to the Endangered Species Act. Additional comments addressing contaminants and the DEIS have been forwarded under separate cover.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Field Office

COPY

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1335 East-West Highway
Silver Spring, MD 20910
THE DIRECTOR

NOV 7 1991

Ms. Julie Belaga
Regional Administrator
United States Environmental Protection
Agency
J.F. Kennedy Federal Building
Boston, Massachusetts 02203-2211

Dear Ms. Belaga:

Attached is the National Marine Fisheries Service (NMFS) Biological Opinion for the Final Designation of the Massachusetts Bay Disposal Site (MBDS) issued under the authority of Section 7(a)(2) of the Endangered Species Act (ESA). Based on our review of the Draft Environmental Impact Statement, submitted by the Environmental Protection Agency, Region 1, and other available scientific information, NMFS has determined that final designation of the MBDS will not jeopardize the continued existence of any endangered or threatened species under our jurisdiction. However, disposal activities associated with the MBDS may adversely affect some of these species. Therefore, NMFS has developed conservation recommendations to minimize adverse effects. These recommendations are consistent with those issued to the Army Corps of Engineers, New England Division on August 7, 1991, for the Central Artery/Third Harbor Tunnel project and include placement of NMFS-approved observers on board disposal vessels and collection of reliable ambient water quality data for the MBDS, determination of toxin tissue levels in live, free-ranging endangered species, and evaluation of the long-term behavior of sediments disposed of at the MBDS.

Individual disposal projects will continue to be permitted by the U.S. Army Corps of Engineers, New England Division, and these activities will require separate Section 7 consultations. The effects of the use of the MBDS to endangered and threatened species under NMFS jurisdiction will be accounted for in the biological opinions issued for Corps disposal permits. Accordingly, this biological opinion does not contain an incidental take statement. Also, please note that the issue of "capping" is not considered in this biological opinion.

This concludes consultation responsibilities for this action. However, consultation must be reinitiated if new information reveals effects of these activities that may affect listed species or their habitat in a manner or to an extent not

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

previously considered, the identified activities are modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or if another species is listed or critical habitat designated that may be affected by the proposed activities.

In addition to Section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of endangered species, Section 7(a)(1) of the ESA places an additional responsibility on all Federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species... ." NMFS is developing recovery plans for sea turtles and final plans for the northern right whale and humpback whale are being reviewed. These plans describe actions deemed necessary to achieve recovery and include implementation schedules that identify the Federal agencies best suited to address each recovery action. NMFS will advise and coordinate efforts toward achieving the goals of each plan. Copies of the northern right whale and humpback whale recovery plans will be forwarded to you by the Northeast Regional Office when they are available.

I look forward to future cooperation during recovery plan implementation and section 7 consultations.

Sincerely,

Michael F. Tillman

(for) William W. Fox, Jr.

Enclosure

NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT
SECTION 7 CONSULTATION - BIOLOGICAL OPINION

AGENCY: Environmental Protection Agency, Region 1

ACTIVITY CONSIDERED: Massachusetts Bay Disposal Site: Final Designation for Ocean Disposal

CONSULTATION CONDUCTED BY: National Marine Fisheries Service Northeast Region

DATE ISSUED: _____

BACKGROUND

The Headquarters of the Environmental Protection Agency (EPA) initially requested and received from the National Marine Fisheries Service (NMFS), a list of endangered and threatened species that may occur near all interim dredged material disposal sites in U.S. waters in May 1981.

The Northeast Region (NER), NMFS, notified the Environmental Protection Agency, Region 1, of new information on endangered and threatened species in June 1982, and, advised EPA to incorporate this information into any documents pertaining to designation of the Massachusetts Bay Disposal Site (MBDS). As the regulatory authority which manages the disposal site, the Corps of Engineers, New England Division (Corps), was given responsibility by EPA to prepare a technical evaluation document to characterize marine resources that are potentially at risk from continued use of the Massachusetts Bay Disposal Site (MBDS).

On March 27, 1985, the Corps met with NMFS to design the studies and data collection necessary for the technical evaluation document. Specific studies were undertaken by the Corps and NMFS. The technical document prepared from these studies provided a description of endangered and threatened species, their habitats and forage species, and the potential impacts of continued use of the MBDS to endangered and threatened species (Hubbard et al. 1988). Using this information, EPA then released a Draft Environmental Impact Statement (EPA 1989) which concluded that continued use of the MBDS as a disposal site for dredged material was not likely to significantly impact any endangered and threatened species, their prey or critical habitat. In a letter dated November 6, 1989, EPA requested NMFS concurrence that the designation of the MBDS as a permanent site for receiving dredged material would not have any significant effect on endangered or threatened species under the purview of NMFS.

In response to comments by NMFS and other agencies that raised concerns about the content of this DEIS, a Supplemental Draft Environmental Impact Statement (EPA 1990) was also released for review. NMFS considered the information contained in Hubbard et al. (1988) and EPA (1989 and 1990) and believes that endangered and threatened species under its jurisdiction may be affected by continued use of the MBDS. Therefore, NMFS utilized these documents, as well as other available information, to develop this Biological Opinion.

DESCRIPTION OF PROPOSED ACTIVITY

This biological opinion evaluates the designation of the MBDS as a permanent dump site. Individual disposal projects permitted by the U.S. Army Corps of Engineers will require separate section 7 consultations.

A. SITE LOCATION

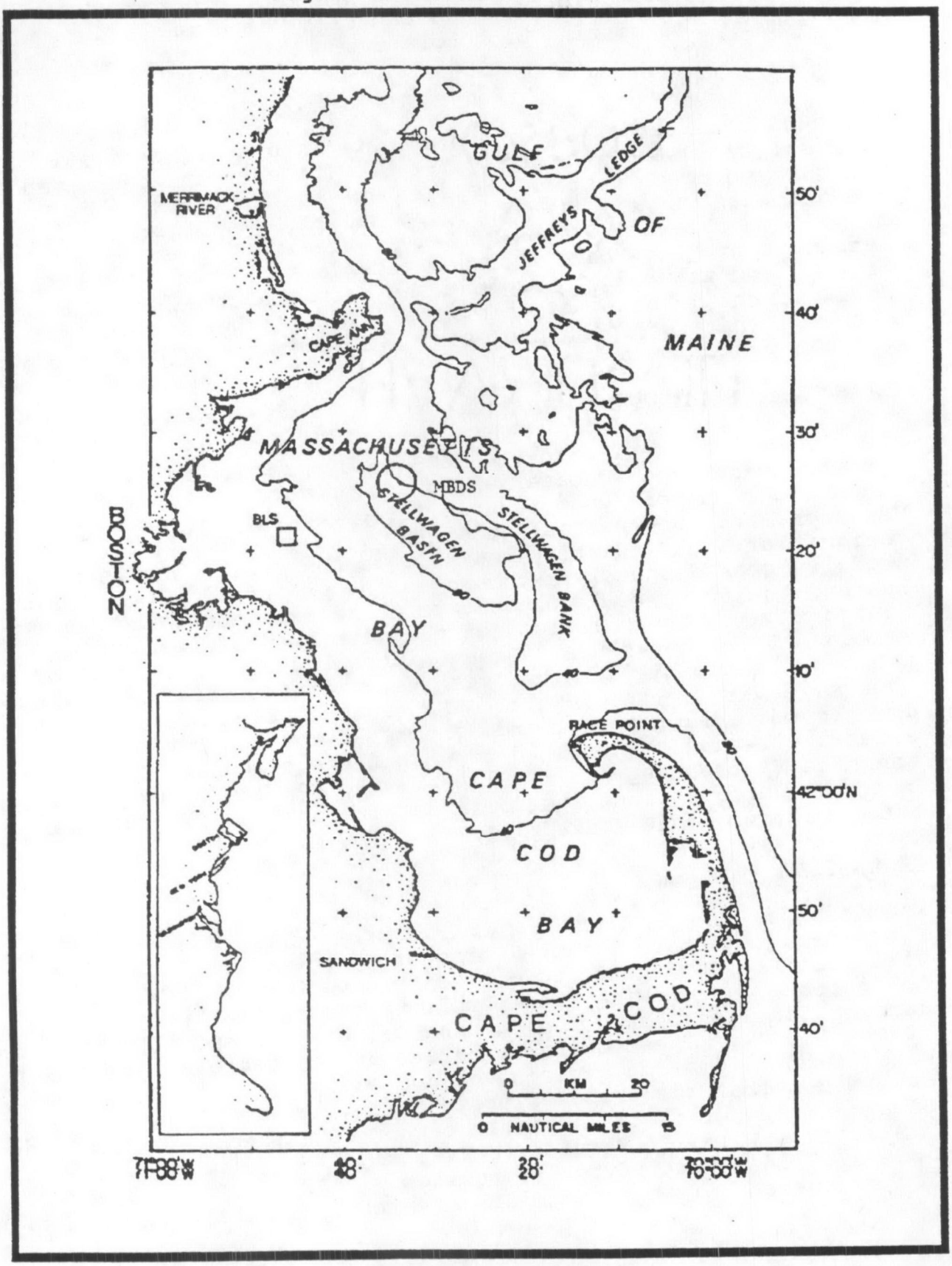
The interim MBDS is centrally located in Massachusetts Bay (Figure 1) at the northern edge of Stellwagen Basin. The Basin averages 90m in depth and is situated immediately west of Stellwagen Bank, the shallow sand bank that forms the eastern edge of Massachusetts Bay. The center of the MBDS is at 42°25.7′ N and 70°34.0′ W, and is approximately 22 nautical miles east of Boston. The site is located in water ranging from approximately 60-100 meters deep, and has a circular boundary of 2 nautical miles in diameter.

Stellwagen Bank, along with Jeffreys Ledge to the north, is an important area for a diverse group of both demersal and pelagic marine fauna that support many of the local commercial and recreational fisheries. The importance of Stellwagen Bank is embodied in the ongoing proposal to designate the area as a National Marine Sanctuary (U.S. Department of Commerce 1991).

Relocation of Boundary

As part of permanent designation, EPA proposes (EPA 1990) that the center of the permanent MBDS be relocated one nautical mile west to overlap with the Industrial Waste Site (IWS). The IWS has been used since the 1940s for both authorized and unauthorized dumping of various industrial wastes, including explosives, chemicals and low-level radioactive waste. Intentionally sunken derelict vessels and construction debris have also been dumped at the IWS. The IWS was last used in 1976 and was formally removed from the list of designated dump sites on February 2, 1990. EPA's purposes in moving the current MBDS to the IWS are twofold. First, it will further the distance from the Stellwagen Bank National Marine Sanctuary preferred boundary alternative as currently proposed by NOAA. Second, some parties

Figure 1 - MBDS PROJECT AREA



have suggested that the shift could provide a "defacto" capping of the IWS by disposing dredged material which meets the requirements of testing protocols over contaminated areas.

B. SITE HISTORY

The MBDS has been an EPA approved interim dredged material disposal site since the early 1970s. The site had been used for unregulated ocean disposal as far back as the 1940s. The Corps has disposed or permitted the disposal of 2.8 million cubic yards of dredged material at the MBDS over the last 12 years. Permitted projects have included materials dredged from harbors, rivers, and channels throughout the Massachusetts Bay area. However, the majority of this material (67%) has come from Boston Harbor. These dredging projects have generated approximately 230,000 cubic yards annually.

C. NATURE OF FINAL DESIGNATION

EPA proposes to designate the MBDS as a permanent disposal area for receiving dredged material to accommodate regional disposal needs under authority of Section 102(c) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (MPRSA). Final designation would identify the MBDS as the regional site to be used if ocean disposal is chosen as the preferred alternative. EPA and the Corps will continue to share management and monitoring responsibilities for the site as described under Section 103 of the MPRSA. Ocean disposal would be allowed only when no practicable alternatives are available which have less adverse environmental impact. EPA and the Corps believe that dredged material disposal and associated environmental alterations will be confined to within the circular boundary of the site (Hubbard et al. 1988; EPA 1989; EPA 1990), by virtue of permitting regulations, use of a testing protocol, enforcement, and site management\monitoring.

Permitting

The Corps is the permitting authority for ocean disposal. Under final designation, individual dredging projects in the region will still be considered on a case-by-case basis. EPA has the obligation of reviewing each permit to ensure that proposed dumping complies with Ocean Dumping Criteria as set forth in 40 CFR §227.4. These criteria define unacceptable adverse effects to the marine environment and ecosystem. If EPA determines that the proposed project will not comply with the ocean dumping criteria, a permit cannot be issued. NMFS and the U.S. Fish & Wildlife Service (USFWS) also review permits; however, final veto authority resides with EPA. Permits provide for management of an ocean disposal site by limiting the types

and quantities of material disposed, by setting restrictions on times of disposal, or by requiring capping or containment of contaminated material.

Corps-approved inspectors monitor all disposal activities by recording the LORAN-C coordinates at which the barge stops and the distance to the target disposal buoy. Current Corps permit requirements specify that disposal must be point discharged so that any impacts associated with disposal will be restricted to a spatially limited area and will avoid areas of known concentrations of containers of toxic chemicals and low-level radioactive material. Studies by the Corps have estimated the impact area as having a radius of 400 meters.

Testing Protocol

Under current ocean dumping regulations (40 CFR Subpart M), only dredged materials that have undergone an evaluation to determine their acceptability for ocean disposal may be dumped. Criteria for this evaluation are intended to prevent further degradation or endangerment of the marine environment from disposal. A dredged material testing protocol has been developed by EPA and the Corps, in cooperation with the USFWS, and NMFS to make these determinations. Materials that do not pass the protocol are not considered suitable for unconfined ocean disposal. The guidelines for performing tests on dredged material are described in the "Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters " (EPA/Corps 1977) and the recent "Guidance for Performing Tests on Dredged Material to be Disposed of in Open Waters" (EPA/Corps 1989) and discussed in more detail below.

The dredged material testing protocol involves a three-tiered approach to testing materials for the presence of contaminants and determination of their effects on marine organisms. As described by the Corps (1990):

> Tier I is a review of existing literature and the physical characteristics of the area to determine the potential for contamination and the need for chemical testing. In Tier II testing, bulk chemical analysis of the material is performed to determine whether contaminants are present at concentrations that have the potential for environmental impacts. Tier III uses biological testing (bioassay and bioaccumulation) to determine the potential negative impacts of dredged material disposal on marine organisms.

The choice of reference site sediments to be used as a comparison to disposal sediments is a key element in Tier III test results. Conditions of reference site sediments, as described in the DEIS

are the following; "The sediments should be mostly free of contaminants, similar to dredged material in grain size and represent conditions of the disposal site if dumping had not occurred." Sediments that have not passed testing protocols will be disposed of on land sites.

In addition, confined ocean disposal, known as "capping," is being considered by the Corps as a management alternative for the disposal of materials that do not pass testing protocols. At this time, NMFS, USFWS, EPA and the Commonwealth of Massachusetts have not determined the environmental feasibility of confined ocean disposal at the MBDS. Accordingly, this biological opinion considers only the effects of disposal of materials that have passed testing protocols, and may be disposed without confinement.

Enforcement

Enforcement of the site regulations is the joint responsibility of EPA and the Corps. The Corps may revoke or suspend disposal permits if any conditions of the permit are violated. EPA is responsible for assessing the civil liability of the violator by considering the gravity of the violation, prior violations and the demonstrated good faith of the violator in attempting to achieve rapid compliance after notification of a violation.

Site Management and Monitoring

EPA has primary responsibility for site management, which integrates permitting, enforcement, monitoring, and data interpretation to evaluate continually the appropriateness of ocean disposal in relation to the MPRSA and the Ocean Dumping Criteria. According to EPA (1989), the purpose of monitoring is to evaluate the impact of disposal on the marine environment by comparing the results to a set of baseline conditions. Monitoring should take into account both short-term effects immediately observable and monitored before, at, and immediately following the time of disposal and long-term or progressive effects measurable only over a period of years and indicated by subtle changes in selected characteristics of the ecosystem.

Specific criteria for monitoring results given in the ocean dumping regulations at 40 CFR §228.10 include evaluation of the following type of effect: "Accumulation of material constituents (including without limitation, human pathogens) in marine biota at or near the site." In addition, these regulations specify criteria for the categorization of disposal sites. Impact Category I sites may be classified if any of a number of conditions are met indicating degradation in or near it. These conditions include the movement of "waste constituents" from the

disposal site, their accumulation in the sediments, water column, or biota of the site, and the consistent identification of toxic concentrations above ambient values outside the site more than 4 hours after disposal. If such conditions are found, EPA is required to limit use of the disposal site until they are reduced to acceptable levels of impact. Currently the MBDS is considered a Category II site.

EPA plans to conduct annual monitoring surveys at the MBDS to determine dredged material distribution and movement (including resuspension and transport), benthic organism colonization of dredged material, sediment chemistry, food chain interactions between benthos and fish of the area, and bioaccumulation of contaminants in benthic organisms.

LISTED SPECIES LIKELY TO OCCUR IN THE PROJECT AREA

The following is a complete list of endangered and threatened species that may occur within the Massachusetts Bay area:

Endangered

Blue whale	*Balaenoptera musculus*
Fin whale	*Balaenoptera physalus*
Sei whale	*Balaenoptera borealis*
Humpback whale	*Megaptera novaeangliae*
Northern right whale	*Eubalaena glacialis*
Leatherback sea turtle	*Dermochelys coriacea*
Kemp's ridley sea turtle	*Lepidochelys kempi*
Shortnose sturgeon	*Acipenser brevirostrum*

Threatened

Loggerhead sea turtle	*Caretta caretta*

There are no species proposed for listing that occur in the project area, although NMFS is conducting a status review of the harbor porpoise (*Phocoena phocoena*). The harbor porpoise also has been placed on a candidate species list for the ESA. NMFS has also received a petition to designate Cape Cod Bay as critical habitat for the right whale. Because of the bay's proximity to the disposal site and importance to this highly endangered whale, the regional effects of disposal at the MBDS are of special concern to the species.

SPECIES ACCOUNTS

A number of documents submitted to NMFS by EPA and the New England Division of the Army Corps of Engineers summarize the general and MBDS-specific distributions of the above listed species (Hubbard *et al*. 1988; EPA 1989: EPA 1990; MDPW 1991,

1991a, 1991b, 1991c, & 1991d). MBDS-specific studies focused on sightings in three 10' square quadrants of latitude/longitude which included and were immediately adjacent east and west to the disposal site. Information from these and other sources are summarized below to provide accounts of the listed species that may occur in the MBDS.

A. The following species are known to occasionally occur in the project area but are not likely to be adversely affected for the reasons given below.

Blue Whale

This species is normally distributed from the Gulf of St. Lawrence/Nova Scotia region northward during spring and summer. Although fall and winter ranges are unknown, blue whales are suspected to migrate south to temperate waters at these times. Blue whales have been sighted recently on four occasions (in 1986 and 1987) in the vicinity of Stellwagen Bank (Clapham 1990; Jarvis 1990), and were likely feeding on dense aggregations of krill (Clapham 1990). Blue whale presence in the Stellwagen Bank area in 1986-1987 corresponded to increased sightings of right and sei whales, which feed on similar prey types.

Because they are rarely observed there, the Stellwagen Bank area is not considered usual habitat for blue whales, and activities at the MBDS should not affect them. However, should conditions which led to the 1986-1987 sightings reoccur, blue whales could be seen more frequently in the vicinity of Stellwagen Bank and the MBDS.

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle is the most severely endangered sea turtle in the world. Nesting, which has decreased from the efforts of an estimated 40,000 individuals in 1947 to 200-750 for the last 8 years (Meylan 1986), occurs on a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963; Hildebrand 1963). Adult distribution is largely restricted to the Gulf of Mexico.

Significant numbers (37 from 1986 through 1987) of juveniles (10" to 12" in length) regularly strand in Cape Cod Bay in fall and winter months as a result of cold-stunning. Temperatures below 5°C are lethal to Kemp's ridleys. What attracts juveniles to Cape Cod Bay is probably foraging habitat which supports benthic crustaceans, their reported prey (Dobie et al. 1961; Pritchard and Marquez, 1973). The importance of the Cape Cod Bay habitat to the survival of the species is unknown, although Morreale et al. (1989) documented rapid growth (500 grams per

month) for juvenile Kemp's ridleys that spent the summer months foraging in Long Island Sound.

Disposal of dredged material at the MBDS will probably not directly affect Kemp's ridley sea turtles. In the summer, surface temperatures at the MBDS may reach 17-18°C, and, bottom temperatures generally remain below 7°C (MDPW 1991b). Because the latter temperature is within the lethal range for this benthic feeding species, use of the MBDS as a foraging area is unlikely. Indirect or additive effects to the general environmental health of Cape Cod Bay could degrade foraging habitat. Discussions of these possible effects to Cape Cod Bay are located in the Assessment of Impacts section of this document.

Loggerhead Sea Turtle

The loggerhead sea turtle is the most abundant species of sea turtle occurring in U.S. waters. The species' winter and early spring range is south of 37°00'N in estuarine rivers, coastal bays, and shelf waters of the southeastern United States. Loggerheads move northward as temperatures increase to above 20°C. Juvenile and subadult loggerheads occur in southern Massachusetts waters from midsummer through fall, probably feeding on crabs and other benthic invertebrates. Between 1980 and 1988, 23 loggerhead strandings were reported in Cape Cod Bay. Like the Kemp's ridley sea turtle, the activity of the loggerhead is limited by temperature. Prolonged exposure to water temperatures below 15°C may result in dormancy, shock and death.

Final designation of the MBDS will probably not directly affect loggerhead sea turtles for the same reasons as described for Kemp's ridley sea turtles, namely low temperatures and lack of foraging habitat.

Shortnose Sturgeon

Shortnose sturgeon is an anadromous fish present in many large rivers in the Northeast (Dadswell et al. 1984). The closest known population to the MBDS is in the Merrimack River (Figure 1) (Kiefer and Kynard 1989), however, there is no evidence that the area of the disposal site is utilized by shortnose sturgeon. Final designation of the MBDS should not affect this species because consequences of disposal events are not expected to occur significantly beyond the boundaries of the MBDS (MDPW 1991d).

Except for possible effects to sea turtle habitat in Cape Cod Bay, designation of the MBDS is unlikely to affect the blue whale, Kemp's ridley sea turtle, loggerhead sea turtle or

shortnose sturgeon. Potential effects to Cape Cod Bay are discussed and may be applied to any sea turtle habitat that may exist there.

B. The following species are known to utilize the project area and may be affected as described below.

Humpback Whale

Humpback whales are found throughout the oceans of the world, migrating from tropical and subtropical breeding grounds in winter to temperate and Arctic feeding grounds in summer (Evans 1987). Several stocks occur in the northwestern Atlantic. The Gulf of Maine stock migrates from summer feeding grounds off the coast of New England to winter breeding grounds along the Antillean Chain of the West Indies, primarily on Silver and Navidad Banks north of the Dominican Republic. In the Gulf of Maine, sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge. Although small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank, sightings peak in May and August. Distributions appear to be closely connected to seasonal abundances of the sand lance Ammodytes spp., a finfish and the current preferred prey of humpback whales. However, Atlantic herring, mackerel, pollock, haddock and krill will be taken if abundant and available (NMFS 1990a). Pollock and haddock are considered semi-demersal species and have been taken occasionally in spring and fall trawls at the MBDS site (Hubbard et al. 1988). When sand lance numbers were low in the summer of 1986, humpbacks were largely absent from the area. As sand lance numbers increased, the humpbacks returned to previously seen numbers by 1988.

Sand lance prey on copepods, and prefer the sloping, gravel bottom edges of Stellwagen Bank. Therefore, the distribution of humpbacks closely follows the perimeter of Stellwagen Bank north to Jeffreys Ledge. Approximately 150-250 humpbacks, representing 25-45 percent of the entire Gulf of Maine population use this area each year (MDPW 1991c). From May to October, two clusters of humpback whale sightings on Stellwagen Bank are commonly seen. One is centered along the southwestern perimeter of Stellwagen Bank between 42°10′ and 42°17′N, and the other from the northern edge of Stellwagen Bank, 42°22′N to 42°40′N.

Numerous sightings were recorded for the MBDS and eastern quadrants of the MBDS-specific studies, and were centered 4 nautical miles to the east of the MBDS. Notably, distributional maps of humpback whales with calves show four occurrences within the boundaries of the MBDS and another

18 occurrences in Stellwagen Basin. These sightings are consistent with those of single adults, who have also been sighted in the MBDS and Stellwagen Basin.

Researchers with the Cetacean Research Unit have observed juvenile and adult humpbacks and right whales subsurface feeding in the general area of the MBDS and Stellwagen Basin (Weinrich, pers. comm. 1991). As already stated, Massachusetts Bay sand lance stocks were scarce in 1986. Nevertheless, juveniles were observed in Stellwagen Basin with distended throat grooves after diving, demonstrating feeding attempts at depth. The Cetacean Research Unit has postulated that although Stellwagen Basin may represent marginal habitat for adult humpbacks, juveniles may be able to utilize the area for feeding because of their lower energy requirements (Belt et al. 1989).

Northern Right Whale

The northern right whale is the most endangered of the large whales. Devastated by whaling in the 19th and 20th centuries, remnant populations still exist in the Pacific and northwestern Atlantic oceans. The northwestern Atlantic stock is thought to number approximately 350 animals (NMFS 1990b). Researchers have identified five known "high-use" areas in coastal Florida and Georgia, the Great South Channel east of Cape Cod, Massachusetts and Cape Cod Bays, the Bay of Fundy and the Browns and Baccaro Banks off Nova Scotia. The coastal Florida and Georgia area is used for calving and overwintering while the other areas represent spring/summer/fall feeding and breeding grounds. Other wintering areas may exist, but are as yet unidentified.

Northern right whales are regularly present in Massachusetts and Cape Cod Bays from mid-February through May, feeding on dense plankton blooms, often the copepod Calanus finmarchius. These sightings peak in April and May. However, by mid-June most individuals have either travelled east to the Great South Channel or north to the aforementioned feeding and breeding grounds. However, recent information demonstrates the ability of individuals to move great distances (Bruce Mate, unpublished data). Therefore, right whales may appear in the Massachusetts and Cape Cod Bays areas in any season.

The occurrence and behavior of northern right whales have been studied in Cape Cod Bay in detail since the early 1980's. Prior to 1986, right whale sightings were concentrated in the northeastern sector of Cape Cod Bay. Though less numerous, sightings have occurred in both the central and eastern quadrants of the MBDS-specific study area. As described for the sei whale, this situation changed dramatically in 1986. Sightings by researchers studying Cape Cod Bay showed both an increase in the number of right whales sighted and an expansion of their range.

The reasons for this unusual occurrence are the same as described for sei whales and the same conclusion can be drawn concerning the periodic importance of the area as a feeding ground for right whales. However, right whales appear to consistently utilize areas adjacent to the MBDS.

Fin Whale

Fin whales are the most abundant and widely distributed of the baleen whales that occur in the Gulf of Maine. Some are present during all seasons in the area extending from the southern base of the Great South Channel, northwest along the 50 fathom contour into the southwestern Gulf of Maine over Stellwagen Bank, to Jeffreys Ledge. Sightings are most numerous in spring and summer with peaks in May and July and occur at Jeffreys Ledge, Stellwagen Bank and the Great South Channel.

Observed distribution of fin whales indicate that they may occur immediately in and around the disposal site. Most sightings were to the north and east of the site in spring and summer. However, some sightings were noted to the west of the site in the period from January to April and could have indicated inshore feeding on herring and Atlantic mackerel. Fin whales feed in response to the general abundance of a variety of schooling fishes (including herring and Atlantic mackerel) and euphausiids (Gaskin 1982). In the last 10-15 years they have been observed utilizing American sand lance (*Ammodytes* spp.) in the Gulf of Maine. Sand lance abundance has varied in the area and low numbers of fin whale sightings from 1984 to 1987 may have been linked to low sand lance densities. However, changes in fin whale sightings were not as drastic as those for humpback, sei, and right whales. Thus, they may be more successful at exploiting alternative prey species.

Sei Whale

Sei whales are found in most oceans, excluding tropical and extreme polar seas. Southern New England shelf-edge waters are presently considered the southern limit of the feeding range for a stock of sei whales centered off eastern Nova Scotia. Sightings off the northeastern United States occur mostly from April through August in the area extending from the base of the Great South Channel between the 50 and 1000 fathom contours, north along the shelf edge through the Northeast Channel into the deeper basins of the Gulf of Maine.

Sei whales were reported on only three occasions in Massachusetts and Cape Cod Bays from 1975-1985. Then, in the summer of 1986, this situation changed dramatically. Sei and right whale sightings were common while humpback and fin whale sightings declined. Sei whale sightings in the MBDS area in 1986 were

common in these studies. Their distribution indicates that sei whales utilized Stellwagen Basin and deeper areas of Massachusetts Bay, including the immediate vicinity of the MBDS, rather than Stellwagen Bank.

The reason species abundances changed in 1986 is believed related to changes in prey abundance. Sei and right whales are plankton feeders, preferring calanoid copepods (although sei whales have been observed feeding on finfish in other regions). Humpback and fin whales are piscivorous (although both species have been reported feeding on euphausiids), and currently utilize sand lance in the Massachusetts and Cape Cod Bays areas. In 1986, the abundance of sand lance was reduced significantly while the abundance of the copepod (Calanus finmarchius) reached a maximum in the Massachusetts Bay and Cape Cod Bays areas. Although the 1986 species' distribution is apparently rare, it is clear that Stellwagen Basin and waters of the MBDS may at times be an important feeding area for sei whales.

Leatherback Sea Turtle

The species is widely distributed throughout the oceans of the world, nesting on tropical beaches and feeding in temperate waters on its preferred prey, jellyfish. The largest of sea turtles, leatherbacks are able to maintain body temperatures 7° to 17°C above ambient (Colleen Coogan, per. comm.), possibly by virtue of their size and an arrangement of blood vessels in the skin and flippers that enables retention of heat generated during swimming.

In the northwest Atlantic, leatherbacks have been reported in New England and as far north as Nova Scotia and Newfoundland. Although their tolerance of low temperatures is greater than for other sea turtles, leatherbacks are generally absent from northern waters in winter and spring.

Most sightings and reported strandings in this area have occurred from July through early November. Inshore seasonal movements in New England may be linked to those of the jellyfish Cyanea capillata. Because significant numbers of these jellyfish may periodically occur in the MBDS, the area could be utilized by leatherbacks for foraging. In addition, individuals may transit the area during seasonal migrations, or when seeking prey.

ASSESSMENT OF IMPACTS

A. VESSEL TRAFFIC

The possibility of disposal-associated vessel traffic resulting in collisions with endangered and threatened species has been assessed. The draft northern right whale and humpback whale

recovery plans cite ship collisions as known and potential human impacts to these species. The right whale's behavioral characteristics of resting, skim feeding, and mating at the surface makes them particularly susceptible to ship collisions. Twenty percent of the known right whale mortalities from 1970 to 1989 were attributed to ship collisions (NMFS 1990b). In addition, slightly more than 7 percent of 168 right whales in the New England Aquarium's photographic catalog show evidence of ship strikes (Kraus 1990).

In general, whales utilizing the region show tolerance of boat traffic (Beach & Weinrich 1989). Northern right and humpback whales engaged in feeding and courtship behaviors appear to be unaware of vessel action around them. While this may lower the probability of harassment, it may also result in whales being less wary and more susceptible to ship strikes. Leatherback sea turtles are also known to have been killed by collisions with ships (MDPW 1991b).

MDPW (1991) reports that tugs and barges are slow moving, typically travelling at around 5 knots. Listed species in the area may be aware of, and able to avoid these vessels. In addition, the Corps plans to familiarize on-board inspectors with Northeast Region guidelines for the operation of vessels in the vicinity of endangered whales. Observations by trained inspectors and vessel crews should further minimize the possibility of collisions. Therefore, the possibility of vessel strikes to endangered and threatened species as a result of disposal-associated operations should not significantly impact any endangered and threatened species in the project area.

Acoustical disturbance is another potential impact of vessel traffic that is discussed in the northern right whale and humpback draft recovery plans. Although data are lacking, observations have suggested that right whales do not react to low frequency engine noise or minor vessel maneuvering. Conversely, cows with calves and single long-diving individuals have been observed to avoid vessels. Therefore, they may be more aware of vessels in the area and susceptible to acoustical harassment.

Although the potential for acoustical disturbance exists, it is unlikely to adversely impact endangered and threatened species in the area. Disposal-associated vessel traffic will be occurring to the west of known whale concentration areas, and Corps-approved inspector's adherence to NER guidelines concerning the operation of vessels in the vicinity of whales should further minimize this impact.

B. WATER QUALITY

EPA estimates that future disposal needs for the Boston area will be similar to historic levels of about 3 million cubic yards per decade or 230,000 cubic yards per year. However, some projects, such as the Central Artery/Third Harbor Tunnel Project (CA/THT) and the Corps' Boston Harbor Improvement Project will dispose large volumes of material at higher rates than historic levels (1.28 million cubic yards over a 4-year period and 2.25 cubic million yards over a 2-year period, respectively). CA/THT materials to be disposed of at the MBDS have passed testing protocols. Conversely, the Corps is proposing that some materials from the Boston Harbor Improvement Project that did not pass the testing protocol be disposed of at the MBDS and capped with sediments that have passed testing protocols. CA/THT materials were evaluated extensively for their environmental effects in MDPW (1991, 1991a, 1991b, 1991c, & 1991d). Because they may occur concurrently, the combined effects of the CA/THT project and the Boston Harbor Improvement Project were also analyzed. NMFS considers these evaluations to be the best current available information regarding the effects of disposal to water quality of the MBDS and discusses their results in this Biological Opinion as an indication of possible water quality effects that may result from continued use of the MBDS. Because capping is an unresolved issue, the disposal of materials that have not passed testing protocols are not assessed for their potential effects to water quality.

In their assessment of proposed disposal activities, MDPW reviewed existing information provided in Hubbard et al., 1988. Studies of the release of sediments from scows, indicated that the chemical and physical impacts to the water column are short in duration and spatially restricted to the boundaries of the MBDS. While most of the material descends to the bottom, about 5 percent may remain in the water column, dispersing according to prevailing currents.

Although the testing protocol is useful for determining sediments with contamination levels above background or low conditions, it does not indicate that sediments are completely contaminant-free, or evaluate additive impacts with the environment or other disposal activities. Chemical data used for sediment samples from the Third Harbor Tunnel, Fort Point Channel and Charles River in Boston are discussed in MDPW (1991d) and Bryan et al. (1991). Analyses report levels of contamination for arsenic, cadmium, chromium, lead, mercury, copper, nickel, zinc, PCBs (polychlorinated biphenyls) and PAHs (polycyclic aromatic hydrocarbons) in MDPW (1991).

To characterize additionally the water quality impacts of the CA/THT, these levels were applied to the ADDAMS (Automated

Dredging and Disposal Alternatives Management System) DUMP model and used to simulate suspended solids, water column chemistry and deposition of solids. Details of the model's runs including assumptions and conditions are described in MDPW (1991) and MDPW (1991d). Results are summarized in the following paragraphs.

Total suspended solids (TSS) were estimated for mean current conditions for three 3,000 cubic yards barges per day (CA/THT alone) and eight 3,000 cubic yards barges per day (CA/THT combined with Boston Harbor Improvement Project). Simulations indicate that maximum concentrations of TSS occur in the lower 15 feet of the water column and are brief in duration, with the majority of sediments settling within 3 hours after a dump event. No material was found to ascend into the upper 100 feet of the water column following rapid descent to the bottom. Multiple dump events result in oscillating concentrations, from a maximum of 929 mg/l to a minimum of 0.8 mg/l. For a single disposal event, a maximum TSS concentration of 929 mg/l occurs 13 minutes after each dump in the lower 15 feet of the water column. Within 1 hour after the dump, TSS concentrations are 47 mg/l. The maximum increase in TSS at the site boundary is predicted to be 2 mg/l above a background level of 1 mg/l in the lower 15 feet of the water column. Multiple dump events do not differ significantly from single dumps because the majority of sediments settle within 3 hours. Disposal vessels will not be releasing sediments simultaneously or within 3 hours of another vessel. MDPW (1991) cites empirical data collected from the disposal of 3,000 cubic yards of dredged material which support the predictions of the model. In that study, the dredged material was observed to descend rapidly in a narrow column. TSS were about 39 mg/l within 20 minutes of disposal and 5-12 mg/l forty minutes after disposal. At these levels, TSS levels should be indiscernible from background approximately 1.5 miles from the MBDS.

Water column chemistry was simulated by the ADDAMS DUMP model using three separate approaches. The first, and most conservative approach, used results from bulk sediment contaminant concentrations analysis. This approach is conservative because it assumes that all contaminants bound to sediment particles will be released to the water column. The second approach used results from elutriate analysis and is an indication of dissolved contaminant levels that would be expected in the dredged material. The third approach combined information from elutriate simulations with estimates of contaminant concentrations that would be associated with sediment particles that remain in suspension indefinitely. Degradation processes such as photolysis, volatilization and changes to contaminants by bacterial action or combination with other chemicals were not

evaluated in any of the three approaches because they were considered insignificant.

Simulations were run for copper (based on bulk sediment analysis) and PCBs (based on elutriate analysis). Copper and PCBs were determined to be the contaminants requiring the greatest dilution to meet EPA's chronic water quality criteria. The biological assessment explains that simulations are needed only for these contaminants because predicted concentrations for other contaminants would be proportional to their concentrations in the sediments, as revealed by testing.

Bulk Sediment Analysis of Copper

Simulations of copper concentrations based on the first approach, using bulk sediment analysis, were run for various dump sizes, frequencies and current conditions (mean and high) for both surface (140.8 mg/kg) and deeper materials (26.5 mg/kg). The surface materials, which have not passed testing protocols, are not considered here. Mean currents transport the plume to the boundary of the dump site slowly and result in higher concentrations within the site boundary. High currents transport sediments faster from the site, but result in concentrations of almost an order of magnitude lower.

This simulation shows that EPA chronic and acute toxicity criteria for copper (both 2.9 ug/l) are exceeded by deeper materials in the plume centroid for mean currents when disposing of three barges containing 1,300 cubic yards (oscillating between .05 and 60.42 ug/l) and eight barges containing 3,000 cubic yards (oscillating between 1.51 and 203.27 ug/l) and for high currents when disposing of eight barges containing 3,000 cubic yards (oscillating between .09 and 158.1 ug/l). EPA acute and chronic criteria for copper are not exceeded for these or any other conditions at the site boundary. Simulated concentrations represent levels above background. The results indicate that high levels of copper will be present in the water column for short periods of time. However, they are largely an indication of contaminants bound to sediments that settle to the bottom and should therefore be unavailable to listed species.

Elutriate Analysis of PCBs

Simulations of PCB concentrations, based on the second approach using elutriate analysis, were run for a single 3,000 cubic yards disposal event under mean current conditions. The PCB concentration of 9.11 ug/l used in this analysis was determined for surface material only. PCBs were not determined for deeper native sediments because they should be free of anthropogenic contamination. Results estimate a peak PCB concentration within

the plume center to be 0.0014 ug/l above background approximately 1 hour after disposal and 0.0004 ug/l approximately 2 hours after disposal. Peak concentration at the boundary was 0.001 ug/l above background. These values are below the chronic and acute EPA water quality criteria for PCBs of 0.03 and 10 ug/l, respectively. Similar simulations were run for copper and the other analyzed contaminants with no violations of water quality criteria. Thus, dissolved levels of contaminants should be low and of short duration.

Combined Elutriate/Suspended Solids Analysis of Copper

Simulations of copper concentrations based on the third analytical approach, which combined elutriate data with estimates of solids that remain suspended indefinitely, were run for surface and deeper materials. This approach provided a more realistic view of contaminants to be expected in the water column. The maximum copper concentration predicted was 0.3 ug/l above background for surface material and was unaffected by dump rate. This analysis shows that even if dissolved levels of contaminants are combined with those of indefinitely suspended sediments, they will still be low and of short duration.

Deposition of Suspended Solids

Finally, the ADDAMS DUMP model was used to estimate the deposition of transported suspended solids. A simulation which considered sand, silt, and clay behavior following a single 3,000 cubic yards dump event determined that sand would quickly settle while silt and clay would remain suspended and contribute to deposition within and beyond the MBDS boundary. Deposition rates for sand and silt were estimated as 0.003 mm each at 7,500 feet, and <0.00003mm each at 15,000 feet from the dump site. The total theoretical contribution from the CA/THT was estimated as 0.2mm at 15,000 feet and should not be discernable from ambient depositional rates of 1-2 mm/year in Stellwagen Basin, where oceanographic conditions would cause most of the material to settle. Because Stellwagen Bank is subjected to higher energy current velocities, it is unlikely that fine clay or silt particles would accumulate in this area. Materials that accumulate within the MBDS will be colonized by benthic organisms (polychaete worms, bivalves) whose activities might resuspend small amounts of sediments. The combination of their contaminant levels, resuspension to no more than a very thin layer above the bottom, and lack of strong currents to carry them renders this consideration of insignificant environmental effect to endangered and threatened species.

Conclusions on Water and Sediment Quality

Simulations do not accurately assess additive water quality contaminant levels based on ambient contaminant concentrations at the MBDS. Ambient water quality data collected by the Massachusetts Water Resources Authority (MWRA) at a site 2.7 nautical miles west of the MBDS buoy and at the MBDS by Science Applications International Corporation (SAIC) are presented in MDPW (1991d). Although the MWRA data are useful as a control to compare MBDS ambient levels, it should not be used to assess MBDS ambient water quality because of possible localized effects of disposal activities and use of the historical IWS, 1 nautical mile to the west of the MBDS. SAIC data are not considered reliable because of high detection limits and the fact that SAIC filtered copper concentrations were often higher (3 ug/l) than for unfiltered samples (<2 ug/l). Nevertheless, the lack of credible water quality data for the MBDS limits complete assessment of water quality impacts.

Water quality impact simulations indicate that suspended sediments and contaminants which might come in contact with endangered species, either through uptake by the skin or swallowing of water, would occur at low levels for short periods of time and would be restricted to the boundaries of the MBDS. Furthermore, the probability of an endangered species encountering a disposal plume is extremely low. Efforts on the part of the Corps to avoid dumping in the presence of endangered species when they do occur within the MBDS boundary should further reduce endangered species contact with disposal plumes or rock. Dispersed sediments and contaminants will travel beyond the boundaries of the MBDS and may be reduced to insignificant levels. Stellwagen Bank and Cape Cod Bay, both important endangered species feeding areas are located about 4 to 5 nautical miles to the east-northeast and 22 miles south-southeast from the MBDS, respectively. By the model's predictions, total suspended solids, contaminant concentrations and sediment deposition should be diluted (MDPW 1991d).

C. PREY INTERACTIONS:

Phytoplankton and Zooplankton

Zooplankton are utilized directly by right whales, sei whales, and fin whales and both phytoplankton and zooplankton are the first components of marine food chains that support all species. The effects of disposal activities to plankton is described in Hubbard, et al. (1988).

Phytoplankton in the disposal plume will be exposed to shear stress and abrasion from sediment particles and may become entrained in the plume and carried below the euphotic zone.

Temporarily high levels of TSS will reduce light penetration and lower phytoplankton productivity, known to be affected at TSS levels of 10 mg/l. Phytoplankton will also be exposed to elevated levels of contaminants and nutrients which cause direct mortality or stimulate growth, respectively. Because disposal plumes will be of short duration (not greater than 3 hours) and restricted spatially (estimated at 2.1 percent of the total surface area of the MBDS), phytoplankton should not be significantly reduced in abundance.

Zooplankton will also be exposed to shear stress, abrasion, entrainment, and elevated concentrations of TSS and contaminants in the disposal plume. A study of the neritic copepod Acartia tonsa showed that TSS above 50 mg/l may reduce prey ingestion rates. Toxins may be assimilated by zooplankton via direct absorption or ingestion of contaminated phytoplankton. As with phytoplankton, these effects will be limited in duration and areal distribution and should not significantly affect endangered species by lowered abundance or contamination of their prey.

Finfish

Humpback and fin whales feed on a variety of small schooling fishes including Atlantic herring, mackerel, pollock, haddock and, primarily in the Gulf of Maine, American sand lance.

Fish eggs and larvae may be affected by shear forces or abrasion during disposal operations. Demersal eggs and larvae near the disposal point could be killed by direct burial in disposal sediments or siltation. Adult fish may be exposed to elevated turbidity and contaminants, the latter of which they may uptake through their skin or gills.

American sand lance and Atlantic herring do not spawn in the vicinity of the MBDS, preferring the sand and gravel substrate that exist on Stellwagen Bank. Nevertheless, planktonic larvae of American sand lance are abundant in the area from January to May, Atlantic mackerel May to June, and Atlantic herring September to December. Data collected using submersibles and trawl gear have shown that semi-demersal larval and adult sand lance occur at the MBDS although the area is not considered their prime habitat. Adults of the pelagic herring and mackerel and semi-demersal pollock and haddock also occur in the MBDS.

The MBDS is not considered an important feeding area for endangered species or their finfish prey. Although disposal activities may affect some finfish resources that endangered species utilize, this should not be significant given the limited extent of disposal activities. A possible exception may be juvenile humpback whales. Cessation of disposal activities when

endangered species are observed feeding in the immediate area of the disposal point should further minimize these impacts.

Jellyfish

Jellyfish, a major food source for leatherback sea turtles, are abundant seasonally in Massachusetts Bay. Presumably, these organisms would be subjected to impacts similar to those for plankton and finfish. While these pelagic drifters may occasionally occur at the MBDS, it would represent episodic events that are unlikely to be significantly affected by the limited spatial and temporal scope of disposal operations.

Marine Debris

The accumulation of marine debris in Massachusetts waters has become a threat to wildlife. The 1989 Massachusetts "Coastweeks" beach clean-up produced over 20 tons of plastic debris from the Commonwealth's coastline. Due to the peculiarities of ocean currents, marine debris remains circulating in Massachusetts and Cape Cod Bays. This debris, especially plastics, has been documented as a serious threat to cetaceans and sea turtles through ingestion or entanglement, either of which may cause mortality. For example, a number of stranded leatherback sea turtles have been found with plastic bags, which they may mistake for jellyfish, in their stomachs (NMFS, SEFC, unpublished data).

Vessel activity resulting from MBDS disposal activities at the MBDS may add to the problem from the disposal of normally generated ship wastes in the area. As of July 31, 1990, international regulations promulgated by the MARPOL Annex V and implemented by the Marine Protection, Research, and Sanctuaries Act prohibit the dumping of plastics at sea. Vessels over 26 feet in length must display a MARPOL V placard and vessels over 40 feet in length must have a waste management plan. By following the MARPOL Annex V guidelines, vessels conducting MBDS disposal operations would minimize adverse effects to threatened and endangered species from marine debris.

D. BIOACCUMULATION

Endangered cetaceans may be particularly susceptible to the bioaccumulation of contaminants. Harbor porpoise in Scotland and the Bay of Fundy apparently carry excessive concentrations of dieldrin and DDT residues in their fat-containing tissues, (Holden and Marsden 1967; Gaskin, Holdrinet, and Frank 1971 and 1976). Levels were high for males and immature or resting females and low for pregnant and lactating females suggesting direct transfer to young. Other lipophilic organochlorine contaminants, such as PCBs, may thus pose an elevated threat to cetaceans.

In a study of PCB metabolism in small cetaceans, it was found that PCB metabolic capacity "was extremely low as compared to those of birds and terrestrial mammals", implying "long-term accumulation and possible reproductive toxicity of persistent organochlorines in these animals." (Tanabe et al. 1988). A causal relationship between PCBs and lowered reproductive success in harbor seals has been shown by Reijnders (1986).

It is currently impossible to conduct a controlled experiment of this kind on large whales. However, PCB contamination in whales may lead to similar effects as in seals. Contaminants such as PCBs and metals have also been found in the leatherback sea turtle (Eckert and Eckert 1990). In addition to reduced reproductive potential, contaminants are suspected to cause immunosuppression and affect overall health especially when animals are under high stress.

Materials that have passed testing protocols should have low concentrations of heavy metals. Their low concentrations combined with the lack of evidence that any endangered species significantly utilize, either directly or indirectly, the benthic fauna of the MBDS renders the threat of bioacummulation through sediments negligible.

As stated in MDPW (1991) the only possible route of contamination to endangered species would be through water column interactions leading from phytoplankton to zooplankton to whales (right, sei, and fin), from zooplankton to finfish (primarily sand lance) to whales (fin and humpback), or from zooplankton and/or fish to jellyfish to leatherback sea turtles. For materials that have passed testing protocols, and will be in the water column for spatially limited short periods of time, as evidenced by the model, the potential for significant bioaccumulation in endangered species from water column interactions is remote.

CUMULATIVE IMPACTS

A. VESSEL TRAFFIC

A number of non-Federal activities add to vessel traffic of the area. Commercial shipping traffic is estimated at 1200 ship crossings per year with an average of three per day (U.S. Department of Commerce 1991). About 20 whale watch companies representing 40 to 50 boats conduct several thousand trips from April to September, with the majority of effort in the summer season. More than 280 commercial vessels fish on Stellwagen Bank. Sportfishing contributes more than 200 vessels per day from May to September. In addition, an unknown number of private recreational boaters frequent Massachusetts and Cape Cod Bays. While the combination of these activities may cause sublethal effects to endangered and threatened species that could prevent

or slow a species' recovery, such effects are currently unknown. Ship strikes have been identified as a significant mortality factor to the northern right whale (NMFS 1990b).

B. WATER QUALITY

Previous illegal and unregulated dumping of toxic chemical and low level radioactive waste containing barrels at the historic IWS, located 1 nautical mile west of the MBDS may affect water quality at the site. The impacts of barrel seepage or release of chemicals when trawlers break them open incidental to entanglement in nets is unquantified.

In addition, atmospheric contributions of contaminants such as PCBs will contribute to the levels at the MBDS. Sources of PCB contamination include atmospheric releases from improperly dumped electrical equipment. An estimated 98 percent of the PCBs entering the ocean come from the atmosphere and the remaining 2 percent through river runoff (Clark 1989).

Reliable ambient water quality data are needed to accurately assess the cumulative effects of future disposal activities.

C. PREY INTERACTIONS

In addition to illegally dumped marine debris, cumulative impacts from non-Federal actions to prey of endangered species may include indirect impacts from those mentioned for water quality and bioaccumulation sections of this assessment of impacts.

D. BIOACCUMULATION

Past illegal and unregulated dumping at the historic IWS and unregulated atmospheric or other non-point source inputs of contaminants such as lead and PCBs may contribute to environmental contamination resulting in bioaccumulation in endangered species. Bioaccumulation of contaminants in endangered species cannot be adequately evaluated until more information is obtained on existing or background toxin levels in living, free-ranging individuals. NMFS remains concerned about the possible cumulative effects of adverse impacts to endangered and threatened species and will continue to call for monitoring of the species to identify any downward trends.

CONCLUSIONS

NMFS concludes that final designation of the MBDS is not likely to jeopardize the continued existence of any endangered or threatened species under its purview. The following factors form the basis for that conclusion. However, additional information is necessary to assure that the basis for this determination

remains valid. Appropriate monitoring and management programs and additional studies are needed, as described in the Conservation Recommendations.

(1) Current distribution and abundance of humpback, fin, sei, and right whales and their known prey indicate significant high use of Stellwagen Bank and adjacent areas rather than those of the MBDS or IWS, located approximately 4 to 6 nautical miles to the west. Although leatherback sea turtles and their prey may occasionally utilize MBDS waters, that use is not considered critical to their survival. Although some juvenile humpback whales may feed in Stellwagen Basin and the waters of the MBDS, rapid descent of sediments through the water column and Corps' monitoring which restricts disposal when whales are in the area should prevent adverse impacts to these animals. The blue whale, Kemp's ridley sea turtle, loggerhead sea turtle, and shortnose sturgeon do not occur in the MBDS area with enough frequency to be affected by disposal activities.

(2) This Biological Opinion considers ocean disposal only for those materials that pass the testing protocol designed to determine suitability for ocean dumping. Through a disposal model simulation of the Central Artery/Third Harbor Tunnel project, a relatively large undertaking, the effects of disposal on total suspended solids, water quality, prey, and suspended solid deposition was found to be of short duration and limited generally to the boundaries of the MBDS. Areas of importance to endangered species that are adjacent to the MBDS such as Stellwagen Bank and Cape Cod Bay are not expected to receive significant amounts of materials. Although listed species may swallow or absorb small amounts of these contaminants through their skin, the levels should be insignificant.

(3) Existing regulations for ocean dumping and NMFS guidelines for the intentional approach of marine mammals and proposed Corps' management of disposal activities should minimize impacts from vessel traffic, marine debris and direct impacts of disposal activities. Close Corps monitoring, with EPA oversight, will further ensure that disposal is limited to designated buoys in the MBDS area.

REINITIATION OF CONSULTATION

Reinitiation of formal consultation is required if: (1) New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the identified action.

CONSERVATION RECOMMENDATIONS

In addition to Section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, Section 7(a)(1) of the ESA places an additional responsibility on all Federal agencies to: "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species....." NMFS is developing recovery plans for sea turtles, and final plans for the northern right whale and humpback whale are being reviewed. These plans describe actions deemed necessary to achieve recovery, and include implementation schedules that identify the Federal agencies best suited to address each recovery action. NMFS will advise and coordinate efforts toward achieving the goals of each plan. Copies of the northern right whale and humpback whale recovery plans will be forwarded to you by the Northeast Regional Office when they are available.

NMFS recommends that the following conservation measures be implemented to reduce adverse impacts to listed species. Similar measures were issued in the August 7, 1991, Biological Opinion to the Corps and Federal Highway Administration for the Central Artery/Third Harbor Tunnel Project. NMFS considers these recommendations applicable to all disposal projects that may be conducted at the MBDS. Thus, EPA should use its review authority to ensure that all permits issued by the Corps include conservation recommendations one through five. Additionally, a cooperative effort between EPA, the Corps, NMFS, Commonwealth of Massachusetts and all other agencies involved with potential environmental degradation of the MBDS is required to accomplish conservation recommendations six and seven. EPA should be the lead agency for these long-term studies.

(1) Disposal activities associated with the MBDS may result in harassment, vessel collisions and exposure of endangered and threatened species to falling sediments (with small levels of contamination) and rock. In addition, sediments may affect some phytoplankton, zooplankton and fish species that are utilized by endangered species.

To minimize these risks, NMFS-approved observers should be on board disposal vessels during all disposal operations to identify and report the presence of listed species in the vicinity of the MBDS. Disposal vessels should not intentionally approach listed species closer than 100 feet when in transit. When species are present in the MBDS, vessels should, except when precluded by safety considerations, follow the advice of the on-board NMFS-approved observer to avoid direct impacts to individuals when releasing sediments at the disposal point. The on-board

NMFS-approved observer should utilize the following guidelines to determine if disposal should be allowed in the presence of listed species. If listed species are sighted between a distance equal to twice the disposal vessel length and the disposal point, then release of sediments or rocks should be delayed until the animals move away from the disposal point. An alternative disposal buoy may be used, if available, when animals do not leave the primary disposal point. If visibility precludes the ability to sight listed species within a distance equal to twice the disposal vessel length, activities should be suspended until they improve. If listed species are sighted between a distance equal to twice the disposal vessel length and 1500 feet of the disposal point, the onboard NMFS-approved observer will note the animals' relative position, direction and speed of swimming, and behaviors such as feeding or logging of whales to determine if release of sediments or rock is likely to harass or endanger the animals. For example, whales actively feeding at or near the disposal point are more likely to interact with the water column and thus released sediments than resting whales. If listed species are sighted at or beyond 1500 feet (1/4 nautical mile) of the disposal point, release of sediments or rock may proceed.

NMFS is currently reviewing regulations for the intentional approach of marine mammals. Should these regulations be implemented with stricter approach distances than Northeast Regional guidelines, these conservation recommendations will be modified accordingly.

(2) EPA and Corps personnel in charge of disposal monitoring should be in contact with NER Protected Species Staff regarding endangered species distributions and abundances in the region during disposal operations.

(3) Compliance with MARPOL V and the Marine Protection, Research and Sanctuaries Act of 1972, as amended, will reduce the effects of marine debris to listed species. Therefore, all project vessels over 26 feet in length should be displaying a MARPOL V sticker. All vessels over 40 feet in length must document their waste management plan to NMFS.

(4) Monitoring efforts should be implemented to verify the predictions of the ADDAMS DUMP model and ensure that disposal material remains contained within the MBDS circular boundary. Highest priority should be given to worst case conditions. Such data would establish confidence in the model's use for the MBDS.

(5) Weather conditions may preclude the safe dumping of materials at the marker buoy. To ensure that disposal effects will be confined to the MBDS, onboard Corps inspectors should be given weather guidelines for exercising authority to suspend disposal operations before leaving port.

(6) Information is needed to evaluate sufficiently the additive, long-term impacts of disposal operations to the water quality of the MBDS and the Massachusetts Bay in general. EPA should, in cooperation with the Corps, NMFS and the Commonwealth of Massachusetts, conduct studies to adequately characterize the ambient levels of heavy metals and organics inside the boundaries of the MBDS and throughout Massachusetts Bay.

(7) All agencies involved in activities that either contribute to the existing, or may add to the contaminant load in the Massachusetts Bay and Cape Cod Bay system, should be involved in a long-term testing program to monitor accumulated levels of key contaminants in free-ranging endangered species. Historic tissue samples should also be tested when available to determine background levels of these chemicals.

INCIDENTAL TAKE

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2), NMFS will issue a statement specifying the impact of incidental taking of endangered species, providing reasonable and prudent measures necessary to minimize impacts, and setting forth the terms and conditions that must be followed.

The action of final designation of the MBDS should not result in the direct take of any endangered or threatened species under NMFS jurisdiction. Furthermore, all disposal at the MBDS will involve additional Federal action by the Corps or other action agencies. Section 7 consultation regarding these actions will provide incidental take statements for the scope of each project. Accordingly, an incidental take statement is not being issued for this Biological Opinion.

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APPENDIX D

1991 MONITORING DATA RESULTS

MASSACHUSETTS BAY DISPOSAL SITE

STUDY

U.S. ENVIRONMENTAL PROTECTION AGENCY

NARRAGANSETT, RHODE ISLAND

CHEMICAL CONTAMINATION AND ENVIRONMENTALLY RELATED DISEASES IN AQUATIC ORGANISMS AT THE MASSACHUSETTS BAY DISPOSAL SITE

PRINCIPAL INVESTIGATORS

George R. Gardner

Richard J. Pruell

CONTRIBUTORS

Sandra Baksi

Warren Boothman

Doranne Borsay[1]

Donald Cobb[1]

Jeff Corbin[1]

Saro Jayaraman[1]

Bruce Reynolds

Paul Yevich

[1]Science Applications International Corporation

PROJECT OFFICER

Kymberlee Keckler (U.S. EPA Region I, Boston, MA.)

December 31, 1991

U.S. Environmental Protection Agency
Environmental Research Laboratory
Narragansett, Rhode Island 02882

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INTRODUCTION

The Massachusetts Bay Disposal Site (MBDS), and Industrial Waste Site (IWS) commonly known as "The Foul Ground" are aquatic disposal areas for reception of construction and industrial wastes near Stellwagen Bank in the southern Gulf of Maine and Massachusetts Bay. Concern that these waste disposal activities could lead to ecological risks and possible human health effects from consumption of contaminated seafood led to a chemical and biological site characterization by U.S. EPA Region I, and the Environmental Research Laboratory, Narragansett, Rhode Island (ERL-N). The U.S. EPA research vessel, OSV ANDERSON, supported these summer of 1991 field survey activities.

This ERL-N study measured the concentration of PCBs, PAHs, pesticides, and metals in surface sediment samples from MBDS and IWS, and in edible and non-edible biological tissues of indigenous fish (Winter Flounder; American Plaice), crustacea (Lobster), and bivalve molluscs (Sea Scallop; Ocean Quahog). Chemical analysis were also conducted on sea scallops deployed <u>in situ</u> at both MBDS and IWS. Pathological examinations of winter and yellowtail flounder, American plaice, and sea scallops (indigenous and deployed) were used to appraise the sites for environmentally related diseases. This ERL-N report summarizes chemistry data for sediment and animal tissue, and toxic response effects at MBDS and IWS. Our report also compares some data values for Massachusetts Bay, Georges' Bank, and Quincy Bay, Boston Harbor organism and sediment chemistry, and winter flounder and sea scallop histopathology.

METHODOLOGY

The study approach followed methodologies developed or modified by ERL-N research teams in the area of sediment and tissue chemistry, and gross and cellular pathology in lower animals.

Biological Studies

Teleosts: Winter Flounder (n=20), and Yellowtail Flounder (n=1) were collected near the Industrial Waste Site (IWS) May 13, 1991, and American Plaice (n=41) were collected June 24, and July 17-18, 1991. Standard Otter Trawling methods were used to capture these benthic flatfish.

Invertebrates: Crustaceans and bivalve molluscs collected by otter trawl and by dredge at MBDS May 6-8, 1991 included lobster (*Homarus americanus*) (n=9), Ocean Quahogs (*Arctica islandica*) (n=2), and Sea Scallop (n=13). In addition, adult Sea Scallop (n=18) were deployed at three IWS sites in July and recovered in September, and (n=8) were collected by otter trawl at Georges' Bank during the July cruise.

Histopathological Protocol:

Teleost and invertebrate tissue fixation and processing followed guidelines established for use in the ERL-N Lower Animal Pathology Program. Dietrich's Fixative was used because of its superior qualities for teleost tissue fixation and staining, and Hellys was used with invertebrate tissue for the same reasons.

Winter Flounder and yellowtail were returned to ERL-N live, where they were measured for total length, weighed to the nearest gram, fixed in Dietrich's Fixative, and tissues processed for microscopic evaluation. American Plaice tissue fixation including initial processing occurred on-board the OSV Anderson at the time of collection. Final tissue processing of these animals occurred at ERL-N upon survey completion. Meristic values for American Plaice are not reported here since the values had not been recorded at the time of collection. Sea Scallop from IWS and George Bank were returned live to ERL-N for tissue fixation, while animals recovered after deployment at IWS were fixed on-board the OSV Anderson. The histological tissue processing and staining methods are those developed for use by the Armed Forces Institute of Pathology, and ERL-N, or modifications arising from ERL-N methods development.

Histological Endpoints:

The histological assessments focus on portals of chemical entry, concentration and excretion. Histological accountability includes the tissues (i.e.; epithelium, connective, muscle, and nervous), and major internal organs associated with digestive, circulatory,

and major internal organs associated with digestive, circulatory, excretory, endocrine, nervous, and respiratory systems.

Contaminant Studies

Two sediment cores from MBDS South, and two from IWS North were taken on the May 6-8, 1991 survey cruise. Thirty biological organisms for chemical evaluations included lobster (n=9), Ocean Quahogs (n=2), Sea Scallop (n=3), Winter Flounder (n=9), and American Plaice (n=4). Sea Scallop chemistry also included animals deployed at MBDS (n=3), and Georges' Bank (n=3).

Chemicals measured: Classes of environmental chemicals and pollutants measured included Chlorinated Hydrocarbons (Chlorinated pesticides and Polychlorinated biphenyls), Polycyclic Aromatic Hydrocarbons (PAHs), and several trace metals.

Analytical Protocol:

Organic Analysis/Sediments

About 10-20 grams of each homogenized wet sediment were added to 30 grams of sodium sulfate, 50 ml of methylene chloride and internal standards, and the sediment samples were then shaken overnight. A separate aliquot of the homogenized sample was weighed prior to and following oven-drying to determine percent moisture. Following the overnight shaking, the solvent/sample mixtures were centrifuged and the supernatent collected. Another 50 ml of methylene chloride was added to each sediment, and the samples were shaken for approximately 6 hours. The samples were then centrifuged and the supernatent combined with that collected earlier. Sample extract volumes were reduced under a stream of nitrogen to approximately 1 ml, exchanged to hexane and treated with activated copper powder to remove free elemental sulfur. The extracts were then passed through a column consisting of 9.5 grams of silicic acid, deactivated with water 6.75%. Two fractions were collected and combined for each extract; the first was eluted with 50 mls of pentane, the second with 36 mls of methylene chloride. Following volume reduction under nitrogen, each extract was split into two equal portions. One half was treated with sulfuric acid to further remove organic interferences, and was then analyzed for PCBs and chlorinated pesticides by GC-ECD. The other portion of each extract was analyzed for PAHs by GC-MSD. Each GC was equipped with a 30 meter DB-5 capillary column, with helium used as the carrier gas. Multiple level standard calibrations provided the basis for analyte quantitation.

Organic Analysis/Tissues

Tissue samples were homogenized with a titanium homogenizer and then the homogenate was split for organic and inorganic analysis. Approximately 10 grams of homogenized tissue was placed in a centrifuge tube with appropriate amounts of the internal standards

and 50 ml of acetonitrile for organic analysis. A separate aliquot was taken for a moisture determination. Each sample was then mechanically mixed, centrifuged and the supernatent decanted three times. The supernatent from each step was combined for each sample, placed in separatory funnels with deionized water and back extracted with pentane. The pentane was decanted and dried over sodium sulfate prior to volume reduction under nitrogen. After the extracts were brought to one ml, a portion was removed for gravimetric lipid weight determination. Extract cleanup and analysis procedures for the tissue samples were identical to those utilized for the sediment extracts, except for the omission of the sulfur removal step.

Inorganic Analysis/Sediments

Homogenized wet sediment samples were freeze-dried in polycarbonate centrifuge tubes so that the dry weight of the samples was approximately 2.5 grams. Extraction was performed with dilute nitric acid in an ultrasonic water bath for a minimum of sixteen hours. After centrifugation, the supernatant for each sample was decanted and another aliquot of acid was added to each sediment. The samples were sonicated for an hour, recentrifuged, and the supernatant combined with the earlier portion. Following dilution with dilute nitric acid to 50 mls, chemical analysis for each sample was performed on an Inductively Coupled Plasma Atomic Emission Spectrometer calibrated with multiple level standards.

Inorganic Analysis/Tissues

Homogenized tissue samples were freeze-dried in Teflon vessels, yielding approximately 2.5 grams of dry sample. Concentrated nitric acid was added to each vessel, and the samples were heated to boiling in a microwave. After the samples cooled, they were filtered and diluted to 50 ml with deionized water. Analysis of the tissues was performed as described for the sediments, except that the concentrations of several elements (copper, chromium, lead, nickel, and cadmium) were determined by Atomic Absorption Spectrophometry.

RESULTS

Biological Studies

Meristic Measures:

The Stellwagen Bank Winter Flounder total length ranged from 20.0-39.7 cm with a mean of 28.14 cm, and weight ranged from 115-801 gm with a mean of 381 gm. Their age range was from 1.5 to 4.0 years and averaged 2.5 years. Fourteen of these animals were female, while six were male. The single Yellowtail Flounder measured 41 cm total length, weighed 714 gm, and was female. The sex of n=41 American Plaice included twenty five females, six males, and ten unknown (tissues unavailable).

Pathological Disorders:

Our previous epidemiological studies investigating chemical and pollutant related diseases in winter flounder and other marine fish have identified a causal relationship between several environmentally related non-infectious and infectious diseases, and exposure to contaminated sediment (Gardner, Pruell and Folmar 1989). These investigations identified individuals at risk by obtaining pathobiological evidence of exposure, and corresponding concentrations of chemical pollutants in organism tissues and site sediment. Our laboratory experiments verify a relationship between toxic-induced responses in organ systems including liver, gall bladder, kidney, spleen, pancreas, gill, and nervous and ciculatory systems of feral flounder, and environmentally stable pollutants (Gardner et al. 1991). The present epidemiological study investigating Massachusetts Bay marine fish identified a low level of these pollutant related biological abnormalities including neoplastic, and non-neoplastic disorders. An index (Table 1), and summary of the cellular pathology data are given in Master Tables for Winter Flounder (Table 2), American Plaice (Table 3), yellowtail Flounder (Table 4). Diseases identified in Sea Scallop (Tables 5 and 6) are summarized in Table 7.

Neoplasms and Related Disorders

Winter Flounder

A liver hepatoma was observed in one Winter Flounder, a male measuring 30 cm in length, and weighing 334 grams. Histologically, the basophilic hepatoma is a single, circumscribed nodule with a glandular pattern, and a high mitotic frequency. Synonyms or related terms for hepatoma include adenoma, and neoplastic nodule. The examination of liver, and of other internal organs of the animal shows there were no other structural alterations correlating with the presence of the tumor.

known to occur in the presence of PAHs and other chemical contaminants in aquatic systems. Carcinogenic PAHs have been shown to cause a homologous disorder in liver of rodents.

Yellowtail Flounder

Neoplastic cellular disorders were not observed in the single Yellowtail Flounder collected for examination.

Sea Scallop

Neoplasms were not present in any of the Sea Scallops indigenous to MBDS or IWS, or induced in animals deployed in situ.

Non-neoplastic Disorders

Winter Flounder

The examination has shown histological evidence of hepatocytic vacuolation in the liver of a single Winter Flounder. No other non-neoplastic hepatotoxic lesions, or structural modifications were present. Qualitative evaluations of spleen macrophage centers has shown the total area of splenic tissue covered was <1% in all n=21 Winter Flounder.

Helminthiasis (Worm Diseases) was found in the gastrointestinal tract (n=4), biliary system (n=7), and respiratory organs (n=5). These worms caused parasitic granulomas in the gastrointestinal tract (n=4), and gill bifurcation (n=1). Helminth parasites are common in marine fish and are known to parasitize skin, gills, visceral cavity, the internal organs, and musculature. Evidence suggests pollutants increase the number and activity of these infectious organisms. Helminths are absent in Georges' Bank flounder.

American Plaice

The prominent liver conditions included the appearance of basophilic round cells associated with intrahepatic vasculature (n=2), spongiosis hepatis (n=1), and chronic inflammation (n=14). The examination has shown epithelial hyperplasia (n=2), and ductular lamination (n=6) of intrahepatic biliary ducts. Qualitative evaluation of the splenic macrophage centers has shown the centers covered <1% of the total area of n=21, >1% of n=13, and tissue was unavailable for examination in n=7 animals.

Helminthiasis was common to these benthic fishes parasitizing the gastrointestinal tract (n=2), gills (n=2), and the biliary system (n=21). Parasitic granulomas were found in the gastrointestinal tract (n=2), and the kidney (n=1), and bifurcation was observed in gills (n=3).

Yellowtail Flounder

The single Yellowtail Flounder was found to have liver perivascular, and/or biliary kuffing, and helminthiasis of the intrahepatic biliary system. The splenic macrophage center ratio to splenic tissue was >1%.

Sea Scallop

The histological examination has shown limited cellular pathology, and/or parasitism of tissues and major internal organs of the Sea Scallop whether the animals are indigenous to MBDS, or deployed at IWS. The evidence has shown these conditions in mantle, adductor muscle, and the digestive, respiratory, and excretory organs are generally higher at the Georges' Bank reference location in comparison to MBDS, IWS deployment site #2, and IWS deployment site #3 (Table 6). Sea Scallop at the reference IWS site #1 could not be relocated for retrieval.

Contaminant Studies

Sediment and tissue samples were collected from several locations in the Mass Bay area. These samples were analyzed for a variety of organic compounds and elements. The abbreviations used to represent the analytes in the tables and text are listed in Table 8. Only a very limited number of samples of each type from each station were collected. Therefore, although some comparisons of the results are made below, the data have not been statistically compared and any differences noted should not be considered definitive.

Chemistry/Sediment

Triplicate chemical analyses were conducted on sediment core samples that were collected from two locations (IWS North and MBDS South). Numerous organic and inorganic chemistry measurements were made on these samples. The results of these determinations are shown in Tables 9-13. In general, the concentrations of all contaminants studied were very low in the samples from both locations. Although the concentration differences between sites were small, in general the samples from the MBDS South station contained higher levels of some organic contaminants than the IWS North samples.

Of the chlorinated compounds measured, the DDT series compounds (p,p'-DDD, p,p'-DDE and p,p'-DDT) were found in the highest concentrations (Tables 9 and 11). Only trace levels of PCB congeners, chlordanes or other chlorinated compounds were detected. The concentrations of DDT series compounds were about a factor of three higher at the MBDS South site than at the IWS

North station. However, in general the levels of all of these chlorinated compounds were considerably lower than those previously measured in Quincy Bay (Gardner and Pruell, 1988).

PAH concentrations were generally higher at the MBDS South location (factor of about four) than at the IWS North site (Tables 10 and 12). Again, however, the PAH concentrations at both of these sites were considerably lower than those measured in Quincy Bay (Gardner and Pruell, 1988). The only exception to this is perylene which was found at both the MBDS South and IWS North sites at relatively high concentrations. The levels measured at these sites were similar to those previously measured in many of the Quincy Bay samples. Perylene can have both anthropogenic (combustion) and natural sources. Although its natural source has not been completely established it is believed to be produced naturally during the early digenesis of organic material in sediments (Venkatesan, 1988). Because perylene was found in higher concentrations than the other combustion generated PAHs, the major source of this compound at the MBDS South and IWS North sites appears to be natural.

The concentrations of eight elements (Cu, Zn, Cr, Pb, Ni, Cd, Mn and Fe) were also measured in samples from the MBDS South and IWS North sites. Results from the analyses of these samples (Table 13) show that the concentrations of these elements at the two sites were very similar with the possible exception of Cd which showed slightly higher concentrations in the MBDS South samples. Four of these elements (Cu, Cr, Pb and Cd) were also measured as part of the Quincy Bay Study (Gardner and Pruell, 1988). In that study the Cu concentrations measured in surface sediments ranged from 6.8 to 141 ug/g with only 2 of 33 samples containing levels below those found in the present study. The Cr concentrations measured in Quincy Bay ranged from 5.6 to 215 ug/g with most values well above those measured in the present study. All of the Pb levels measured in the Quincy Bay Study (6.6 - 164 ug/g) were above those measured in the MBDS South and IWS North samples (Gardner and Pruell, 1988). The Cd concentrations were also higher in many of the samples from Quincy Bay compared to those measured from the MBDS and IWS sites in the present study.

Chemistry/Tissues

Organism samples representing several marine species were also collected for chemical analysis. These samples were analyzed for the same suite of analytes as were the sediment samples. This included a series of PCB congeners, selected chlorinated pesticides, PAHs and several elements (Cu, Zn, Cr, Pb, Ni, Cd, Mn and Fe).

Lobster

Muscle and hepatopancreas tissue samples were analyzed from three

lobster samples. The muscle samples (claw and tail) contained low concentrations of organic contaminants (Tables 14 and 15). PCB congener concentrations were all less than 20 ng/g and in the expected distributions with congeners 118, 153 and 138 being found in the highest levels. The chlorinated pesticide found in the highest level was p,p'-DDE (3.64 - 12.4 ng/g). PAH concentrations were also low in the muscle tissue with maximum concentrations less than 3 ng/g for all compounds measured.

The concentrations of Cr, Pb, Ni, Cd, Mn and Fe were also very low in the lobster muscle samples (Table 18). Cu and Zn concentrations were higher; however, these levels probably reflect the natural biochemistry of this species.

As expected, the concentrations of many of the measured organic contaminants found in the lobster hepatopancreas samples (Tables 16 and 17) were considerably higher than those measured in the muscle samples. This was especially true for all of the chlorinated compounds (except PCB congener 008 and aldrin which were not detected in any of the lobster samples) and PAHs. The magnitude of the difference between tissues for the organic contaminants varied among compounds from about a factor of 20 to as much as a factor of 500.

The only metal showing major differences in concentration between the two tissue types was Cd (Table 18). The mean Cd concentration in the hepatopancreas samples was about 200 times higher than that of the muscle samples (11.1 vs 0.055 ug/g dry weight).

A comparison of the organic contaminant levels measured in the lobsters collected from the Mass Bay Disposal Site with those previously measured in lobsters collected from Quincy Bay is shown in Table 19 and Figures 1-6. For most of the organic contaminants the concentrations measured in the Quincy Bay lobster were considerably higher than the levels in the present samples. Differences in the concentrations of metals were more variable (Table 20). The site having the higher levels differed among metals and tissue types with no clear trend.

Winter Flounder

The concentrations of chlorinated organic compounds in the flounder muscle samples were low (Table 21) and similar to those that were measured in the lobster muscle samples (Table 14). As expected, the concentrations of these compounds were considerably higher in the liver samples (Table 23). The levels detected in this tissue were similar to those that were measured in the lobster hepatopancreas samples (Table 16). PAH concentrations were very low in both the flounder muscle and liver samples (Tables 22 and 24). These levels were lower than those found in the corresponding tissues of the lobster samples. This is

probably related to the fact that fish generally have a greater ability to metabolize PAHs than do crustaceans.

Metals concentrations were higher for most elements in the flounder liver samples relative to the muscle samples (Table 25). This difference was large for all elements except Cr and Ni.

Tables 26 and 27 show the mean concentrations of organic and inorganic contaminants, respectively, that have been measured in flounder from Quincy Bay, the Mass Bay Disposal Site and Georges Bank. For the organic contaminants (Table 26 and Figures 7-10) the muscle data show that the levels measured for Mass Bay samples in the present study are intermediate between those in samples from the Quincy Bay and Georges Bank locations. This may indicate a general decrease in concentration with distance from shore. However, since these samples were collected on different dates, the time of collection may have also been a factor. The metals data (Table 27) do not show any clear trends among the three sites.

American Plaice

Muscle and liver samples from American Plaice collected from Mass Bay were analyzed for PCBs, chlorinated pesticides and PAHs (Tables 28-31). However, because of the limited amount of tissue available, only the muscle samples were analyzed for metals (Table 32). The results obtained for this species were very similar to those of the Winter Flounder samples (Tables 21-25). Relatively low concentrations of chlorinated compounds were found in the muscle samples (Table 28) with considerably higher amounts in the liver samples (Table 30). Only trace concentrations of PAHs were detected in both tissues (Tables 29 and 31). Metals levels were low in the Plaice muscle samples (Table 32) and very similar to those that were found in the Winter Flounder muscle samples (Table 25).

Bivalves (Scallops and Quahogs)

Indigenous scallops were collected from Mass Bay and Georges Bank. Scallops were also deployed for ten weeks at the Mass Bay location. The adductor muscles of these scallops were analyzed for organic and inorganic contaminants. In addition, other scallop samples and an ocean quahog sample were collected from the MBDS site for whole organism analysis and one scallop gut sample was analyzed for organic contaminants only. Results from the analysis of these samples are included in Tables 33-43.

PCB concentrations were generally similar in the indigenous scallop samples that were collected from the Georges Bank and Mass Bay sites (Tables 33 and 35). However, the concentrations of p,p'-DDE and p,p'-DDD were somewhat higher at the Mass Bay site (Tables 33 and 35). PAH concentrations also appeared to be

higher at this location (Tables 34 and 36). Concentrations of PCBs, chlorinated pesticides and PAHs in the scallops deployed at the Mass Bay site (Tables 35 and 36) appeared to be similar to or somewhat higher than the levels seen in the indigenous organisms collected at that location (Tables 37 and 38).

Metals concentrations were generally low and similar in the Mass Bay and Georges Bank indigenous scallop muscle samples (Table 43). Similar levels were also measured in the muscle samples from scallops deployed at the Mass Bay site.

PCB and chlorinated pesticide concentrations in the whole scallop samples (Table 39) were similar to those of the scallop muscle samples (Tables 33, 35 and 37). However, the PAH concentrations were substantially higher in the whole scallop samples (Table 40). This was particularly true for sample 902593 which contained very high concentrations of alkylated phenanthrenes and anthracenes which are indicative of petroleum contamination. These samples also contained elevated concentrations of Cu and especially Cd relative to the scallop muscle samples (Table 43). Organic contaminant concentrations in the scallop gut sample were very high for the three classes of compounds (PCBs, chlorinated pesticides and PAHs) that were measured (Table 41 and 42).

The organic contaminant levels in the whole ocean quahog sample were relatively low (Tables 41 and 42) in comparison to those of the whole scallop samples. This sample did contain relatively high concentrations of most of the metals (Table 43); however, the elevated levels of Mn and Fe may indicate that the elevated levels are due to the presence of sediment in the gut of this organism.

CONCLUSIONS

Pathology

This study identified abnormalities in liver (a single hepatoma, megalocytic hepatosis, spongiosis hepatis, basophilic round cell infiltration) the biliary system (intra and extrahepatic), kidney, and spleen of MBDS/IWS Winter Flounder and American Plaice. Previous studies have shown the prevalence values for these toxic-induced diseases of winter flounder coincide with chemical contamination of sediment (Gardner, Pruell and Folmar 1989). The Mass Bay study also identified diseases of skin, gill, visceral cavity, internal organs and musculature produced by parasitic worms. These diseases are absent or rare in offshore flounder (i.e., Georges' Bank) and clean environments, but incidence increases in degraded environments as the conditions become more favorable for these parasites. The pattern and magnitude of the above diseases of flounder and plaice at the Mass Bay Foul Area agrees with results previously established by Gardner, Pruell and Folmar (1989) for low to moderately polluted New England marine and estuarine environments.

Our study has shown a 5% prevalence of liver neoplasms in the Stellwagen Bank Winter Flounder near the IWS and MBDS where sediment analysis determined B[a]P values in sediment cores of 0.002 and 0.014 ug/g respectively. We have previously established a relationship between Winter Flounder liver neoplasm prevalences and B[a]P in sediments (Fig. 11 from: Gardner, Pruell, and Folmar 1989). According to the empirically derived curve in Fig. 11, the expected sediment level of B[a]P for 5% prevalence would be approximately 0.2 ug/gm. There are two possible explanations for the slightly higher value; 1) the sample size from the current study consisted of 20 while the curve shown in Fig. 11 was generated from sample sizes of >100, and 2) the sediment cores were not taken in the same area from which the fish were collected.

Data given in Figure 11 for B[a]P contamination are as follows: Georges Bank (GB) Non-detectable; Fox Island, Narragansett Bay (FI) 0.02 ug/g; Foul Area, Massachusetts Bay (FA) 0.01 ug/g; Gaspee Point, Narragansett Bay (GP) 1.00 ug/g; Black Rock Harbor, CT (BRH) 3.16 ug/g; Quincy Bay, Boston Harbor (QB) 6.46 ug/g; New Bedford Harbor, MA (NBH) 8.43 ug/g.

Previous studies demonstrate a relationship exists between abnormalities of structure and function of internal organs, amounts of melanotic material in spleen macrophage aggregations of flounder, and environmental degradation (Gardner et al. 1989; Wolke et al. 1985). These studies show the relationship of

macrophage aggregate number and size to area of splenic pulp is a function of internal organ pathology and organism health. An aggregate to pulp area of <1% generally indicates a healthy organism. A higher bulk of aggregate to pulp (i.e.; >1%) generally signifies increased levels of environmentally related diseases, or degraded organism health. In flounder (particularly Quincy Bay flounder) identified with liver neoplasms the macrophage aggregate area exceeds 8 percent (i.e., 8-50%). The current study of spleen in MBDS/IWS fish shows the average splenic macrophage aggregate to splenic pulp area is <1% in MBDS Winter Flounder; 20% of the American Plaice have values > 1%.

Diseases of the liver, and splenic macrophage values for flatfish at the MBDS/IWS collection area follow normal frequency curves established in previous studies (i.e., fig. 11) for pathology and chemical contamination of sediment. Therefore, the low prevalence diseases of the liver and spleen biomarker values developed in this study are predictive of the relatively low PAH (i.e.; B[a]P) contamination levels we measured in sediment. Fish parasitism, and Sea Scallop histopathology provides corroborating evidence for low level chemical contamination at the MBDS/IWS collection area, which we verified by chemical analysis in this study.

Chemistry

Contaminant concentrations were very low in the sediment samples collected from the two sites (MBDS South and IWS North sites). However, since samples from only two stations were analyzed (triplicate analysis of each), only limited conclusions should be drawn from these results.

As expected, the highest contaminant concentrations were found in the lobster hepatopancreas and fish liver samples. Relatively low levels of contamination were seen in the lobster, flounder, plaice and scallop muscle samples.

When the lobster and flounder results are compared with data previously collected from Quincy Bay and Georges Bank, a trend of decreasing concentrations with distance from shore is observed. Therefore, these data do not indicate that the Mass Bay site has a major impact on the concentrations of the measured contaminants in biota. However, it must be noted that the data that are available represent only a few samples from a limited number of species some of which are mobil and therefore should not be considered conclusive.

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TABLE 1

INDEX FOR FISH PATHOLOGY

NEOPLASMS

1/ Liver Hepatoma

NON-NEOPLASTIC LESIONS

2A/ Liver/hepatocytic vacuolation
2B/ Liver/megalocytic hepatosis
2C/ Liver/basophilic round cells
2D/ Liver/spongiosis hepatis
2E/ Liver/perivascular or biliary kuffing
2F/ Liver/inflammation

3A/ Gastrointestinal tract/basophilic nidi
3B/ Gastrointestinal tract/parasitic granulomas

4A/ Respiratory organ/telangiectasia
4B/ Respiratory organ/bifurcation
4C/ Respiratory organ/helminthiasis
4D/ Respiratory organ/hyperplasia

5A/ Spleen % macrophages/< 1
5B/ Spleen % macrophages/ > 1

6A/ Biliary/lamination
6B/ Biliary/hyperplasia
6C/ Biliary/parasitism

7A/ Kidney/parasitic granuloma

8A/ Parasites/gastrointestinal
8B/ Parasite/gill

TABLE 2

MASSACHUSETTS BAY STUDY

MASTER TABLE

WINTER FLOUNDER

SAMPNUM ERL-N	SEX	LENGTH (TL CM)	WEIGHT (GM)	NEOPLASTIC	NON-NEOPLASTIC	SPLEEN % MA
91-270	F	37.6	628		4B, 6C	5A
-270	M	37.0	593			5A
-272	F	36.0	535			5A
-274	F	39.7	801		8B	5A
-275	F	33.1	480			5A
-276	F	33.0	525		6C	5A
-277	M	34.5	488		6C	5A
-278	F	28.2	328		6C	5A
-279	F	32.2	377		2A,6C	5A
-280	F	29.8	372		3B,6C,8A	5A
-281	F	32.2	407			5A
-282	M	30.8	394		3A,6C,8A	5A
-283	M	30.0	334	1	8A,8B	5A
-284	F	30.5	404		3B	5A
-316	M	23.5	145		8B	5A
-317	F	26.0	212		8A,8B	5A
-318	F	24.0	185		8A	5A
-319	F	23.7	162		3B,8B	5A
-320	M	20.9	115		3B,6C	5A
-321	F	22.0	132			5A

Mean Length 28.14 cm (20.0 -39.7 cm)
Average age was 2.5 yrs. (range 1.5 -4.0 yrs.)
Average weight 381 gm (range 115-801)

TABLE 3

MASSACHUSETTS BAY STUDY

MASTER TABLE

AMERICAN PLAICE

SAMPNUM ERL-N	SEX	LENGTH (TL CM)	WEIGHT (GM)	NEOPLASTIC	NON-NEOPLASTIC	SPLEEN % MA
91-446	F	*	*		6C	-
-447	F				2F, 4B, 6C	5B
-448	F				6C	5A
-449	F				6B,6C	5A
91-450	F				7A	5A
-451	F				6C,8B	-
-452					6C	-
-453	M				3B,6C,8A	5B
-454	F					-
91-455	M				6C,8B	5A
-456						-
-561	F				4D,6C	5A
-562					3B	5A
-563	F				4D,6C	5A
-564	F				6C	5A
91-565	F				6C	5B
-566	F				6C	5A
-567	F				2F	5A
-568	F				2D,2F,2G,4D,4E,6B	5B
-569	F				2F,6A	5B
91-570					2B,2F,6A	-
91-571	M				2F,6A,6C	5A
-572					6C	5A
-573	F				2F	5A
-574					2F,6A,6C	5A
91-575	F				2F,6C	5A
-576	F				6A	5A
-577	F				2C	5B
-578					2C	5A
-579					2F,4C	5A
91-580	F				2F,6C	5A
-581	M				6C	5B
-582	M				2F,4B,6A,6C	5B
-583	M					5B
-584	F				4B,6A	5B

TABLE 3 (cont'd)

91-585	F	2F	5B
-586	F	6C	5A
-587	F	6A	5B
-588			5B
-589	F	2F	5A
91-590			

* = LENGTH AND WEIGHT MEASURES NOT TAKEN ON BOARD OSV ANDERSON.

TABLE 4

MASSACHUSETTS BAY STUDY

MASTER TABLE

YELLOWTAIL FLOUNDER

SAMPNUM ERL-N	SEX	LENGTH (TL CM)	WEIGHT (GM)	NEOPLASTIC	NON-NEOPLASTIC	SPLEEN % MA
91-723					2E,6C	5B

TABLE 5

INDEX FOR SHELLFISH PATHOLOGY

1A/ Digestive Organ/inflammation
1B/ Digestive Organ/parasitisim

2A/ Respiratory organ/viral-bacterial
2B/ Respiratory organ/protozoan

3A/ Mantle/inflammation
3B/ Mantle/epithelial necrosis

4A/ Adductor muscle/atrophy
4B/ Adductor muscle/heliminthiasis

5A/ Reproductive organ/inflammation
5B/ Reproductive organ/ductular fibrosis

6A/ Hinge Ligament/inflammation

7A/ Excretory organ/nephrofibrosis

TABLE 6

MASSACHUSETTS BAY STUDY

MASTER TABLE

SEA SCALLOP

SAMPNUM ERL-N	SITE	SEX	NON-NEOPLASTIC
91-540	MBDS	M	2A,3A,5A
-541	"	M	1A,2A
-542	"	F	1A,2A,3B,4A
-543	"	F	1A,2A,3A&B,4A
-544	"	M	1A,2A,5A
91-545	"	F	1A,2A,4A
-546	Georges Bank	F	1A,2A
-547	"	F	1A,2A,3A&B,4A
-548	"	M	1A,2A,4A,3B
-549	"	F	1A,2A,3A,4A,5A
-550	"	F	1A&B,2A,3A&B
-551	"	F	1A,4A
-552	"	M	1A,2AA,4A
-553	"	F	1A,2A,4A&B
-554	MBDS	F	–
-555	"	M	3A&B
-556	"	F	1A
-557	"	M	4A
-558	"	M	1A,2A
-559	"	M	3B
91-560	"	M	2A
-1295	IWS #2	F	1A,4A
-1296	"	F	1A
-1297	"	F	1A,4A
-1298	"	M	1A,4A,6A,7A
-1299	"	M	1A,4A
91-1300	"	M	4A
-1301	IWS #3	F	–
-1302	"	M	4A,5B
-1303	"	M	1A
-1304	"	M	
-1305	"	M	

TABLE 7

SEA SCALLOP PATHOLOGY SUMMARY

(Number and Percent)

PATH INDEX #	ENVIRONMENTAL SITE			
	GEORGES BANK (n=8)	MBDS (n=13)	IWS#2(n=5)	IWS#3 (n=6)
1A	8 (100)	7 (54)	5 (100)	1 (17)
1B	1 (13)	0 --	0 --	0 --
2A	6 (75)	8 (62)	0 --	0 --
3A	4 (50)	3 (23)	0 --	0 --
3B	2 (25)	4 (31)	0 --	0 --
4A	5 (63)	4 (31)	4 (80)	2 (33)
4 B	3 (38)	0 --	0 --	0 --
5A	1 (13)	2 (15)	0 --	1 (17)
6A	0 --	0 --	1 (20)	0 --
7A	0 --	0 --	1 (20)	0 --

Table 8

KEY TO ABBREVIATIONS USED

PCBs

CB008 - CB209	Individual PCB congeners are identified by number after Ballschmiter and Zell

Chlorinated Pesticides

HCB	Hexachlorobenzene
Lindane	gamma-HCH or gamma-BHC
AChlordane	alpha-Chlordane or cis-Chlordane
TNonachlor	*trans*-Nonachlor
PPDDE	4,4'-DDE or *p,p'*-DDE
PPDDD	4,4'-DDD or *p,p'*-DDD
PPDDT	4,4'-DDT or *p,p'*-DDT

Polycyclic Aromatic Hydrocarbons

Sum MW178-C1	C1 homologs of phenanthrene and anthracene
Sum MW178-C2	C2 homologs of phenanthrene and anthracene
Sum MW178-C3	C3 homologs of phenanthrene and anthracene
Sum MW178-C4	C4 homologs of phenanthrene and anthracene
Sum MW228	Sum of molecular weight 228 PAHs
Sum Benzofluoranthenes	Sum of Benzo(b,k,j)fluoranthene isomers
Sum MW276	Sum of molecular weight 276 PAHs
Sum MW278	Sum of molecular weight 278 PAHs
Sum MW302	Sum of molecular weight 302 PAHs

Table 9

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN SEDIMENT CORES FROM MASS BAY

LOCATION: MASS BAY, MBDS SOUTH

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902495	902495	902495	MEAN
PCB CONGENER				
008	(0.11)	(0.11)	(0.09)	(0.05)
018	(0.09)	(0.08)	(0.09)	(0.04)
028	0.09	0.26	(0.09)	0.13
052	(0.10)	0.16	(0.10)	(0.09)
044	0.28	0.11	0.28	0.22
066	(0.06)	0.14	(0.06)	0.07
101	0.34	0.50	0.37	0.41
118	0.26	0.32	0.23	0.27
153	0.20	0.20	0.17	0.19
105	(0.05)	0.05	(0.06)	(0.03)
138	0.24	0.27	0.20	0.24
187	0.08	0.11	(0.08)	(0.08)
128	0.20	0.08	0.16	0.15
180	0 22	0.06	0.13	0.14
170	0.04	0.52	0.03	0.20
195	(0.07)	0.10	0.11	0.08
206	(0.03)	0.14	(0.14)	(0.08)
209	0 04	0.12	0.04	0.06
PESTICIDES				
HCB	0.18	0.27	0.14	0.20
LINDANE	0 33	(0.10)	0.36	0.25
ALDRIN	(0.08)	(0 07)	(0.08)	(0 04)
ACHLORDANE	0.08	0.22	0.21	0.17
TNONACHLOR	0.06	0.14	0.09	0.09
PPDDE	0.43	0.55	0.49	0.49
PPDDD	3.01	3.45	3.55	3.34
PPDDT	0.09	0.32	0.32	0.24
MIREX	(0.04)	(0.08)	(0.08)	(0.03)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.
For levels below the MLDs, one half the MLD was used to calculate the mean.

Table 10

PAH CONCENTRATIONS IN SEDIMENT CORES FROM MASS BAY

COLLECTION DATE: MAY, 1991

LOCATION: MASS BAY, MBDS SOUTH

SAMPLE NUMBER	902495	902495	902495	MEAN
PAHs				
FLUORENE	(3.43)	(3.13)	(2.86)	(1.57)
PHENANTHRENE	34 9	14.2	16.3	21.8
ANTHRACENE	8.25	(3.13)	4.30	4.71
SUM MW178-C1	14 0	10 4	11.2	11.9
SUM MW178-C2	6 01	5.33	3.77	5.04
SUM MW178-C3	(3.43)	(3 13)	(2.86)	(1.57)
SUM MW178-C4	(3 43)	(3 13)	(2.86)	(1.57)
FLUORANTHENE	51.5	17.8	20.1	29.8
PYRENE	55.7	20.7	24.0	33.5
BENZ[a]ANTHRACENE	22.5	14 8	16.5	17.9
CHRYSENE	27.2	15.8	16.6	19.9
SUM BENZOFLUORANTHENES	30 4	18.2	21.2	23 3
BENZO[e]PYRENE	16.9	9.30	10.8	12 3
BENZO[a]PYRENE	17.0	11.6	12.0	13 5
PERYLENE	239	243	234	239
INDENO[123-cd]PYRENE	8.72	4 51	4.83	6.02
DIBENZ[ah]ANTHRACENE	(3 43)	(3.13)	(2 86)	(1.57)
BENZO[ghi]PERYLENE	9.82	4.86	4.48	6 39
CORONENE	(3 43)	(3 13)	(2.86)	(1.57)

Concentrations are in ng/g dry weight
Numbers within ( ) are MLDs
To calculate the mean one half of the MLD was used

Table 11

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN SEDIMENT CORES FROM MASS BAY

LOCATION: MASS BAY, IWS NORTH

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902494	902494	902494	MEAN
PCB CONGENER				
008	0.13	(0.09)	(0.10)	(0.08)
018	(0.08)	(0.07)	(0.08)	(0.04)
028	(0.07)	(0.07)	(0.07)	(0.04)
052	0.13	*0.03*	(0.09)	(0.07)
044	*0.07*	*0.03*	(0.08)	(0.03)
066	0.12	(0.05)	(0.05)	0.06
101	0.25	0.15	0.08	0.16
118	0.21	0.18	0.06	0.15
153	0.17	0.13	0.06	0.12
105	(0.04)	0.09	(0.05)	(0.05)
138	0.19	0.10	0.06	0.12
187	0.07	0.09	(0.06)	(0.06)
128	0 09	0.11	0.11	0.10
180	0 16	0.09	0.04	0.10
170	0.09	0.05	0.07	0.07
195	0.06	0.05	0.09	0.07
206	0.02	0.02	(0.03)	(0.02)
209	(0.03)	(0.02)	(0.04)	(0.02)
PESTICIDES				
HCB	0.20	0.16	0.17	0.18
LINDANE	(0.09)	(0.08)	(0.09)	(0.04)
ALDRIN	(0.06)	(0.06)	(0.07)	(0.03)
ACHLORDANE	(0.06)	(0.05)	(0.06)	(0.03)
TNONACHLOR	(0.07)	(0.06)	(0.07)	(0.03)
PPDDE	0.22	0.17	0.13	0.17
PPDDD	0.92	0.95	0.81	0.89
PPDDT	0.14	(0.06)	(0.07)	(0.07)
MIREX	(0.06)	(0.06)	(0.07)	(0.03)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.
For levels below the MLDs, one half the MLD was used to calculate the mean.

Table 12

PAH CONCENTRATIONS IN SEDIMENT CORES FROM MASS BAY

COLLECTION DATE: MAY, 1991

LOCATION: MASS BAY, IWS NORTH

SAMPLE NUMBER	902494	902494	902494	MEAN
PAHs				
FLUORENE	(2.80)	(2.62)	(2.85)	(1.38)
PHENANTHRENE	5.88	4.91	4.94	5.24
ANTHRACENE	(2.80)	(2.62)	(2.85)	(1 38)
SUM MW178-C1	(2.80)	(2.62)	(2.85)	(1.38)
SUM MW178-C2	(2.80)	(2.62)	(2.85)	(1.38)
SUM MW178-C3	(2.80)	(2.62)	(2.85)	(1.38)
SUM MW178-C4	(2.80)	(2.62)	(2 85)	(1.38)
FLUORANTHENE	6.30	6.88	5 87	6.35
PYRENE	7.04	8.41	7.39	7 61
BENZ[a]ANTHRACENE	4.24	4.34	3.02	3.87
CHRYSENE	4.20	5.74	4 95	4.96
SUM BENZOFLUORANTHENES	5.28	6.17	5.26	5.57
BENZO[e]PYRENE	(2.80)	(2.62)	(2.85)	(1.38)
BENZO[a]PYRENE	(2.80)	2.78	(2.85)	(1.87)
PERYLENE	156	173	167	165
INDENO[123-cd]PYRENE	(2.80)	(2 62)	(2.85)	(1.38)
DIBENZ[ah]ANTHRACENE	(2.80)	(2.62)	(2.85)	(1.38)
BENZO[ghi]PERYLENE	(2.80)	(2.62)	(2.85)	(1.38)
CORONENE	(2.80)	(2.62)	(2.85)	(1 38)

Concentrations are in ng/g dry weight
Numbers within ( ) are MLDs.
To calculate the mean one half of the MLD was used

Table 13

METAL CONCENTRATIONS IN SEDIMENT SAMPLES

MAY, 1990

(ug/g dry weight)

Station	Rep	Cu	Zn	Cr	Pb	Ni	Cd	Mn	Fe
MBDS South	1	15.4	70.3	34.7	3.27	25.5	0.55	212.	19800
	2	15.5	73.6	35.3	3.22	25.7	0.54	222.	20800
	3	16.0	74.3	37.0	2.75	26.6	0.52	227.	21100
	Mean	15.7	72.7	35.7	3.08	25.9	0.54	220.	20600
	(SD)	(0.3)	(2.2)	(1.2)	(0.29)	(0.6)	(0.02)	(7)	(600)
IWS North	1	18.0	78.7	41.0	3.36	26.2	0.38	251.	22100
	2	18.3	79.0	40.6	3.15	26.6	0.36	243.	22800
	3	18.8	77.6	40.7	3.05	25.9	0.35	244.	22500
	Mean	18.4	78.4	40.8	3.19	26.2	0.36	246.	22400
	(SD)	(0.4)	(0.7)	(0.2)	(0.16)	(0.3)	(0.02)	(4)	(300)

Table 14

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN LOBSTER MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902529	902530	902531
PCB CONGENER			
008	(0.19)	(0.18)	(0.21)
018	1.37	(0.14)	(0.17)
028	3.63	1.00	0.72
052	1.93	0.53	0.37
044	1.03	(0.09)	(0.17)
066	4.16	2.55	1.32
101	2.25	1.11	0.60
118	12.1	9.29	4.85
153	16.0	10.8	5.38
105	4.47	3.47	1.59
138	12.9	8.35	3.92
187	5.98	4.00	2.70
128	2.55	1.91	0.84
180	4.88	3.40	1.52
170	1.84	1.17	0.53
195	0 48	0.24	(0.12)
206	0.58	0.30	(0.06)
209	0.34	0.19	0.15
PESTICIDES			
HCB	0 78	0.91	0.69
LINDANE	0.06	0.09	(0.19)
ALDRIN	(0.13)	(0.06)	(0.14)
ACHLORDANE	0 77	0.70	0 43
TNONACHLOR	1 33	1.24	0.75
PPDDE	12 4	7.75	3.64
PPDDD	1.56	1.15	0.50
PPDDT	0.49	0.34	(0.14)
MIREX	0.29	0.19	(0.14)

Concentrations are in ng/g dry weight.

Numbers within( ) are MLDs

Table 15

PAH CONCENTRATIONS IN LOBSTER MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902529	902530	902531
PAHs			
FLUORENE	5.40	9.99	2.87
PHENANTHRENE	9.34	13.6	6.49
ANTHRACENE	(2.26)	1.95	(1.22)
SUM MW178-C1	4.96	10.3	3.59
SUM MW178-C2	4.00	7.27	2.22
SUM MW178-C3	(2.26)	(1.05)	(1.22)
SUM MW178-C4	(2.26)	(1.05)	(1.22)
FLUORANTHENE	11.2	10.5	5.89
PYRENE	10.9	26.7	5.24
BENZ[a]ANTHRACENE	3.00	1.87	1.35
CHRYSENE	6.03	3.79	3.08
SUM BENZOFLUORANTHENES	(2 26)	4.02	3.62
BENZO[e]PYRENE	(2.26)	2.21	2.00
BENZO[a]PYRENE	(2.26)	2.09	1.45
PERYLENE	(2.26)	(1.05)	(1.22)
INDENO[123-cd]PYRENE	(2.26)	(1 05)	(1.22)
DIBENZ[ah]ANTHRACENE	(2.26)	(1 05)	(1.22)
BENZO[ghi]PERYLENE	(2.26)	4.38	1.74
CORONENE	(2.26)	4 40	(1.22)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 16

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN LOBSTER HEPATOPANCREAS SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902500	902501	902502
PCB CONGENER			
008	(0.22)	(0.17)	(0.16)
018	32.8	0.71	0.81
028	108	40.6	39.4
052	49.9	15.3	11.8
044	29.3	2.60	2.18
066	142	118	91.3
101	83.4	54.7	43.7
118	376	368	259
153	538	505	342
105	190	199	128
138	507	459	316
187	199	195	128
128	112	113	70.7
180	280	281	170
170	99.7	102	63.1
195	22.1	20.1	16.7
206	41.1	35.8	32.3
209	17.2	13.8	13.6
PESTICIDES			
HCB	13.4	17.7	13.0
LINDANE	3.17	2.74	3.47
ALDRIN	(0.15)	(0.12)	(0.11)
ACHLORDANE	22.3	21.8	21 4
TNONACHLOR	57.3	66.9	62.4
PPDDE	1010	772	573
PPDDD	104	98.8	57 2
PPDDT	30.5	24.6	16 1
MIREX	7.45	8.99	6.44

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 17

PAH CONCENTRATIONS IN LOBSTER HEPATOPANCREAS SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902500	902501	902502
PAHs			
FLUORENE	26.5	17.4	17.9
PHENANTHRENE	108	66.5	94.2
ANTHRACENE	12.8	4.19	10.2
SUM MW178-C1	80.7	38.4	99.9
SUM MW178-C2	75.5	33.8	101
SUM MW178-C3	52.1	(2.01)	60 9
SUM MW178-C4	37 6	25.6	46.6
FLUORANTHENE	241	112	288
PYRENE	198	129	299
BENZ[a]ANTHRACENE	50.7	22.8	28.6
CHRYSENE	112	60.8	77.2
SUM BENZOFLUORANTHENES	149	121	105
BENZO[e]PYRENE	82.7	55.9	52.2
BENZO[a]PYRENE	48.1	38.2	32.5
PERYLENE	23.1	18.1	20.3
INDENO[123-cd]PYRENE	31 6	25.0	22.9
DIBENZ[ah]ANTHRACENE	8.38	4.49	4.38
BENZO[ghi]PERYLENE	33.3	24.4	25.7
CORONENE	(2.58)	(2.01)	(1.89)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 18

METAL CONCENTRATIONS IN AMERICAN LOBSTER SAMPLES

MAY, 1990

(ug/g dry weight)

	Cu	Zn	Cr	Pb	Ni	Cd	Mn	Fe
LOBSTER MUSCLE 1	121.	151.	0.37	0.15	0.44	0.092	4.84	25.2
LOBSTER MUSCLE 2	82.8	148.	0.19	0.14	0.44	0.041	5.26	31.6
LOBSTER MUSCLE 3	117.	154.	0.31	0.20	0.52	0.033	7.54	39.2
LOBSTER HEPATO 1	97.0	70.7	0.12	0.10	0.53	10.6	5.1	64.6
LOBSTER HEPATO 2	84.5	48.1	0.10	0.07	0.51	11.8	5.6	56.4
LOBSTER HEPATO 3	152.	54.2	0.08	0.00	0.38	11.0	4.8	51.5

Table 19

MEAN CONCENTRATIONS IN LOBSTER SAMPLES

	COLLECTION DATE: MAY, 1987 QUINCY BAY		COLLECTION DATE: MAY, 1991 MASS BAY	
	MUSCLE n=16	HEPATOPANCREAS n=8	MUSCLE n=3	HEPATOPANCREAS n=3
PCB SUM*	250	16000	36.2	1720
PESTICIDES				
HCB	0.65	26.9	0.79	14.7
G-BHC	0.34	3.96	0.08	3.13
A-CHLORDANE	0.75	61.7	0.63	21.8
PP-DDE	24 6	2550	7.93	785
PP-DDD	0.61	190	1.07	86.7
PP-DDT	nd	55.5	. 0.30	23.7
PAHs				
FLUORENE	2.90	62.8	6.09	20.6
PHENANTHRENE	13.7	294	9.81	89.6
ANTHRACENE	0.81	20.4	1.23	9.06
SUM MW 178-C1	30 2	906	6.27	73.0
SUM MW 178-C2	42.8	1400	4.50	70.1
SUM MW 178-C3	21.2	716	nd	38.0
SUM MW 178-C4	3.87	171	nd	36.6
FLUORANTHENE	47.8	1220	9.21	214
PYRENE	32.3	852	14.3	209
BENZ[a]ANTHRACENE	3.81	84 0	2.07	34.0
CHRYSENE	17.0	343	4.30	83.3
SUM BENZOFLUORANTHENES	12.0	209	2.92	125
BENZO[e]PYRENE	6 87	106	1.78	63.6
BENZO[a]PYRENE	4 49	53 1	1.56	39.6
PERYLENE	0.98	16 0	nd	20.5
INDENO[123-cd]PYRENE	4.77	54 7	nd	26.5
BENZO[ghi]PERYLENE	4.51	41.7	2.42	27.8
DIBENZ[ah]ANTHRACENE	0.80	nd	nd	5.75
CORONENE	1.10	nd	2.05	nd

Concentrations are in ng/g dry wt

nd Not detected

PCB SUM* (PCB SUM is sum of Congeners common to all studies: 052,101,151,118,153,138,128,180,195,206&209).

n= Number of samples analysed.

Table 20

MEAN METAL CONCENTRATIONS IN WINTER FLOUNDER MUSCLE SAMPLES

(ug/g dry weight)

	QUINCY BAY MAY, 1987 n=25	MASS BAY MAY, 1990 n=3	GEORGES BANK OCT, 1989 n=3
Cu	0.05	1.07	1.2
Zn		26.8	19.7
Cr	0.11	0.14	0.07
Pb	0.02	0.11	0.10
Ni		0.57	0.02
Cd	0.002	0.027	0.072
Mn		1.47	0.68
Fe		11.9	5.5

Table 21

PCB AND PESTICIDES CONCENTRATIONS IN FLOUNDER MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902533	902534	902535
PCB CONGENER			
008	(0.15)	(0.15)	(0.14)
018	0.19	0.11	0.13
028	0.70	0.64	0.69
052	0.76	0.74	0.80
044	0.25	0.21	0.23
066	2.19	2.69	2.19
101	3.04	4.15	3.15
118	8.93	12.7	9.21
153	17.2	24.1	17.2
105	2.85	3.90	3.11
138	15.0	21.4	15.1
187	5.66	6.88	4.68
128	2.76	3.95	2.81
180	8.19	11.8	8.61
170	2.64	3.62	2.84
195	0.75	1.01	0.77
206	1.35	1.82	1.35
209	0.79	0.90	0.83
PESTICIDES			
HCB	0.60	0.66	0 81
LINDANE	0.16	0 18	0.20
ALDRIN	(0 10)	(0.10)	(0.10)
ACHLORDANE	1.29	1.33	1 52
TNONACHLOR	2.63	3.02	2.83
PPDDE	8.52	10.0	9.43
PPDDD	2.49	2.86	2.67
PPDDT	0.92	0.90	1.10
MIREX	0.20	0.27	0.26

Concentrations are in ng/g dry weight.

Numbers within ( ) are MLDs

Table 22

PAH CONCENTRATIONS IN WINTER FLOUNDER MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902533	902534	902535
PAHs			
FLUORENE	(0.88)	1.96	1.59
PHENANTHRENE	1.39	2.44	2.77
ANTHRACENE	(0.88)	(1.76)	(0.83)
SUM MW178-C1	1.27	2.00	1.01
SUM MW178-C2	(0.88)	(1.76)	2.21
SUM MW178-C3	(0.88)	(1.76)	(0 83)
SUM MW178-C4	(0.88)	(1 76)	(0.83)
FLUORANTHENE	1 21	(1.76)	1.49
PYRENE	1.61	6.53	4.33
BENZ[a]ANTHRACENE	(0.88)	(1 76)	(0.83)
CHRYSENE	(0.88)	(1.76)	(0.83)
SUM BENZOFLUORANTHENES	(0.88)	(1.76)	(0.83)
BENZO[e]PYRENE	(0.88)	(1.76)	(0.83)
BENZO[a]PYRENE	(0 88)	(1.76)	(0 83)
PERYLENE	(0.88)	(1.76)	(0 83)
INDENO[123-cd]PYRENE	(0.88)	(1.76)	(0.83)
DIBENZ[ah]ANTHRACENE	(0.88)	(1 76)	(0.83)
BENZO[ghi]PERYLENE	(0.88)	(1.76)	(0 83)
CORONENE	(0.88)	(1.76)	(0.83)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 23

PCB AND PESTICIDES CONCENTRATIONS IN FLOUNDER LIVER SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902507	902508	902532
PCB CONGENER			
008	(0.31)	(0.33)	(0.36)
018	13.2	15.5	30.3
028	37.4	45.4	71.6
052	32.8	42.4	67.4
044	14.3	17.8	29.9
066	54.1	89.9	57.4
101	59 6	117	69.9
118	182	356	163
153	301	582	259
105	61.6	122	52.7
138	296	584	249
187	103	180	75.0
128	57.9	119	46.6
180	185	395	163
170	59.1	110	47.5
195	17.2	27.0	13.5
206	32 1	53.5	32.4
209	15.0	19.5	15.9
PESTICIDES			
HCB	11.7	16.3	13.3
LINDANE	2.73	3.66	2.34
ALDRIN	(0.21)	(0.22)	(0.24)
ACHLORDANE	30.6	43.8	26.1
TNONACHLOR	64.9	101	48.3
PPDDE	275	470	197
PPDDD	59.3	95.6	47.3
PPDDT	17.0	24.5	14.6
MIREX	5.10	6.61	0.81

Concentrations are in ng/g dry weight.

Numbers within ( ) are MLDs

Table 24

PAH CONCENTRATIONS IN WINTER FLOUNDER LIVER SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902507	902508	902532
PAHs			
FLUORENE	4.20	3.93	5.39
PHENANTHRENE	7.12	5.29	5.11
ANTHRACENE	(1.80)	(1.93)	(2.12)
SUM MW178-C1	6.24	5.51	(2.12)
SUM MW178-C2	11.6	3.69	6.50
SUM MW178-C3	(1.80)	(1.93)	(2.12)
SUM MW178-C4	(1 80)	(1.93)	(2.12)
FLUORANTHENE	7.59	6.56	8.70
PYRENE	4.08	3.52	5.92
BENZ[a]ANTHRACENE	(1.80)	(1.93)	(2.12)
CHRYSENE	(1.80)	(1.93)	(2.12)
SUM BENZOFLUORANTHENES	(1.80)	7.05	9.84
BENZO[e]PYRENE	(1.80)	(1.93)	(2.12)
BENZO[a]PYRENE	(1 80)	(1.93)	(2.12)
PERYLENE	(1.80)	(1.93)	(2.12)
INDENO[123-cd]PYRENE	(1 80)	(1.93)	(2.12)
DIBENZ[ah]ANTHRACENE	(1.80)	(1.93)	(2.12)
BENZO[ghi]PERYLENE	(1 80)	(1.93)	(2.12)
CORONENE	(1.80)	(1 93)	(2.12)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs

Table 25

METAL CONCENTRATIONS IN WINTER FLOUNDER SAMPLES

MAY, 1990

(ug/g dry weight)

	Cu	Zn	Cr	Pb	Ni	Cd	Mn	Fe
FLOUNDER MUSCLE 1	1.3	27.5	0.11	0.08	0.50	0.032	1.53	14.1
FLOUNDER MUSCLE 2	1.0	27.4	0.21	0.11	0.73	0.041	1.09	10.3
FLOUNDER MUSCLE 3	0.9	25.5	0.09	0.13	0.49	0.008	1.81	11.4
FLOUNDER LIVER 1	39.2	123.	0.11	2.34	1.28	0.70	18.3	441.
FLOUNDER LIVER 2	21.4	110.	0.10	2.21	1.75	0.31	15.9	368.
FLOUNDER LIVER 3	40.1	132.	0.12	1.63	1.40	0.85	15.4	300.

Table 26

MEAN CONCENTRATIONS IN FLOUNDER SAMPLES

	COLLECTION DATE: MAY, 1987	COLLECTION DATE: OCT, 1989		COLLECTION DATE: MAY, 1990	
	QUINCY BAY*	MASS BAY		GEORGES BANK	
	n=25	n=9	n=9	n=3	n=3
	MUSCLE	MUSCLE	LIVER	MUSCLE	LIVER
PCB SUM*	320	67.0	1520	5.44	120
PESTICIDES					
HCB	0.68	0.69	13.8	0.40	7.9
G-BHC	1.21	0.18	2.91	nd	nd
A-CHLORDANE	4.96	1.38	33.5	nd	nd
PP-DDE	25.2	9.32	314	0.99	27.5
PP-DDD	9.33	2.67	67.4	nd	nd
PP-DDT	7.26	0.97	18.7	nd	nd

Concentrations are in ng/g dry wt

nd Not detected

PCB SUM* (PCB SUM is sum of Congeners common to all studies: 052,101,151,118,153,138,128,180,195,206&209)

QUINCY BAY* No data for Flounder Liver Samples.

n= Number of samples analysed.

Table 27

MEAN METAL CONCENTRATIONS IN AMERICAN LOBSTER SAMPLES

(ug/g dry weight)

	QUINCY BAY MAY, 1987 n=25		MASS BAY MAY, 1990 n=3	
	MUSCLE	HEPATOPANCREAS	MUSCLE	HEPATOPANCREAS
Cu	17.1	294.	107.	111.
Cr	0.09	1.57	0.29	0.10
Pb	0.71	0.24	0.16	0.09
Cd	0.007	2.82	0.055	11.1

Table 28

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN AMERICAN PLAICE MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE : MAY, 1991

SAMPLE NUMBER	902598	902599	902600*
PCB CONGENER			
008	(0.30)	(0.15)	(0.21)
018	0.74	2.57	0.21
028	1.47	13.3	1.06
052	4.31	17.1	0.93
044	2.18	4.10	0.23
066	(0.16)	7.93	4.33
101	7.87	14.5	4.83
118	7.14	18.6	18.8
153	15.6	31.1	28.9
105	2.46	4.99	6.44
138	13.1	25.2	27.2
187	6.86	8.82	6.40
28	2.06	3.17	5.26
180	4.81	9.00	15.1
170	2.03	3.47	4.13
195	0.76	1.16	0.94
206	1.29	1.60	1.60
209	1.25	0.96	0.80
PESTICIDES			
HCB	0.48	0.75	0.65
LINDANE	0.16	0.15	0.20
ALDRIN	(0.20)	(0.11)	(0.14)
ACHLORDANE	0.50	1.89	2.74
TNONACHLOR	1.24	3.64	4.38
PPDDE	7.66	23.5	13.3
PPDDD	2.25	4.08	3.75
PPDDT	0.35	1.81	1.35
MIREX	0.21	0.19	0.30

oncentrations are in ng/g dry weight.

Numbers withtin ( ) are MLDs.

* Sample was fixed in Dietrich's

Table 29

PAH CONCENTRATIONS IN AMERICAN PLAICE MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902598	902599	902600*
PAHs			
FLUORENE	2.73	7.58	3.12
PHENANTHRENE	6.11	5.49	2.78
ANTHRACENE	(1.75)	(1.14)	(1.22)
SUM MW178-C1	(1.75)	4.14	(1.22)
SUM MW178-C2	(1.75)	(0.83)	(1.22)
SUM MW178-C3	(1.75)	(0.83)	(1.22)
SUM MW178-C4	(1.75)	(0.83)	(1.22)
FLUORANTHENE	(1.75)	(0 83)	(1.22)
PYRENE	(1.75)	7.64	4.23
BENZ[a]ANTHRACENE	(1.75)	(0.83)	(1.22)
CHRYSENE	(1.75)	(0.83)	(1.22)
SUM BENZOFLUORANTHENES	(1 75)	(0.83)	(1.22)
BENZO[e]PYRENE	(1 75)	(0.83)	(1.22)
BENZO[a]PYRENE	(1 75)	(0.83)	(1.22)
PERYLENE	(1 75)	(0.83)	(1.22)
INDENO[123-cd]PYRENE	(1 75)	(0.83)	(1.22)
DIBENZ[ah]ANTHRACENE	(1 75)	(0.83)	(1.22)
BENZO[ghi]PERYLENE	(1 75)	(0.83)	(1.22)
CORONENE	(1 75)	(0 83)	(1.22)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs
* Sample was fixed in Dietrich's.

Table 30

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN AMERICAN PLAICE LIVER SAMPLES FROM MASS BAY

COLLECTION DATE : MAY, 1991

SAMPLE NUMBER	902596	902597
PCB CONGENER		
008	(2.52)	(2.58)
018	38.4	(2.05)
028	84.3	13.8
052	201	24.9
044	107	6.35
066	201	37.9
101	429	76.7
118	435	181
153	942	345
105	132	58.1
138	824	281
187	454	91.1
128	133	43.6
180	379	118
170	156	37 2
195	54.2	9.37
206	101	16.0
209	61.9	11.9
PESTICIDES		
HCB	14 4	9.61
LINDANE	4 92	1 43
ALDRIN	(1 70)	(1 74)
ACHLORDANE	24 1	16.2
TNONACHLOR	73.9	37 2
PPDDE	489	249
PPDDD	139	44 4
PPDDT	22 2	5.78
MIREX	13 4	2.60

Concentrations are in ng/g dry weight
Numbers withtin ( ) are MLDs

Table 31

PAH CONCENTRATIONS IN AMERICAN PLAICE LIVER SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902596	902597
PAHs		
FLUORENE	19.1	(15.2)
PHENANTHRENE	16.8	25.8
ANTHRACENE	(14.8)	(15.2)
SUM MW178-C1	(14.8)	(15.2)
SUM MW178-C2	19.5	(15.2)
SUM MW178-C3	(14.8)	(15.2)
SUM MW178-C4	(14.8)	(15.2)
FLUORANTHENE	16.2	27.3
PYRENE	23.7	26.6
BENZ[a]ANTHRACENE	(14.8)	(15.2)
CHRYSENE	(14.8)	15.3
SUM BENZOFLUORANTHENES	(14.8)	26.3
BENZO[e]PYRENE	(14.8)	(15.2)
BENZO[a]PYRENE	(14.8)	(15.2)
PERYLENE	(14.8)	(15.2)
INDENO[123-cd]PYRENE	(14.8)	(15.2)
DIBENZ[ah]ANTHRACENE	(14.8)	(15.2)
BENZO[ghi]PERYLENE	(14.8)	(15.2)
CORONENE	(14.8)	(15.2)

Concentrations are in ng/g dry weight
Numbers within ( ) are MLDs.

Table 32

METAL CONCENTRATIONS IN AMERICAN PLAICE SAMPLES

MAY, 1990

(ug/g dry weight)

	Cu	Zn	Cr	Pb	Ni	Cd	Mn	Fe
PLAICE MUSCLE I	1.79	21.4	0.07	0.12	0.00	0.011	0.74	11.5
PLAICE MUSCLE II	1.70	22.6	0.00	0.08	0.00	0.010	0.62	12.5
PLAICE MUSCLE*	1.24	34.1	0.99	0.10	0.35	0.015	0.92	7.6

* This sample was fixed in dietricks solution prior to analysis.

Table 33

PCB CONGENER & PESTICIDE CONCENTRATIONS IN SCALLOP MUSCLE SAMPLES FROM GEORGES BANK

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902608	902609	902610
PCB CONGENER			
008	0.32	0.11	0.23
018	1.31	(0.21)	0.16
028	3.19	0.85	1.39
052	3.94	(0.24)	(0.33)
044	1.46	0.14	0.35
066	1.94	(0.14)	(0.20)
101	2.90	0.39	2.08
118	2.54	0.37	2.07
153	2.59	1.83	3.24
105	0.30	0.08	0.38
138	1.01	0.25	2.40
187	0.18	0.04	0.65
128	0.15	0.03	0.42
180	0.17	0.08	0.52
170	(0.09)	(0.08)	0.14
195	0.06	0.05	0.14
206	(0.09)	(0.08)	(0.11)
209	(0.11)	(0.10)	(0.14)
PESTICIDES			
HCB	0.29	0.27	0.37
LINDANE	(0.27)	(0.24)	0.09
ALDRIN	(0.20)	(0.18)	(0.25)
ACHLORDANE	0.13	0.15	0.26
TNONACHLOR	0.12	0.16	0.34
PPDDE	0.26	0.21	0.84
PPDDD	(0.18)	0.07	0.23
PPDDT	(0.20)	(0.18)	(0.25)
MIREX	(0.20)	(0.18)	(0.25)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 34

PAH CONCENTRATIONS IN SCALLOP MUSCLE SAMPLES FROM GEORGES BANK

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902608	902609	902610
PAHs			
FLUORENE	2.41	10.8	16.2
PHENANTHRENE	4.16	9.08	14.9
ANTHRACENE	(1.72)	2.60	2.87
SUM MW178-C1	3.45	9.55	12.5
SUM MW178-C2	4.24	6.92	11.5
SUM MW178-C3	(1.72)	(1.58)	(2.20)
SUM MW178-C4	(1.72)	(1.58)	(2.20)
FLUORANTHENE	2.92	4.60	8.92
PYRENE	4.18	16.3	29.4
BENZ[a]ANTHRACENE	(1.72)	(1.58)	(2.20)
CHRYSENE	(1.72)	(1 58)	3.70
SUM BENZOFLUORANTHENES	(1 72)	1 96	6.67
BENZO[e]PYRENE	(1.72)	1.71	4.50
BENZO[a]PYRENE	(1.72)	1 81	2.65
PERYLENE	(1 72)	(1.58)	4.64
INDENO[123-cd]PYRENE	(1.72)	(1.58)	(2.20)
DIBENZ[ah]ANTHRACENE	(1.72)	(1 58)	(2 20)
BENZO[ghi]PERYLENE	(1 72)	1.95	4.13
CORONENE	(1.72)	2.38	8 47

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 35

PCB CONGENER & PESTICIDE CONCENTRATIONS IN SCALLOP MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902611	902612	902613
PCB CONGENER			
008	0.26	0.26	0.37
018	0.62	0.30	1.28
028	1.31	1.75	3.96
052	1.49	1.45	4.80
044	0.95	0.64	2.98
066	1.15	(0.27)	3.82
101	1.85	1.87	3.65
118	1.63	1.70	3.15
153	3.86	3.78	6.00
105	0.22	0.28	0.79
138	2.82	2.86	4.24
187	1.37	1.22	1.85
128	0.44	0.42	0.60
180	0.80	0.77	1.15
170	0.32	0.30	0.44
195	0.10	0.14	0.17
206	(0.07)	(0.15)	(0 15)
209	0.02	(0.19)	(0.20)
PESTICIDES			
HCB	0.23	0.47	0.47
LINDANE	(0.22)	(0.46)	(0 47)
ALDRIN	(0 16)	(0.34)	(0.35)
ACHLORDANE	0.29	0.27	0.31
TNONACHLOR	0 40	0.35	0.46
PPDDE	1.33	1.30	1 69
PPDDD	0.57	0.51	0.27
PPDDT	(0 16)	(0.34)	(0.35)
MIREX	0.08	0.07	0.10

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 36

PAH CONCENTRATIONS IN SCALLOP MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902611	902612	902613
PAHs			
FLUORENE	1.74	(2.95)	(3.03)
PHENANTHRENE	7.22	8.57	11.5
ANTHRACENE	2.62	(2.95)	(3.03)
SUM MW178-C1	8.62	14.6	16.0
SUM MW178-C2	11.8	20.6	23.0
SUM MW178-C3	3.41	5.71	10.9
SUM MW178-C4	(1.39)	(2.95)	(3.03)
FLUORANTHENE	23.5	29 8	41.0
PYRENE	26.9	33.4	44.5
BENZ[a]ANTHRACENE	9.26	12.7	14.4
CHRYSENE	13.1	15.1	18.2
SUM BENZOFLUORANTHENES	32 3	40.2	49.9
BENZO[e]PYRENE	17.5	18 2	24.5
BENZO[a]PYRENE	9.43	12.3	14.7
PERYLENE	10.8	12 0	11.4
INDENO[123-cd]PYRENE	3.38	(2.95)	3.46
DIBENZ[ah]ANTHRACENE	(1.39)	(2.95)	(3.03)
BENZO[ghi]PERYLENE	2.53	(2.95)	3.25
CORONENE	(1.39)	(2.95)	(3.03)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs

Table 37

PCB CONGENER & PESTICIDE CONCENTRATIONS IN DEPLOYED SCALLOP MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE : MAY, 1991

SAMPLE NUMBER	902601	902602	902603	902604	902605	902606
PCB CONGENER						
008	0.77	0.83	0.90	0.71	0.54	0.59
018	0.67	0.51	0.36	0.64	0.61	0.82
028	1.17	1.54	2.34	1.91	1.38	2.01
052	2.30	2.27	3.75	3.42	2.22	3.93
044	1.03	0.91	1.68	1.81	0.99	1.63
066	1.84	1.57	4.24	3.26	2.08	3.93
101	3.80	3.09	9.33	6.83	4.26	8.09
118	4 45	3.55	12.2	7.86	5.00	9.47
153	6.95	5.51	18.1	14.2	8.45	14.3
105	1.07	0.71	2.64	1.66	1.03	1.98
138	5.80	4.44	14.8	11.8	7.17	11.1
187	1.91	1.38	4.08	4.60	2.63	3.20
128	1.02	0.78	2.55	1.96	1.22	2.02
180	1.32	0.83	2.19	2.65	1.39	2.21
170	0.50	0.33	0.86	1.09	0.59	0.80
195	0.06	0.16	(0.22)	0.16	0 12	(0.16)
206	(0.08)	(0 12)	(0.12)	(0.07)	(0.08)	(0.08)
209	(0.10)	(0.16)	(0.15)	(0.10)	(0 11)	(0.11)
PESTICIDES						
HCB	0.28	0.42	0 43	0.27	0.27	0.29
LINDANE	0.13	(0.39)	0.22	0.11	0.22	0 17
ALDRIN	(0.18)	(0.29)	(0.27)	(0 17)	(0.19)	(0.19)
ACHLORDANE	0.55	0.39	0.82	0 94	0.64	0.95
TNONACHLOR	1.11	0.85	2.51	2.01	1.18	2.07
PPDDE	4.35	3.41	10.9	7 76	5.02	7 05
PPDDD	0.66	0.61	0.66	1.54	1.11	1 11
PPDDT	(0 18)	(0.29)	(0.27)	(0.17)	(0.19)	(0 19)
MIREX	0 11	0.09	0.22	0.21	0.14	0.15

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 38

PAH CONCENTRATIONS IN DEPLOYED SCALLOP MUSCLE SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902601	902602	902603	902604	902605	902606	902607
PAHs							
FLUORENE	11.8	20.8	10.7	19.0	29.5	28.0	0.22
PHENANTHRENE	22 1	25.3	18.7	35.9	32.0	29.2	1.38
ANTHRACENE	4.41	4.84	4.61	5.01	5.62	4.84	0.47
SUM MW178-C1	22.2	19.3	17.2	31.0	29 6	22.0	1.59
SUM MW178-C2	22.8	18 4	28.1	36.1	25.7	24.0	9.07
SUM MW178-C3	7.26	5.45	13.6	26.7	6.63	11.1	2.34
SUM MW178-C4	(1.58)	(2.49)	(2.34)	(1.49)	(1.63)	(1.66)	3.06
FLUORANTHENE	20.5	17.1	21 1	35.9	31.3	25.1	4.00
PYRENE	41.0	37.0	35 8	80.0	72.7	65.0	5.45
BENZ[a]ANTHRACENE	8 69	5.88	9.86	21.9	18.7	12.0	2.56
CHRYSENE	11.7	10.1	14 8	28.4	22.8	17.5	3.08
SUM BENZOFLUORANTHENES	27 5	21.9	27.8	67.4	51 7	32 4	8.98
BENZO[e]PYRENE	15.8	12.9	16.8	31.2	24 2	16.9	3.88
BENZO[a]PYRENE	8 40	7.00	8 91	20 1	17 5	9.75	1.22
PERYLENE	8.16	5.82	7.34	12 2	9.71	6.84	0.44
INDENO[123-cd]PYRENE	2 37	(2.49)	(2.34)	8 90	7 44	5 98	0.81
DIBENZ[ah]ANTHRACENE	(1.58)	(2.49)	(2.34)	2.05	1.93	(1 66)	0.37
BENZO[ghi]PERYLENE	5.33	7.56	7.10	15 4	14 4	15.2	0.88
CORONENE	1.86	2.50	(2.34)	9.85	24.9	26.9	(7 48)

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs

Table 39

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN WHOLE SEA SCALLOP SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902593	902594
PCB CONGENER		
008	(0.30)	(0.33)
018	3.25	2.76
028	5.03	3.96
052	6.36	6.10
044	3.62	4.20
066	(0.16)	5.35
101	8.02	7.34
118	7.53	6.81
153	14.1	14.4
105	4.75	3.36
138	11.1	10.8
187	4.50	4.80
128	1.85	1.53
180	3.79	3.57
170	1 42	1.32
195	(0.09)	(0.10)
206	(0.17)	(0.18)
209	0.30	(0.10)
PESTICIDES		
HCB	0.81	0.35
LINDANE	0.69	0.54
ALDRIN	(0.20)	(0.22)
ACHLORDANE	1.78	1.79
TNONACHLOR	2.19	2.56
PPDDE	5.77	6.90
PPDDD	4.48	4.61
PPDDT	0.66	0.46
MIREX	0.71	0.18

Concentrations are in ng/g dry weight

Numbers within ( ) are MLDs

Table 40

PAH CONCENTRATIONS IN WHOLE SEA SCALLOP SAMPLES FROM MASS BAY

COLLECTIONDATE: MAY, 1991

SAMPLE NUMBER	902593	902594
PAHs		
FLUORENE	20.2	11.5
PHENANTHRENE	311	50.1
ANTHRACENE	38.9	9.15
SUM MW178-C1	1250	60.8
SUM MW178-C2	2120	88.6
SUM MW178-C3	1300	16.5
SUM MW178-C4	264	(3.87)
FLUORANTHENE	153	98.7
PYRENE	213	90.9
BENZ[a]ANTHRACENE	24 7	25.4
CHRYSENE	47 8	40.3
SUM BENZOFLUORANTHENES	49 8	65.6
BENZO[e]PYRENE	23.1	29.9
BENZO[a]PYRENE	16.3	19.2
PERYLENE	21 1	13.3
INDENO[123-cd]PYRENE	8.58	8.16
DIBENZ[ah]ANTHRACENE	(3 52)	(3.87)
BENZO[ghi]PERYLENE	10.7	9.31
CORONENE	(3 52)	(3.87)

Concentrations are in ng/g dry weight
Numbers within ( ) are MLDs.

Table 41

PCB CONGENER AND PESTICIDES CONCENTRATIONS IN SAMPLES FROM MASS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902595 OCEAN QUAHOG	902607 SCALLOP GUT
PCB CONGENER		
008	(0.46)	10.1
018	1.98	32.1
028	6.51	107
052	3.78	121
044	4.20	51.6
066	8.12	102
101	5.29	166
118	4.85	221
153	8.87	318
105	6.54	52.4
138	7.58	302
187	2.73	96.5
128	1.11	52.0
180	3.22	66.0
170	0.98	27.7
195	(0.14)	0.86
206	(0.26)	2.04
209	0.87	0.89
PESTICIDES		
HCB	1.68	1 31
LINDANE	2.45	2 86
ALDRIN	(0.31)	(0 43)
ACHLORDANE	2.38	28.8
TNONACHLOR	1.82	84 4
PPDDE	6.82	383
PPDDD	8.42	60.0
PPDDT	0.98	2.91
MIREX	(0.31)	3.41

Concentrations are in ng/g dry weight.
Numbers within ( ) are MLDs.

Table 42

PAH CONCENTRATIONS IN SAMPLES FROM MAS BAY

COLLECTION DATE: MAY, 1991

SAMPLE NUMBER	902595 OCEAN QUAHOG	902607 SCALLOP GUT
PAHs		
FLUORENE	12.1	16.4
PHENANTHRENE	28.5	103
ANTHRACENE	(5.46)	35.0
SUM MW178-C1	23 5	119
SUM MW178-C2	47.8	678
SUM MW178-C3	(5.46)	175
SUM MW178-C4	(5.46)	229
FLUORANTHENE	42.4	299
PYRENE	36 8	407
BENZ[a]ANTHRACENE	14.4	192
CHRYSENE	18.4	230
SUM BENZOFLUORANTHENES	29.4	671
BENZO[e]PYRENE	18.0	290
BENZO[a]PYRENE	7.88	91.1
PERYLENE	(5.46)	33.0
INDENO[123-cd]PYRENE	(5.46)	60.7
DIBENZ[ah]ANTHRACENE	(5 46)	27.8
BENZO[ghi]PERYLENE	(5 46)	65 9
CORONENE	(5.46)	(7.48)

Concentrations are in ng/g dry weight
Numbers within ( ) are MLDs.

Table 43

METAL CONCENTRATIONS IN BIVALVE SAMPLES

MAY, 1990

(ug/g dry weight)

	Cu	Zn	Cr	Pb	Ni	Cd	Mn	Fe
INDIGENOUS SCALLOPS - MUSCLE SAMPLES								
SCALLOPS GB1&2	2.74	65.5	6.82	0.10	1.03	0.66	1.55	34.6
SCALLOPS GB3&4	3.77	60.1	3.73	0.19	0.68	1.09	1.54	22.2
SCALLOPS GB7&8	4.14	70.8	4.24	0.16	0.38	1.26	2.79	53.9
SCALLOPS MB1&2	3.35	64.8	2.16	0.20	0.33	1.56	0.88	56.4
SCALLOPS MB3&4	2.99	80.2	3.52	0.26	0.60	1.10	1.56	61.2
SCALLOPS MB5&6	7.15	158.	50.42	0.30	0.32	1.18	1.13	43.0
DEPLOYED SCALLOPS - MUSCLE SAMPLES								
SCALLOPS MBDS	2.45	54.4	0.62	0.27	0.69	1.22	2.54	108.
SCALLOPS MBDS	3.64	28.0	0.31	0.39	1.23	0.64	3.01	228.
SCALLOPS MBDS	2.06	55.4	0.55	0.17	0.56	1.47	1.90	135.
SCALLOPS MBDS	3.64	50.2	4.06	0.79	0.93	6.51	7.21	279.
SCALLOPS MBDS	2.06	50.9	0.81	0.27	0.57	2.29	2.34	126.
SCALLOPS MBDS	4.64	50.6	0.90	0.29	0.71	3.09	2.74	145.
INDIGENOUS BIVALVES - WHOLE ORGANISM SAMPLES								
SCALLOPS MBDS 1	16.2	76.3	0.36	0.9	0.68	23.9	3.19	273.
SCALLOPS MBDS 2	15.8	86.1	0.32	0.2	0.58	22.6	4.35	283.
OCEAN QUAHOG	48.6	236.	1.26	5.80	28.2	3.46	15.3	1150

Figure 1

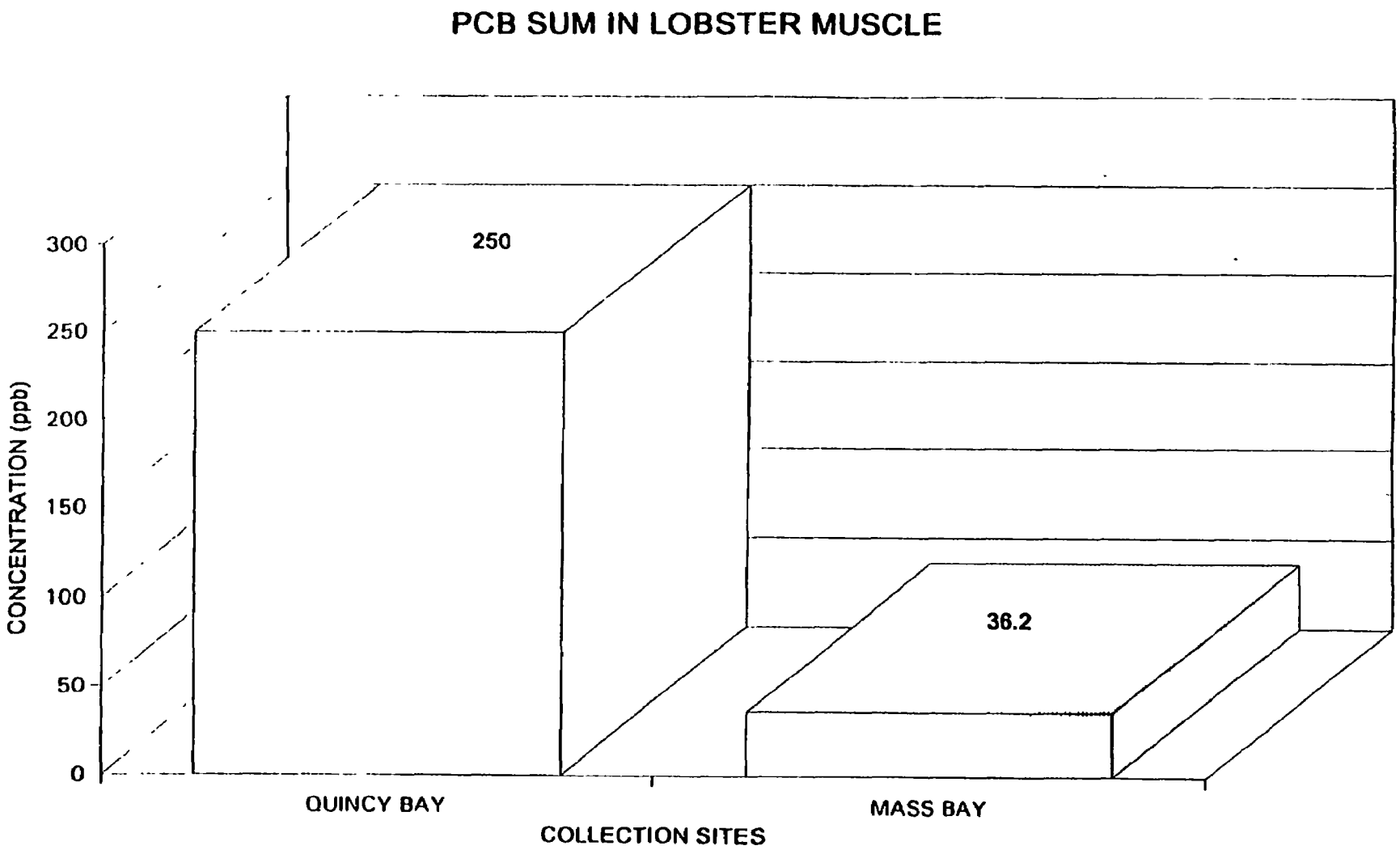

PCB SUM IN LOBSTER MUSCLE
CONCENTRATION (ppb)
300
250
200
150
100
50
0
250
36.2
QUINCY BAY
MASS BAY
COLLECTION SITES

Figure 2

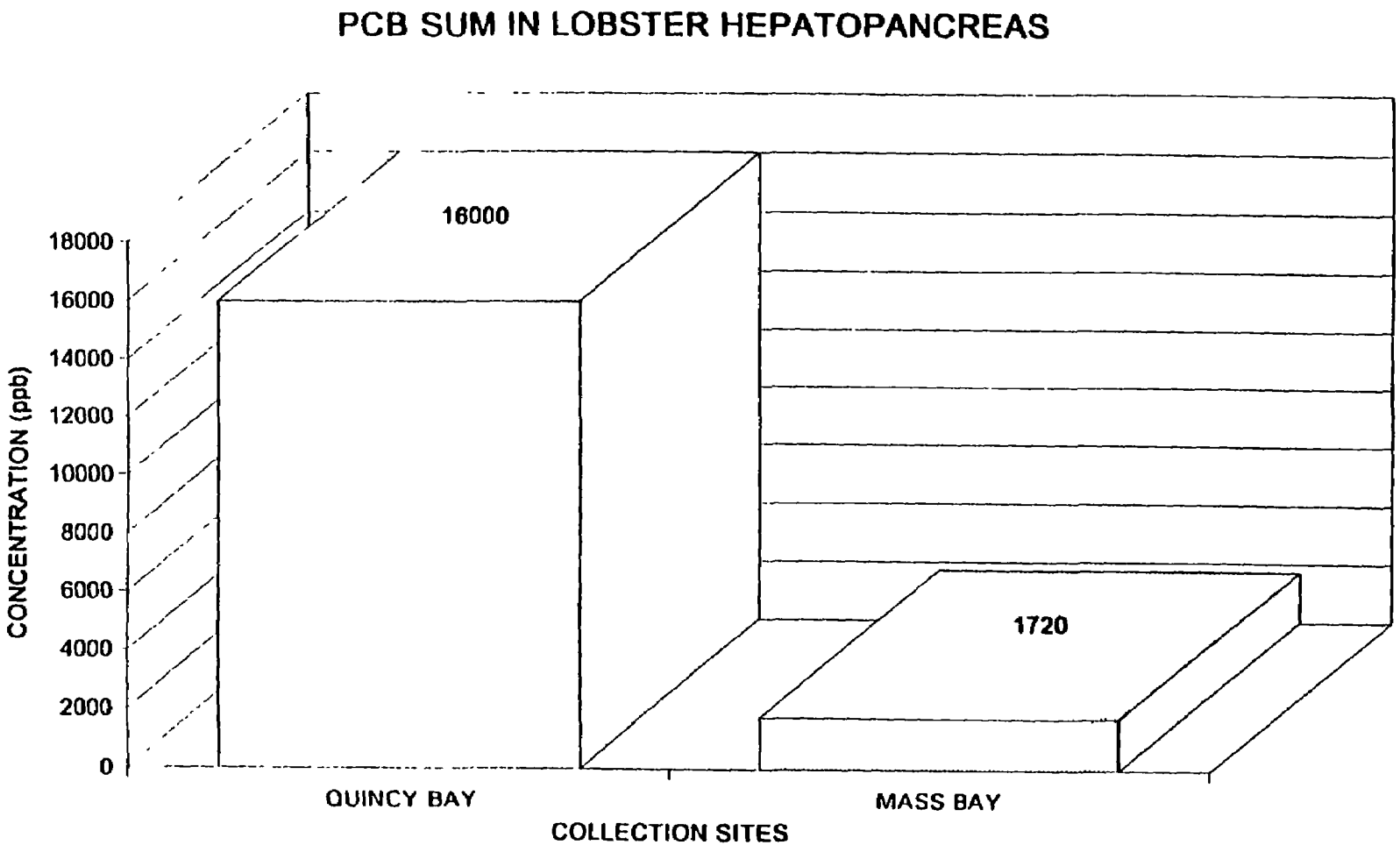

PCB SUM IN LOBSTER HEPATOPANCREAS
CONCENTRATION (ppb)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
16000
1720
QUINCY BAY
MASS BAY
COLLECTION SITES

Figure 3

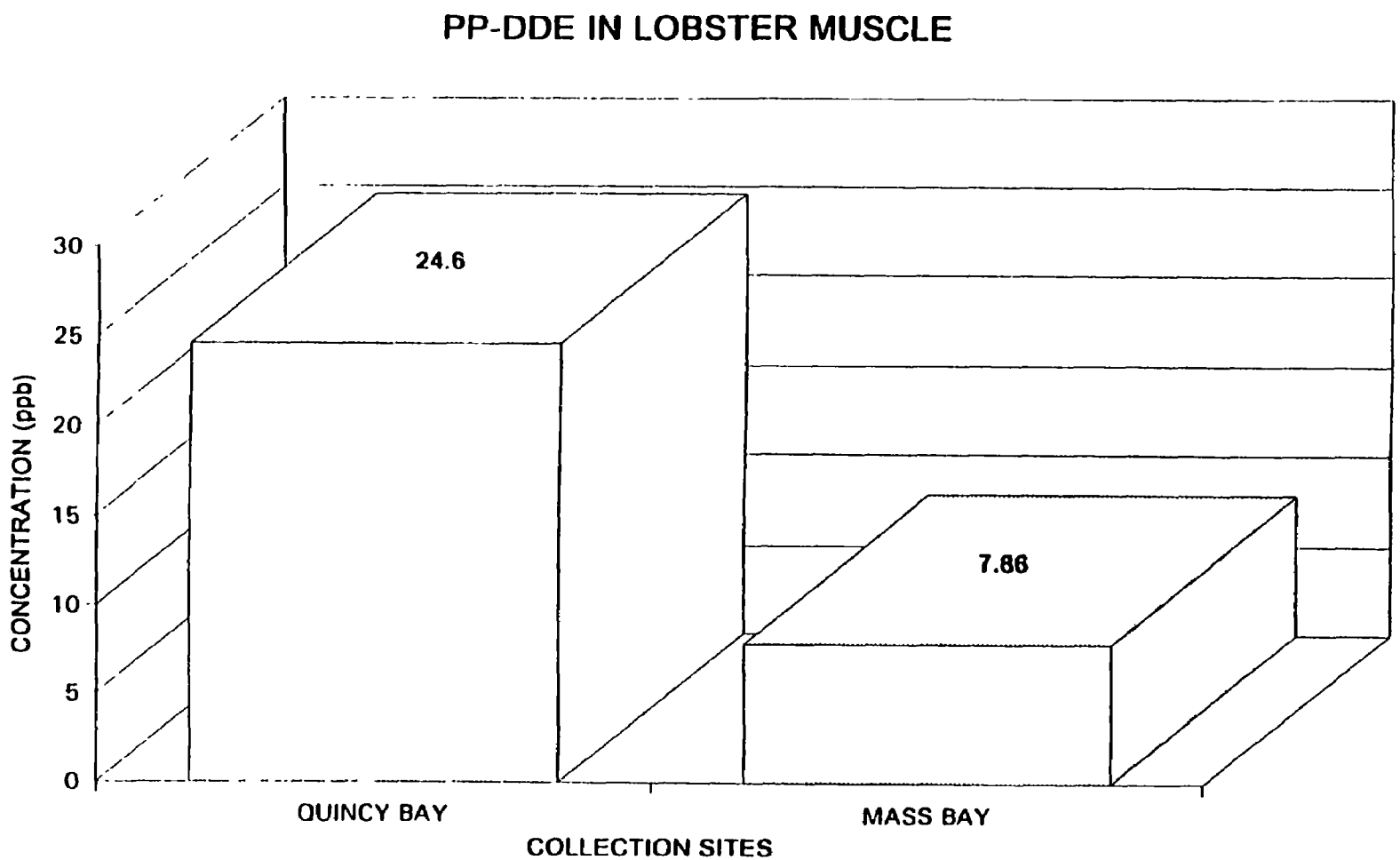

PP-DDE IN LOBSTER MUSCLE
CONCENTRATION (ppb)
30
25
20
15
10
5
0
24.6
7.86
QUINCY BAY
MASS BAY
COLLECTION SITES

Figure 4

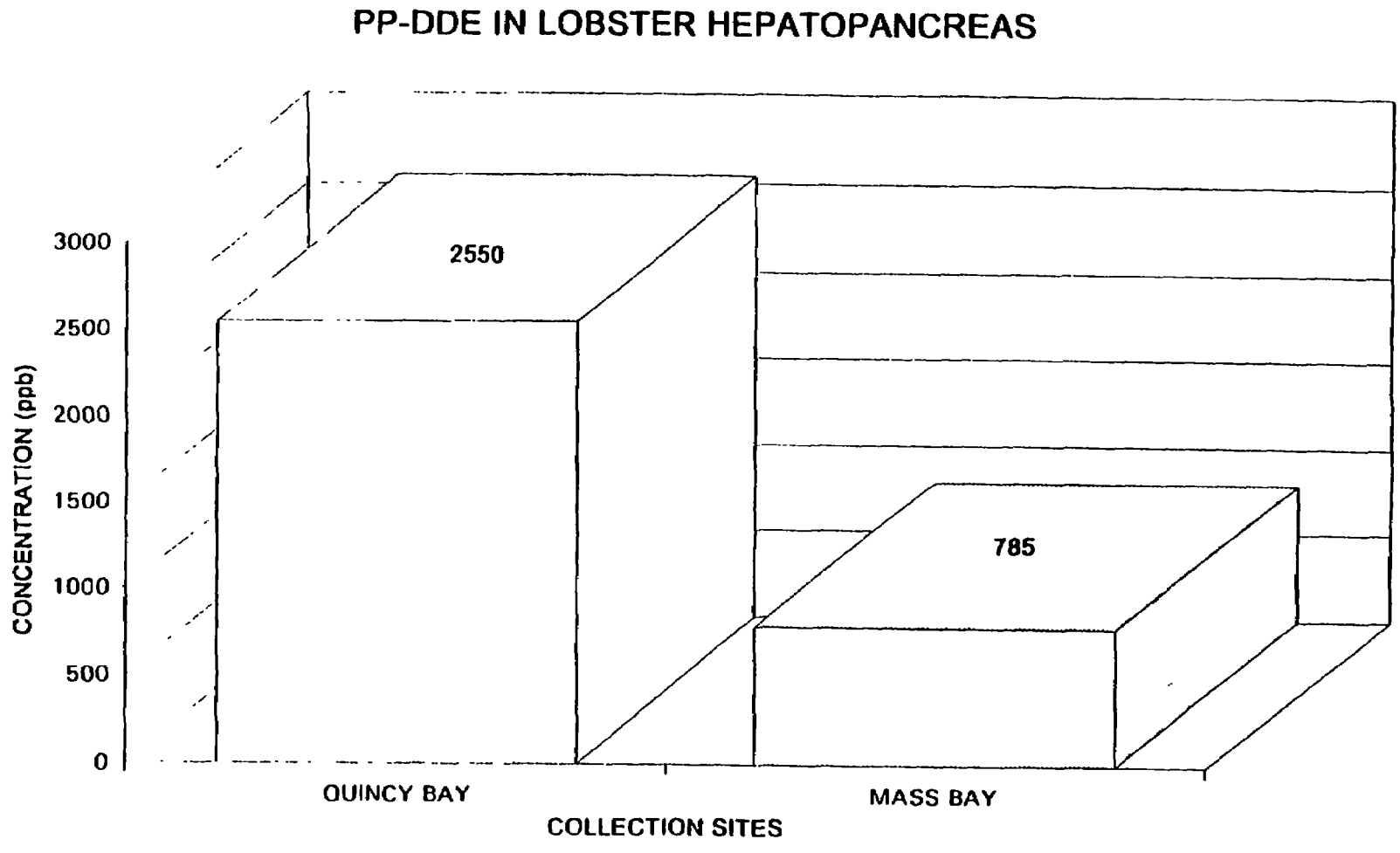

PP-DDE IN LOBSTER HEPATOPANCREAS
CONCENTRATION (ppb)
3000
2500
2000
1500
1000
500
0
2550
785
QUINCY BAY
MASS BAY
COLLECTION SITES

Figure 5

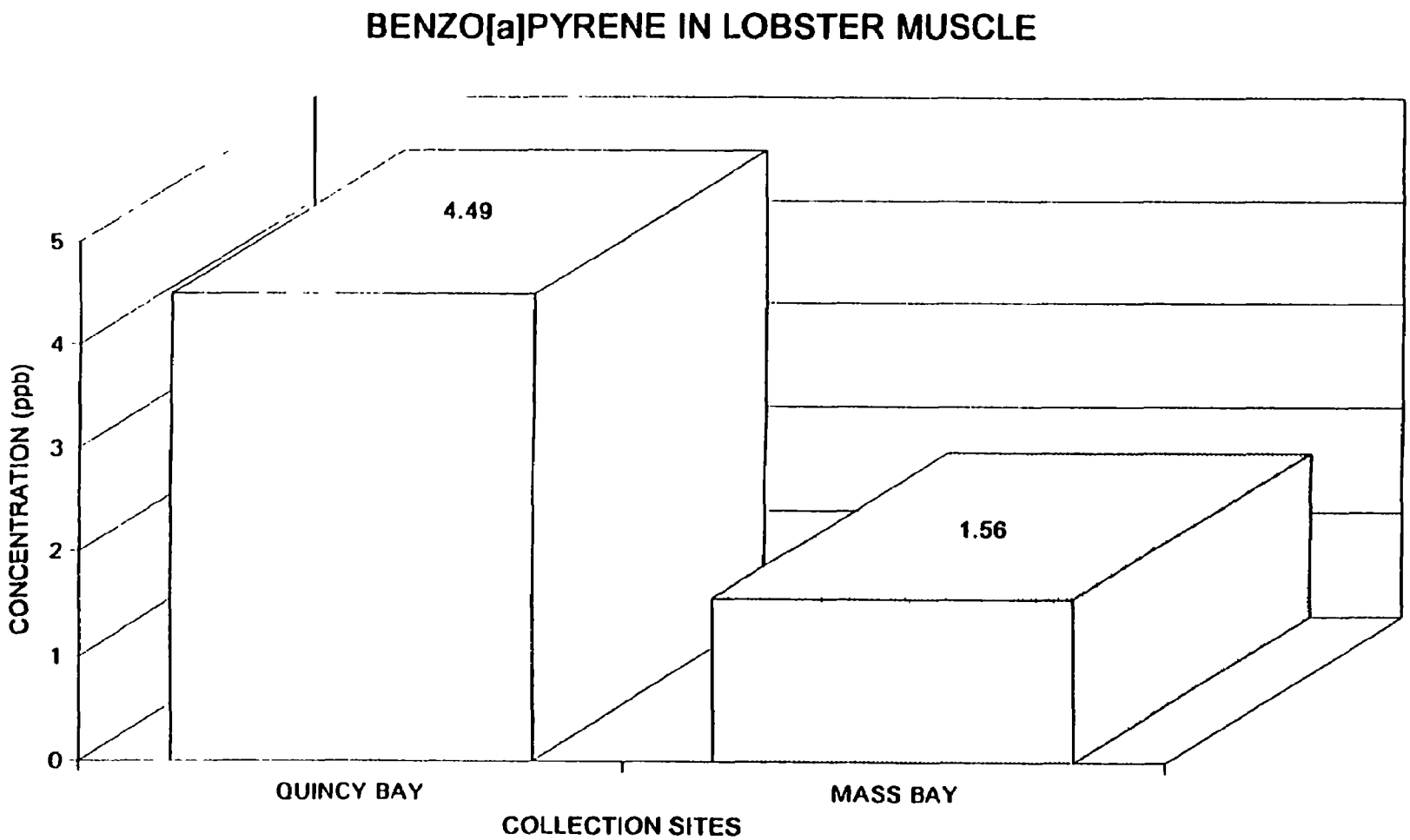

BENZO[a]PYRENE IN LOBSTER MUSCLE
CONCENTRATION (ppb)
0
1
2
3
4
5
4.49
1.56
QUINCY BAY
MASS BAY
COLLECTION SITES

Figure 6

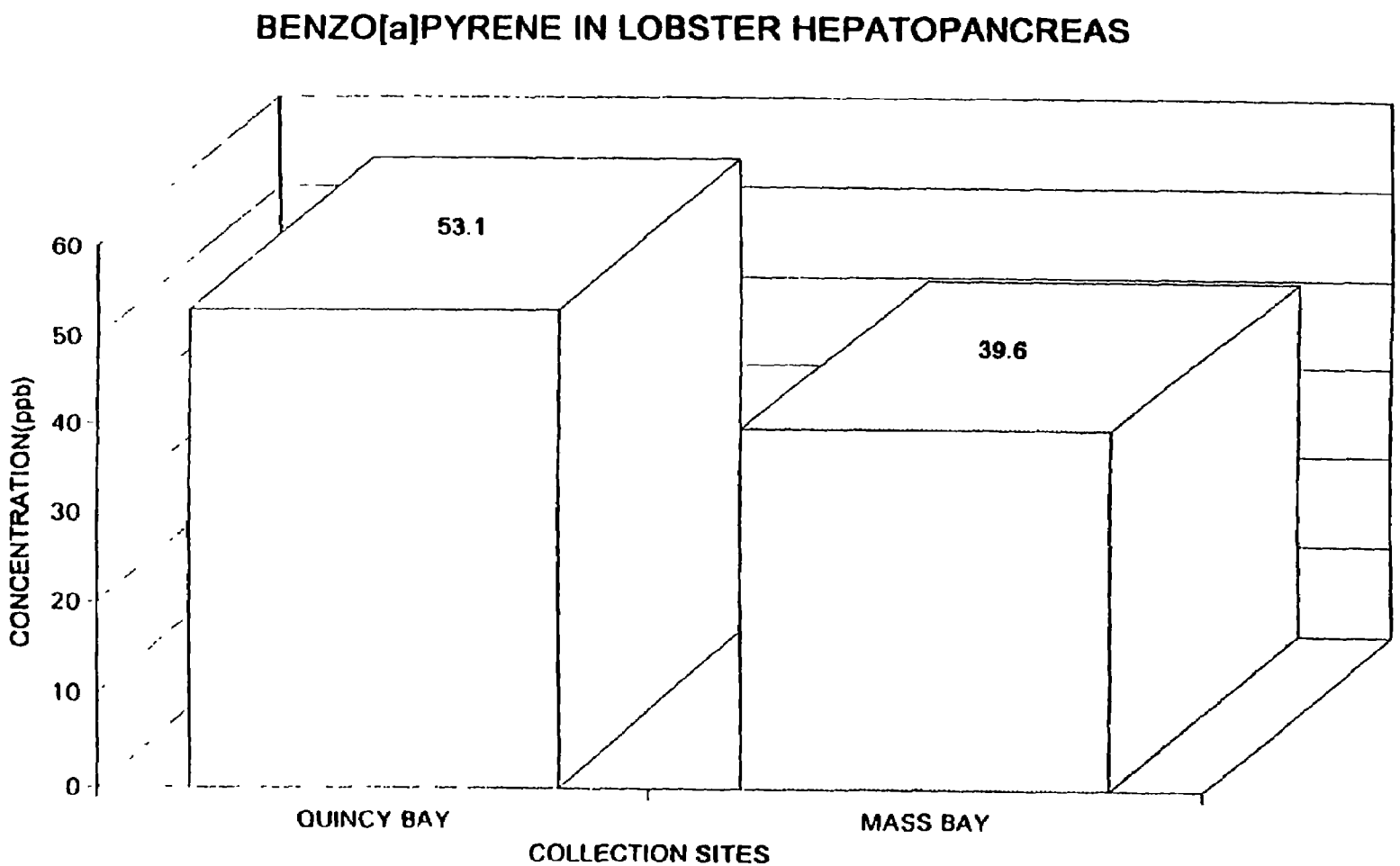

BENZO[a]PYRENE IN LOBSTER HEPATOPANCREAS
CONCENTRATION(ppb)
60
50
40
30
20
10
0
53.1
39.6
QUINCY BAY
MASS BAY
COLLECTION SITES

Figure 7

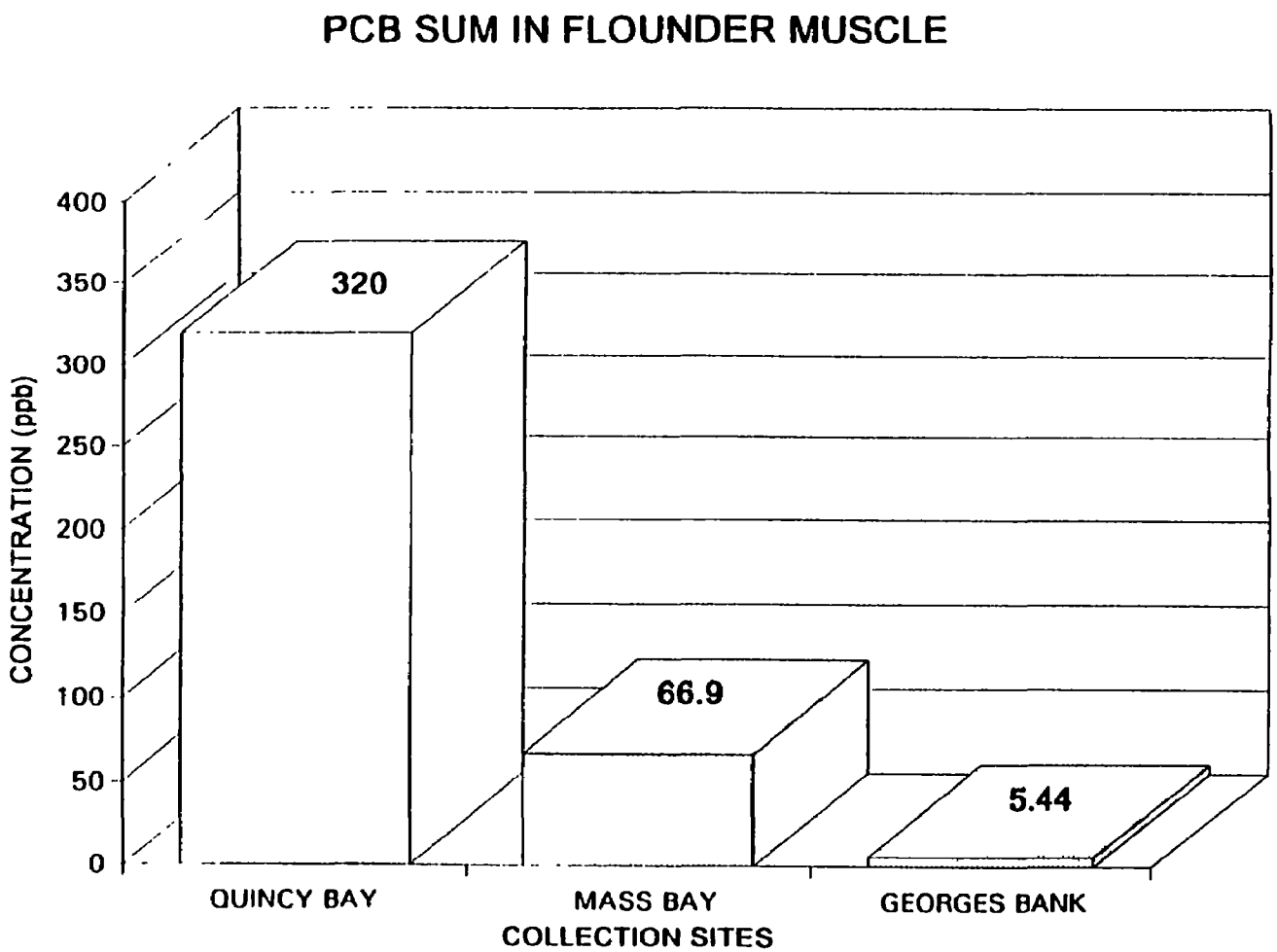

PCB SUM IN FLOUNDER MUSCLE
CONCENTRATION (ppb)
400
350
300
250
200
150
100
50
0
320
66.9
5.44
QUINCY BAY
MASS BAY
GEORGES BANK
COLLECTION SITES

Figure 8

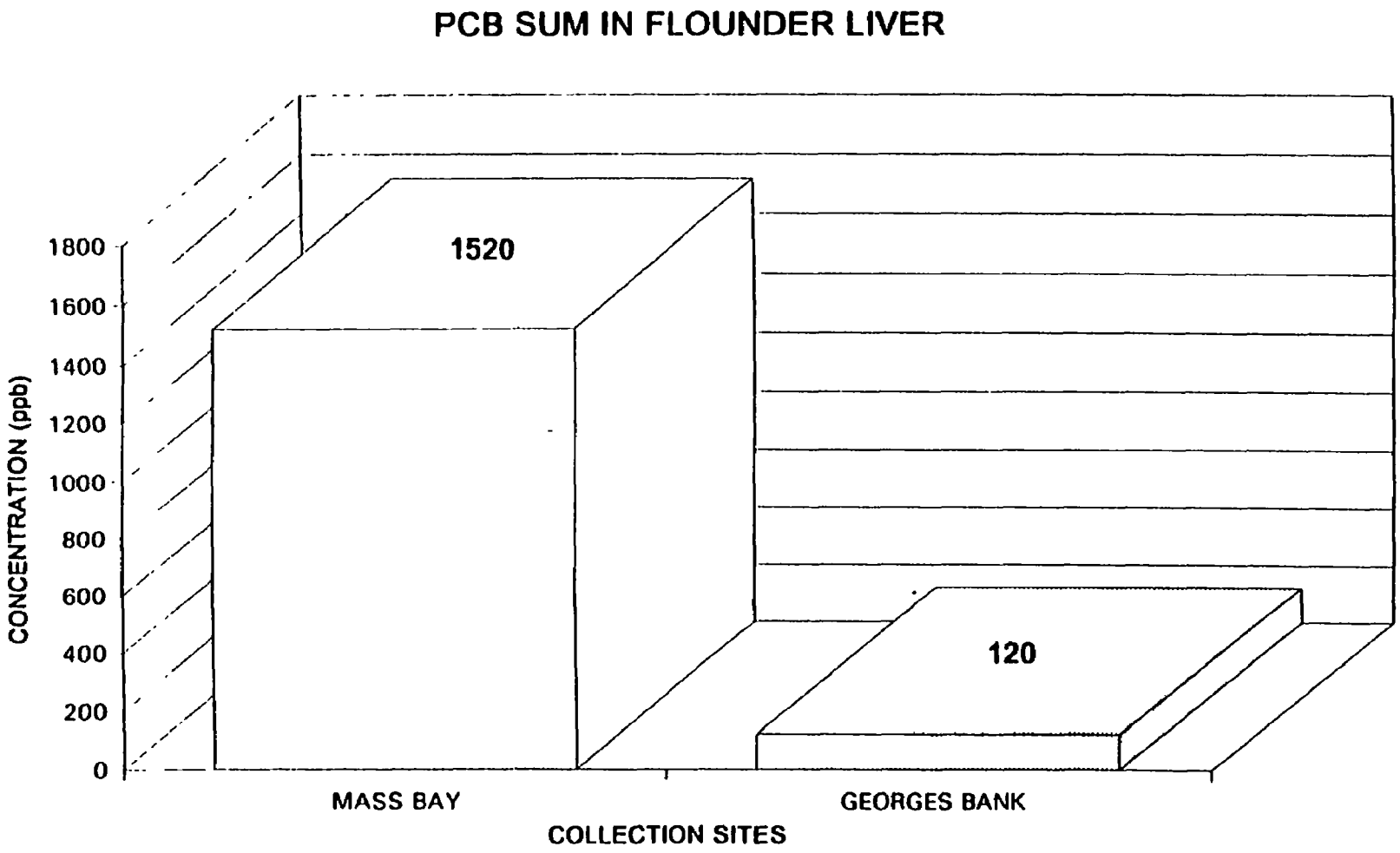

PCB SUM IN FLOUNDER LIVER
CONCENTRATION (ppb)
1800
1600
1400
1200
1000
800
600
400
200
0
1520
120
MASS BAY
GEORGES BANK
COLLECTION SITES

Figure 9

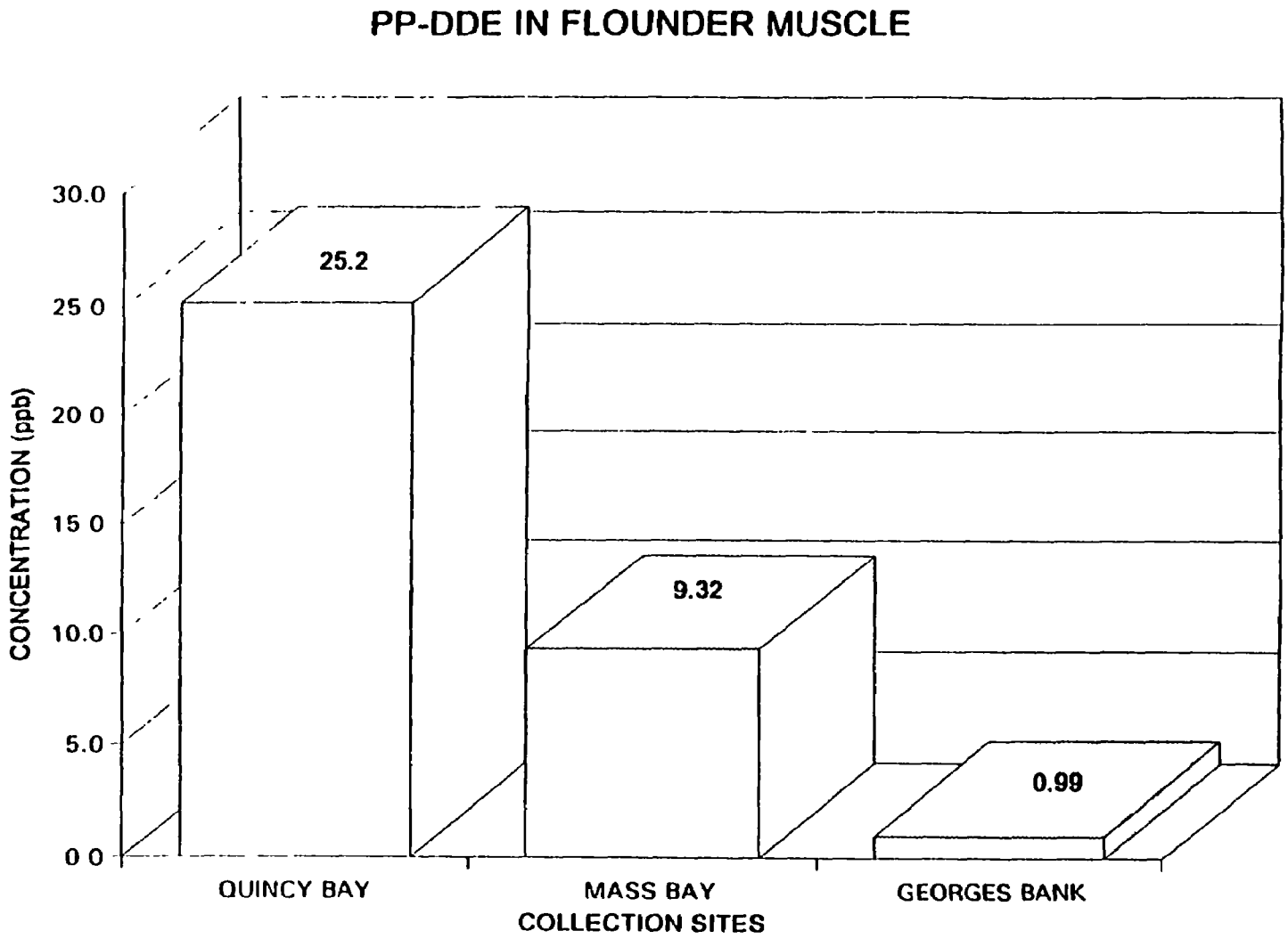

PP-DDE IN FLOUNDER MUSCLE
CONCENTRATION (ppb)
30.0
25 0
20 0
15 0
10.0
5.0
0 0
25.2
9.32
0.99
QUINCY BAY
MASS BAY
GEORGES BANK
COLLECTION SITES

Figure 10

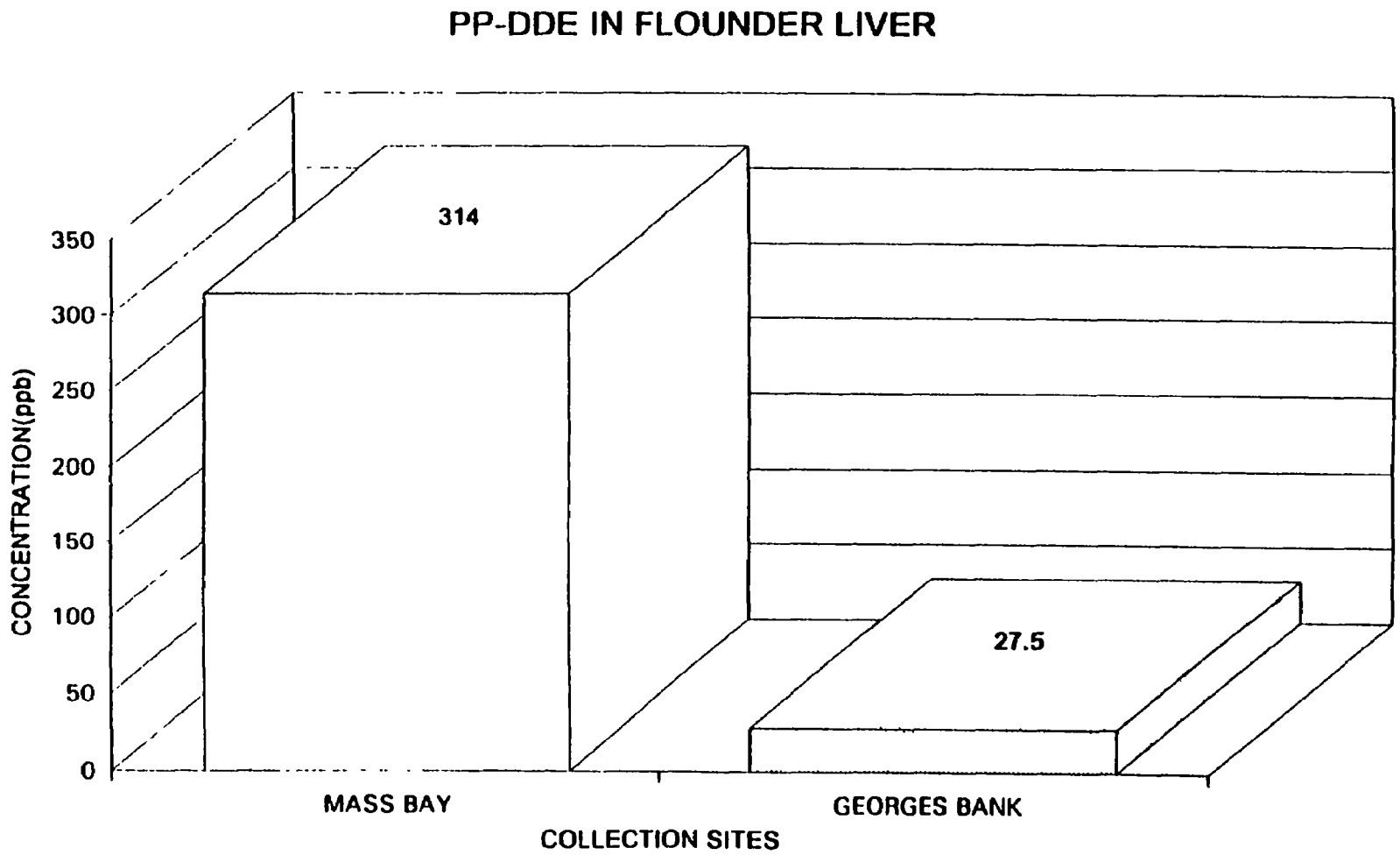
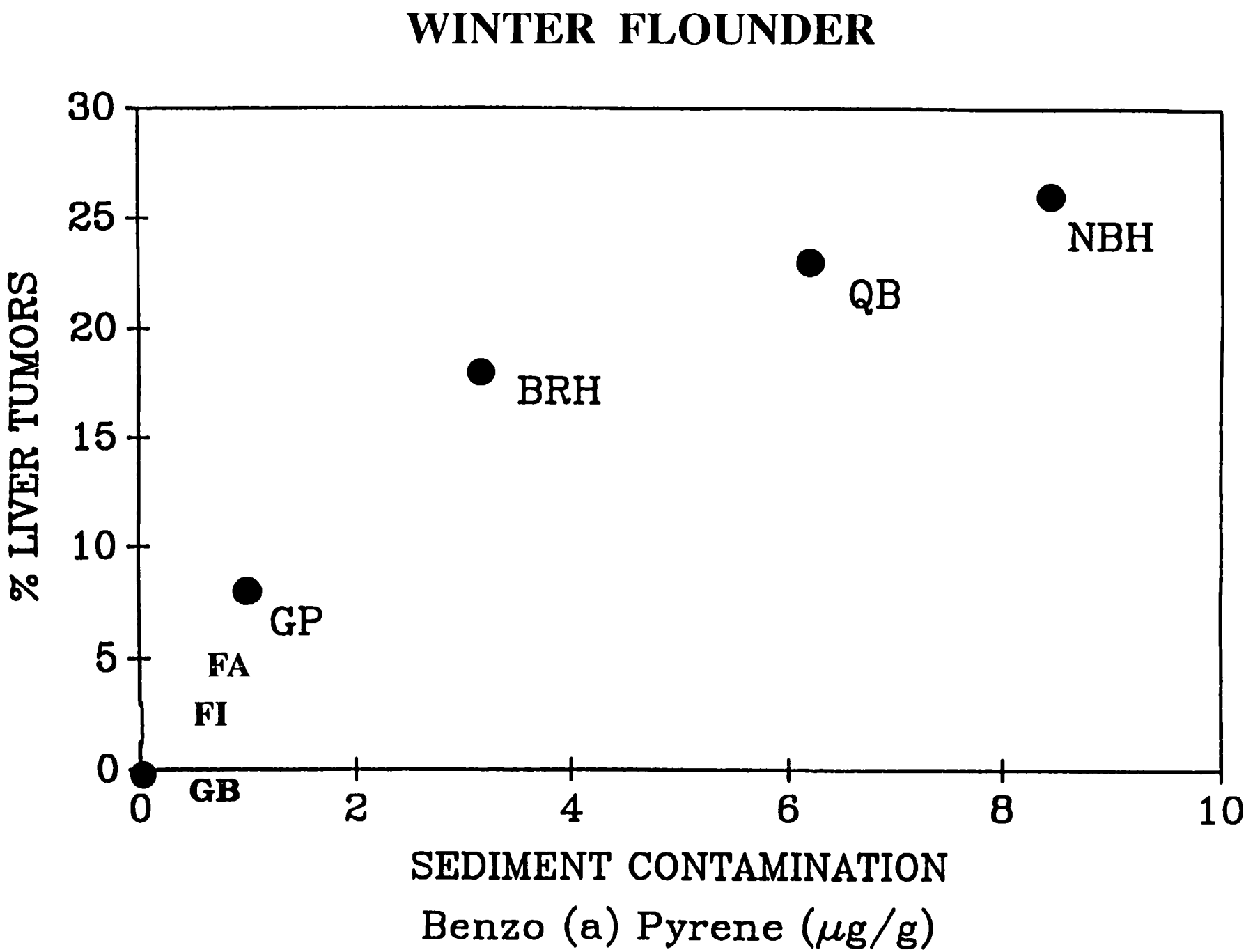

PP-DDE IN FLOUNDER LIVER
CONCENTRATION(ppb)
350
300
250
200
150
100
50
0
314
27.5
MASS BAY
GEORGES BANK
COLLECTION SITES

FIGURE 11


WINTER FLOUNDER
% LIVER TUMORS
30
25
20
15
10
5
0
NBH
QB
BRH
GP
FA
FI
GB
0
2
4
6
8
10
SEDIMENT CONTAMINATION
Benzo (a) Pyrene (μg/g)

APPENDIX E

EPA'S REQUEST FOR A FEDERAL CONSISTENCY DETERMINATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

July 2, 1992

Mr. Jeffrey Benoit, Director
Executive Office of Environmental Affairs
Coastal Zone Management Office
100 Cambridge Street, 20th floor
Boston, MA 02202

Dear Mr. Benoit:

The U.S. Environmental Protection Agency ("EPA") is completing actions necessary for the proposed final designation of a dredged material disposal site in Massachusetts Bay. Potential impacts associated with this action are discussed in the Draft Environmental Impact Statement ("DEIS") and the Supplemental Draft Environmental Impact Statement ("SDEIS"), which were sent to your office for review on September 15, 1989, and June 29, 1990, respectively. The Final Environmental Impact Statement ("FEIS") will be sent to your office in approximately one week. These EISs were prepared by EPA, in cooperation with the U.S. Army Corps of Engineers ("COE"), the National Marine Fisheries Service ("NMFS"), and the U.S. Fish and Wildlife Service ("USFWS"). EPA has completed a preliminary consistency evaluation under the Coastal Zone Management Act, 16 USC §1456 ("CZMA"), as part of this program and has determined that the designation of the proposed site is consistent with the approved coastal zone management program of the Commonwealth of Massachusetts.

EPA has evaluated designation of the Massachusetts Bay Disposal Site ("MBDS") according to the requirements of the Marine Protection, Research, and Sanctuaries Act, 33 USC §1403, which prohibits ocean dumping which would "...unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems or economic potentialities...." Specifically, EPA applied the five general and eleven specific statutory criteria for site designation set forth at 40 CFR §§228.5 and 228.6. EPA's site selection criteria relate to major marine ecosystem concerns. These concerns are substantially equivalent to those found in the Massachusetts Coastal Zone Management ("MCZM") office Policies with respect to protection of living marine resources. For example, both the State Plan and EPA's site selection criteria aim to protect sensitive marine areas such as those used by living resources for breeding, spawning, nursery, feeding, or passage. After consideration of the criteria, EPA has concluded that final site designation will be protective of the marine ecosystems and water quality in Massachusetts Bay. Final designation of the MBDS will provide an environmentally acceptable alternative for the disposal of dredged materials that meet the Ocean Dumping Criteria. If ocean disposal is selected as the most feasible option for a particular dredged material disposal project, this site designation ensures that an ocean disposal site is available in the area.

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In completing the preliminary consistency review, EPA evaluated whether the designation of the proposed site will either directly or indirectly affect the coastal zone of Massachusetts, and EPA determined that the action of designating the proposed MBDS for dredged material will have no such effects. However, EPA has made CZMA consistency review for site designation a matter of standard policy. This policy reflects EPA's efforts to maintain cooperative federal and state environmental regulatory processes that are mutually supportive. In addition, any direct or indirect effects of the actual disposal of dredged material at the MBDS on the coastal zone will be consistent with the policies of the MCZM office. The reasons for this preliminary determination are discussed below.

1. EPA's designation of the MBDS is not an authorization for the disposal of any particular dredged material at the site. Disposal cannot occur until the COE issues a permit or follows its regulatory procedures under §103 of the MPRSA. It should be emphasized that final designation does not denote EPA's approval of particular dredged material disposal proposals at the site. EPA and the COE jointly conduct an environmental review of each proposed ocean disposal project, with input from other state and federal resource agencies including MCZM. This review includes a review of the suitability of the materials for ocean disposal as well as an assessment of the need for ocean disposal. Thus, the proposed designation of the MBDS is consistent with MCZM policies.

2. It is only the actual disposal of dredged material, as authorized by the COE, that conceivably could directly affect the coastal zone. Moreover, EPA does not believe that dumping at the proposed MBDS may reasonably be expected to result in any direct or indirect impacts on the Massachusetts coastal zone that are inconsistent with MCZM policies. First, since the MBDS is not in the coastal zone, use of the site will not directly impact the coastal zone. Second, the MBDS is located approximately 15 nautical miles from Gloucester, MA. Field surveys have shown that bottom currents at the site move primarily in the southeast direction. EPA believes that the MBDS is a containment area. The DEIS presents site-specific resuspension and water quality analyses which support this determination. Therefore, dredged material disposed at the site would not travel into the coastal zone. Third, as discussed in detail in Chapter 5 of the DEIS and Chapters 3 and 4 of the FEIS, improved site management techniques are expected to prevent any unacceptable environmental impacts in or outside the coastal zone. The revised dredged material testing protocol, relocation of the reference site to a cleaner area, and proper site monitoring and management will, in part, enable EPA to minimize foreseeable adverse impacts to the marine environment.

3. The distance from the site to the nearest beach is great enough so that impacts to the shoreline resulting from dredged material disposal cannot reasonably be anticipated. Past use of the site has not resulted in any interference with beach and shore activities in Massachusetts. Monitoring surveys at the site will continue to evaluate the effects of disposal. In the

event that significant movement of the dredged material towards any amenity is evident, use of the site may be modified or terminated (see Chapter 4 of the FEIS). The site evaluation presented in the EISs applied the site selection criteria at 40 CFR §§228.5 and 228.6 which account for effects to the coastal zone, and this analysis bolstered the conclusion that use of the MBDS for dredged material disposal is consistent with MCZM policies.

4. Possible localized effects associated with the use of the MBDS are local mounding, temporary increases in turbidity and the smothering of benthic organisms. As the DEIS indicates, disposal of dredged material may result in the smothering of the benthos within the designated site and possible habitat alteration of the site. The low energy environment in the disposal area and recolonization ability of bottom-dwelling organisms will tend to mitigate any adverse effects from smothering. The ability of these organisms to recolonize in similar sediments renders this impact short-term and insignificant. Evidence of this is found in surveys at the site which have detected no significant differences in the infaunal community between the site and a reference area. Also, these insignificant effects will all be outside the coastal zone. In addition, use of the MBDS would not have a significant effect on commercial or recreational fishing in the area. Most commercial and recreational fishing activity in the vicinity is concentrated in inshore and nearshore waters, the site does not represent a unique habitat for any of the important commercial or recreational fisheries and the species that are harvested at the MBDS are not generally confined to a single habitat and could therefore withstand the small loss of benthic food sources in the disposal area. Therefore, no impact on commercial fishing operations resulting from dredged material disposal at the MBDS is expected.

5. The transport of dredged material to the MBDS by barges during actual disposal operations may result in minor effects, such as noise and turbulence, on the coastal zone. Additionally, small amounts of material could leak from barges during transport to the disposal site. However, any such leakage can be expected to be effectively dispersed in the turbulent wake of the barge, and its impact on marine organisms can be expected to be negligible. This minor leakage has not been an issue of MCZM in the past. In addition, appropriate permit compliance monitoring can be expected to minimize any such spillage to very minor levels. In addition, the MBDS is located adjacent to Boston's major shipping lane, thereby minimizing the effects associated with dredged material disposal with respect to the overall traffic scheme. Thus, once again, the site designation and ultimate use of the site are consistent with MCZM policies.

6. The USFWS and the NMFS have concluded that use of the site will not endanger the endangered or threatened species which occur in the vicinity of the site.

7. Any material proposed for ocean disposal must meet the criteria given in 40 CFR §227. Turbidities resulting from use of the site will be temporary as the predominance of the dredged material will fall to the bottom. EPA and the COE will continue to monitor the MBDS as long as it is used to detect movement of the material and any associated impacts. Thus, no significant negative impacts are expected at the site or in the coastal zone.

Since 1975, approximately 3.2 million cubic yards of dredged material have been disposed at the interim MBDS with no indication of adverse environmental impacts. The MBDS is currently classified under EPA Impact Category II, meaning that no significant unacceptable effects have been identified as a result of dredged material disposal (40 CFR §228.10). The proposed site is centered at 70° 35.0'W latitude and 42° 25.1'N longitude with a diameter of two nautical miles. This site is located approximately 21 nautical miles east of Boston, MA.

Through its policies, the State Plan recognizes both the need to protect coastal water quality through proper control of dredge and fill operations and the need to maintain navigation channels and improve harbors to increase the movement of waterborne commerce. EPA has approached the MBDS designation in this spirit and finds the action consistent with MCZM policies. We therefore conclude, based on the information presented in the DEIS, SDEIS, and FEIS, that the proposed designation is consistent with the policies of the MCZM. We are hereby requesting that you determine whether MCZM concurs with our preliminary findings. We would appreciate a written response within fourteen calendar days as we plan to proceed with final designation in the near future. If there are further questions regarding this consistency determination, please do not hesitate to contact Kymberlee Keckler of my staff at (617) 565-4432.

Sincerely,

Ronald G. Manfredonia, Chief
Water Quality Branch

cc: William Lawless, USACOE, Waltham, MA
Thomas Fredette, USACOE, Waltham, MA
Judith Pederson, MCZM, Boston, MA
Bradford Barr, MCZM, Boston, MA
Christopher Mantzaris, NMFS, Gloucester, MA
Vernon Lang, USFWS, Concord, NH