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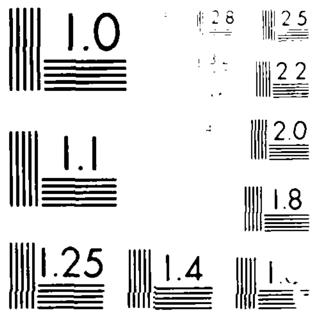
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SAN FRANCISCO DISTRICT

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OAKLAND HARBOR

DEEP-DRAFT NAVIGATION IMPROVEMENTS
DESIGN MEMORANDUM NUMBER 1, GENERAL DESIGN

AND

FINAL SUPPLEMENT I TO THE
ENVIRONMENTAL IMPACT STATEMENT
ALAMEDA COUNTY
CALIFORNIA
MARCH 1988

AD-A191 294

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UNITED STATES ARMY CORPS OF ENGINEERS
SAN FRANCISCO DISTRICT
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105-1905

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ADDENDUM TO THE FINAL SUPPLEMENT 1 TO THE ENVIRONMENTAL IMPACT STATEMENTS

OAKLAND OUTER AND INNER HARBORS DEEP-DRAFT NAVIGATION IMPROVEMENTS ALAMEDA COUNTY, CALIFORNIA MARCH 1988

Prior to filing of the final supplement to the environmental impact statement (FSEIS), a special technical review panel was convened to consider technical issues associated with the ocean disposal of dredged material from the Oakland Harbor project. This panel of national experts from the Environmental Protection Agency (EPA) and the Corps of Engineers (Corps) had been assembled to assist the Corps in ocean disposal site decisions. The recommendations of the panel are attached to and made part of this addendum.

The panel reviewed all available information, including presentations by the U.S. Fish & Wildlife Service, National Marine Fisheries Service and the California Department of Fish and Game.

Regarding the Inner Harbor, the panel finds that material to be dredged from Inner Harbor reaches 1 and 2 and material from the vicinity of Inner Harbor station 3aa is suitable for ocean disposal subject to confirmatory solid phase bioassay tests. Based on available data, material to be dredged from the vicinity of Inner Harbor stations 3cc and 3dd is not suitable for ocean disposal. The panel understands that station 3ee is outside the project area and thus does not address material from this location.

Regarding the Outer Harbor, the data presented to the panel were determined to be insufficient to adequately characterize the Outer Harbor. The material to be dredged from the Outer Harbor requires further evaluation prior to reaching a determination as to acceptability for ocean disposal.

Regarding the general location of the ocean disposal site, based on the available data, the panel cannot find compelling environmental reasons to choose between Site 1M or a site in the vicinity of B1 for the Inner Harbor material found suitable for ocean disposal. Due to the lack of data to reach a definitive conclusion, and given that information available suggests the potential for greater conflict with fishery interests at Site 1M, the panel believes the most prudent approach is to utilize a site in the vicinity of B1.

Regarding the site location, the final B1 and B1A site boundary should be determined on the basis of minimizing interference with the marine sanctuary, probable bottom rock habitat, or oil lease considerations.

In view of these findings, the following actions are proposed:

- Confirmatory solid phase bioassay testing for the deepening of the Inner Harbor to -38 feet will be completed prior to ocean disposal of the dredged materials (approximately 500,000 cy).

- Disposal of uncontaminated material from this initial phase of dredging will be in the ocean in the vicinity of Site B1.

- The ocean disposal site in the vicinity of Site B1 will be adjusted so that its boundary minimizes interference with the marine sanctuary, rockfish habitat and oil lease considerations.

- The results of a trial monitoring program and additional testing for the second phase of the project that would deepen both the Inner and Outer Harbors to -42 feet will be reported in future NEPA documents prior to dredging.

TO: CDR, CESPD
FM: CECW-D

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 14 1988

OFFICE OF WATER

MEMORANDUM

SUBJECT: Transmittal of Findings and Conclusions by Joint EPA/COE Oakland Harbor Technical Review Panel

FROM: Tudor T. Davies, Director
Office of Marine and Estuarine Protection, EPA

Chuck Hummer, Acting Chief, Dredging Division
Office of the Chief of Engineers

TO: Dan McGovern, Regional Administrator
Region IX

Brigadier General Patrick Kelly
Commander, South Pacific Division
U. S. Army Corps of Engineers

As you requested, we convened a joint technical review panel to consider issues associated with the ocean disposal of dredged material from the Oakland Harbor project. A copy of the memorandum containing the charge to the Panel is attached for your information.

The Panel met on March 10 - March 11. To assure the Panel had the most current information, factual presentations were made by staff from the District Engineer's office, EPA Region IX, and expert resource agencies. An agenda identifying the presentations is attached.

The technical findings and conclusions reached by the Panel were based on the available information and address the suitability of the material for ocean disposal and the location of an ocean disposal site. A copy of the Panel's findings and conclusions is attached for your consideration.

One non-technical issue also is worth bringing to your attention. During the factual presentations to the Panel, the Department of the Navy's restrictions on submarine operating areas were mentioned, indicating that the Navy opposed transiting of such areas by barges and scows on their way to the disposal site. While this issue was not within the scope of the charge to the Panel, avoidance of those areas by barge traffic would add time and distance to the transportation of material to the disposal location suggested by the Panel. We thus would suggest that the Corps of Engineers pursue formal clarification of the Department of the Navy's position on the transiting of the submarine operating areas by barges enroute to the disposal site.

Attachments

ATTACHMENT 1

Charge to Panel

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

March 4, 1988

OFFICE OF
WATER

MEMORANDUM

SUBJECT: Technical Review Panel for Oakland Harbor Dredged Material Disposal

FROM: Tudor T. Davies, Director
Office of Marine and Estuarine Protection, EPA

Chuck Hummer, Acting Chief /S/ Ted Pellicciotto for
Dredging Division, COE

TO: Panel Members (see attached list)

Background: The U.S. Army Corps of Engineers (COE) will be requesting Environmental Protection Agency (EPA) concurrence on an ocean disposal site for sediment dredged from the Oakland Harbor. Currently, no ocean disposal site has been designated for material from this project.

The COE is presently completing a final supplemental EIS with the preferred alternative being direct disposal of the dredged material at the 1M site, which is located at 16 nautical miles south-southwest of the Golden Gate ship channel. At present, EPA prefers the B1 or B1A sites on the basis of less potential impacts on fisheries and the Farallon Islands National Marine Sanctuary. The B1 and B1A sites are 24 nautical miles from the ship channel. The COE believes that the environmental impacts of the alternatives are not significantly different and that the added expense to haul the material to those sites is not justified.

In an attempt to resolve outstanding technical/scientific issues related to this situation, the EPA Regional Administrator for Region IX and the Commander of the Corps South Pacific Division have asked their respective headquarter's offices to assess the environmental impacts of the two locations identified as potential ocean disposal sites and to evaluate the suitability of the material for ocean disposal. To carry out this assessment, EPA and COE headquarters have agreed to convene a technical panel to consider the technical/scientific issues raised.

Charge to Panel: The panel is charged with developing technical findings and conclusions relevant to the ocean disposal of dredged material from the Oakland Harbor project in order to provide assistance to decision makers within EPA and the COE. In order to arrive at a sound decision as to the disposal methods or sites to be used and their compliance with the applicable regulatory criteria, decision makers within the EPA and the COE need to have the benefit of sound technical advice. The charge to the panel is limited to technical/scientific matters and does not include recommendations as to policy matters.

The technical issues presented for consideration by the panel at a minimum involve the ocean disposal alternative for 500,000 cubic yards of material from the Oakland Inner Harbor dredging project. To the extent possible within the time constraints of the meeting, the ocean disposal alternative for the full seven million cubic yard of material from the entire Oakland Harbor project also may be addressed. The technical panel's findings and conclusions shall address the environmental/health impacts and risks associated with ocean disposal at site 1M v. sites BI and B1A (see attached map from project EIS). The findings and recommendations should seek to resolve technical/scientific issues associated with:

- Relative impacts at the candidate sites associated with the type of sediment proposed for disposal;
- Evaluation as to the toxicity of the sediments to be disposed and presence or absence of pollutants in the sediments;
- Evaluation of disposal methods to avoid or mitigate anticipated impacts;
- The adequacy of the data relied on by the panel in arriving at their recommendations, including:
  - o Identification of missing data deemed to be essential to impact evaluation;
  - o Steps to obtain this data; and
- Monitoring necessary to evaluate potential impacts of dredged material disposal and/or fill gaps in data.

Panel Structure and Organization:

The panel is comprised of five representatives from EPA and five representatives from the COE. The panel will be under the joint chairmanship of Tudor Davies and Chuck Hummer, who are included in the panel membership. Other panel members are identified in the attached list. Arrangements are being made to have available representatives of other expert agencies for the purposes of making presentations to the panel and providing data and technical information throughout the panel's deliberations.

In order to familiarize [illegible] members with the available data, a copy of the PIS and [illegible] materials have been mailed under separate cover. Panel [illegible] requested to read and evaluate this material prior [illegible] in order to have familiarity with the issues. [illegible] this material by Monday, March 7th [illegible] of EPA at (FTS) 475-7126 or Dave Mathi[illegible] 2-0397 (FTS).

We envision that [illegible] will take place over two days, with the first day [illegible] on assembling information and questioning the outside [illegible] and the second day focussing on drafting the panel's [illegible] findings and conclusions. The panel's final report must [illegible] prior to the end of the meeting. Because of the [illegible] time frame for the meeting it is essential that all panel [illegible] a full understanding of the issues to be considered [illegible] the meeting.

The panel mee[illegible] March 10 and 11 from 8:30 AM to 5:00 PM. The [illegible] place at Fort Belvoir, Virginia in Room 14[illegible] Fort Belvoir is located in a Washi[illegible] and [illegible] map showing its location is attached. We [illegible] the panel and look forward to a prod[illegible]

Attachments

Panel members

EPA	COE
Tudor Davies, OMEP	Chuck Hummer, CE-CW-D
Al Wastler, OMEP	Dave Mathis, CE-CW-D
John Lishman, OMEP	Bob Engler, WES
Bill Muir, Region III	Tom Wright, WES
Jack Gentile, ORD Narragansett	Mike Palermo, WES

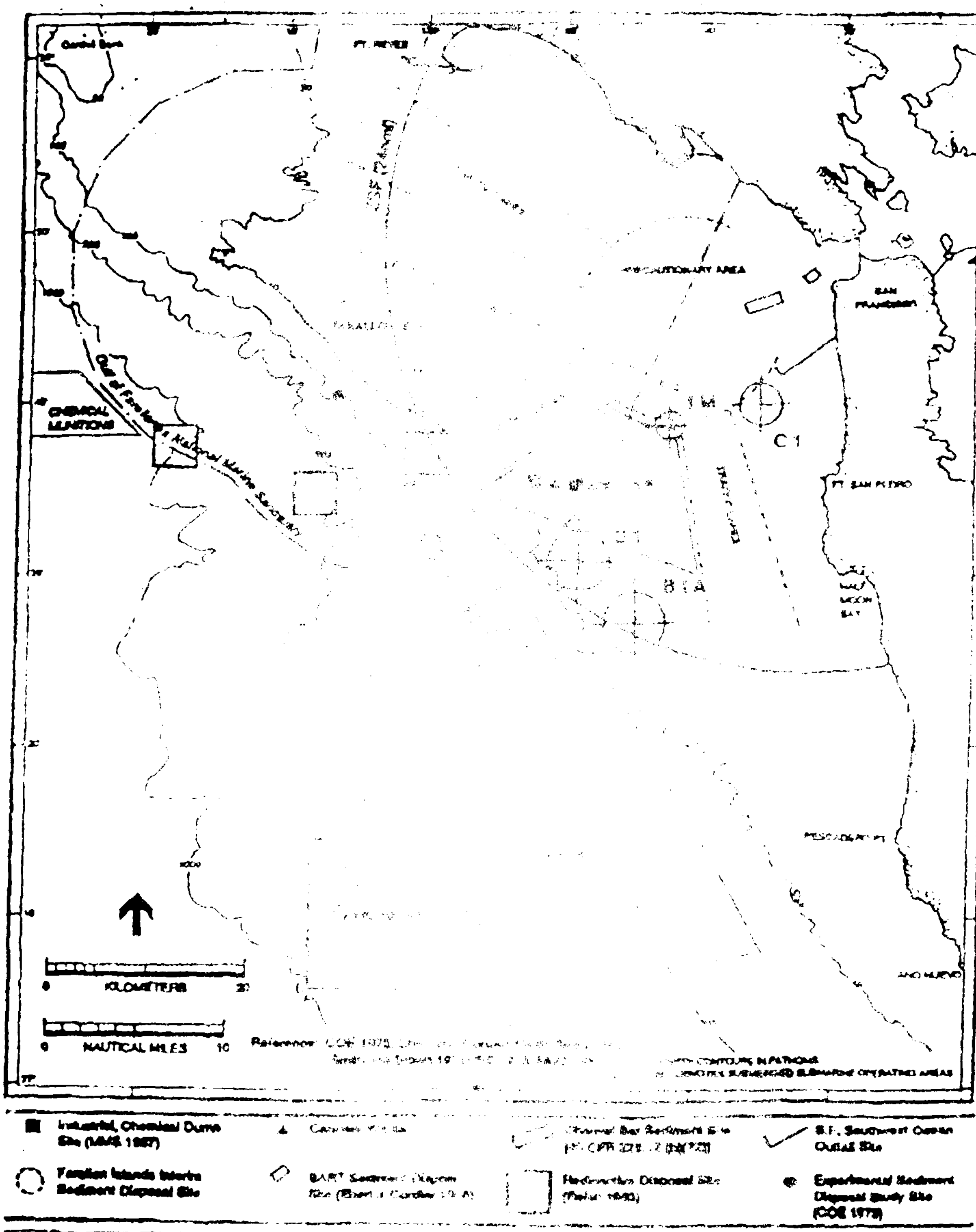

Figure 3-10 Locations of [illegible] and active disposal sites

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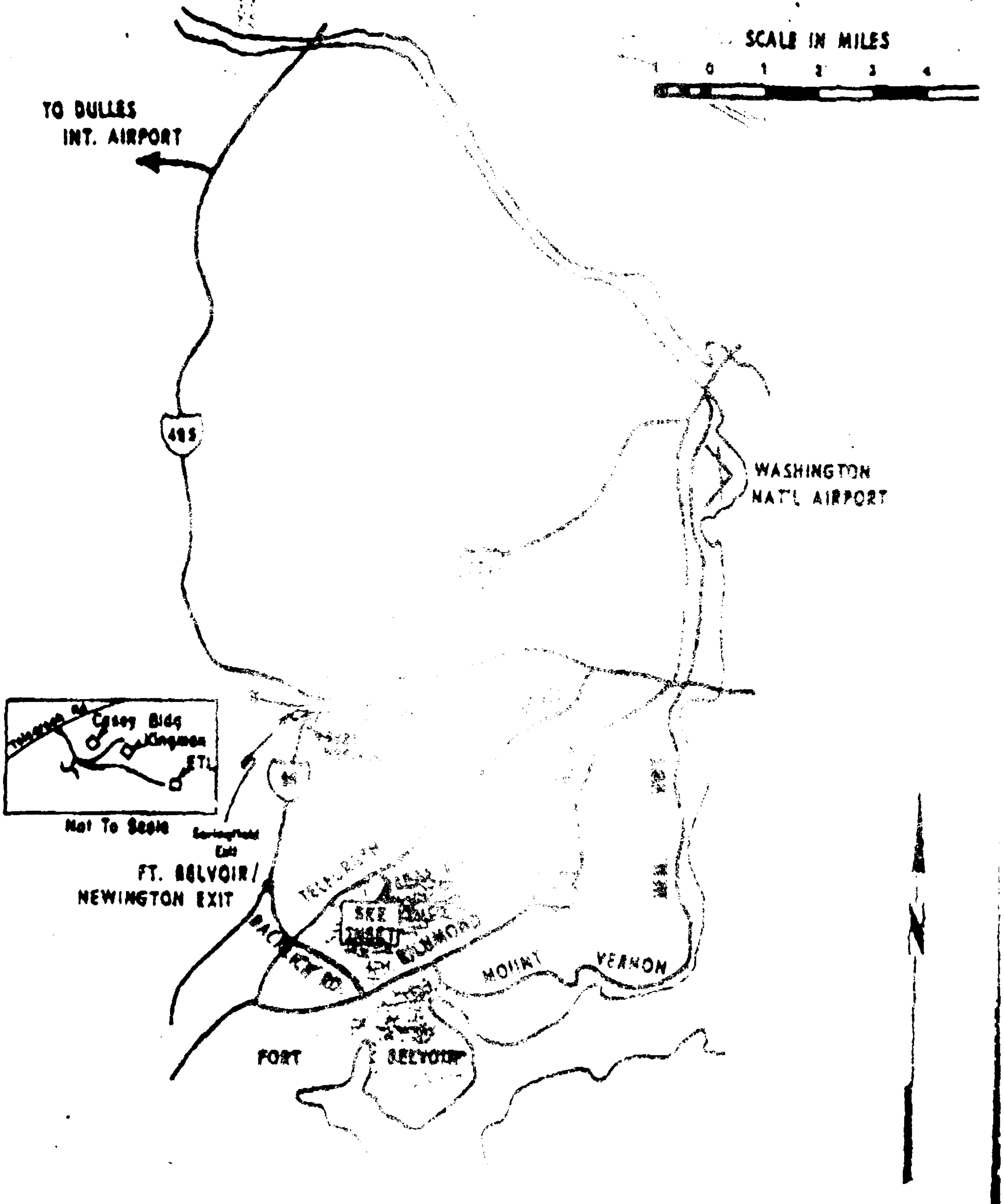


ATTACHMENT 2

Agenda of Factual Presentations to Panel

OAKL [illegible] PANEL MEETING

1) Discussion of [illegible] ground rules
   - Hummer [illegible]

2) Overview by [illegible]

   - District:
     o [illegible]
       [illegible] material
     o [illegible]/documents
       [illegible] existing documents
       [illegible] ongoing/uncompleted studies

   - Region:
     o [illegible] on PN/EIS
     o [illegible] of concern
     o [illegible] involvement

3) Material char[illegible]

   - Source [illegible]
     o [illegible]
       [illegible] Material
     o [illegible]

   - Evalu[illegible] [District]
     o [illegible]
     o [illegible]
     o [illegible] reference sites
     o [illegible]

   - Evaluatio[illegible]
     o [illegible]
     o [illegible]

   - EPA inte[illegible] testing [Region]

4) Site selectio[illegible]

   - Physical [illegible] oceanographic characte[illegible] sites [District]

   - Biologi[illegible] and B Sites
     o Inform[illegible] [District]
     o Pres[illegible]
       [illegible] (Bob Tasto)

ATTACHMENT 3

Panel Findings and Conclusions

PANEL FINDINGS ON SUITABILITY OF MATERIAL FOR OCEAN DISPOSAL

I. INFORMATION RELIED ON

The findings and conclusions of the Panel are based upon consideration of data from the following sources:

1) Draft Supplement I to the Final Environmental Impact Statement Oakland Outer and Oakland Inner Harbors Deep-Draft Navigation Improvements Alameda County, California (Sept. 1987)

2) Preliminary Draft of report by Battelle/Marine Research Laboratory: Results of Bulk Sediment Analysis and Bioassay Testing on Selected Sediments from Oakland Inner Harbor and Alcatraz Disposal Site, San Francisco, California (Jan. 1988)

3) U.S. Army Corps of Engineers sediment chemistry data for 1987 operation and maintenance dredging for Oakland Harbor

II. INNER HARBOR

Finding: The Panel finds that material to be dredged from Inner Harbor reaches 1 and 2 and material from the vicinity of Inner Harbor station 3aa is suitable for ocean disposal subject to confirmatory solid phase bioassay tests. Based on available data, material to be dredged from the vicinity of Inner Harbor stations 3cc and 3dd is not suitable for ocean disposal. The Panel understands that Inner Harbor station 3ee is outside the project area and thus did not address material from this location.[1]

Conclusions Reached

1) Consideration of sediment characterization data does allow the Panel to exercise its best professional judgment as to the suitability of Inner Harbor material for ocean disposal.

Discussion:

Material from Inner Harbor reaches 1 and 2 and the vicinity of station 3aa appears to be suitable for ocean disposal. Sediment chemistry profiles have not identified significant elevations of contaminants of toxicological concern.

Material from the vicinity of Inner Harbor stations 3cc and 3dd is not considered suitable for open ocean disposal. Even

---

1 A map showing the locations referred to is attached.

though the results of the solid phase bioassays as described in the DSEIS were equivocal, supplementary tests (set forth in the preliminary draft of the Battelle report) consisting of suspended solid phase bioassays on sediments from the Schnitzer and Todd areas (Turning Basin) showed significantly high toxicity to oyster larvae. The physical and chemical characteristics of these sediments were similar to those from stations 3cc and 3dd, and the Panel concludes that in this case the comparability of the chemical and physical characteristics suggests similar levels of toxicity for these samples.

2) Solid phase bioassay test results which were available for Panel consideration are equivocal; therefore additional solid phase bioassay testing is necessary to confirm the Panel's finding as to the suitability of Inner Harbor material for ocean disposal.

Discussion:

The solid phase bioassay results were not consistent among the sample locations. In addition, the compositing scheme employed did not allow for sufficient horizontal resolution of material contamination along the Inner Harbor.

Water column testing and the physical characteristics of the sediment to be dredged indicate that water column impacts are unlikely. Therefore, additional testing will be limited to benthic effects as assessed by solid phase bioassays. Solid phase testing on infaunal amphipods, polychaetes, and deposit feeding bivalve molluscs must be conducted to determine toxicity and biocaccumulation potential. These tests must be conducted on individual uncomposited cores to confirm the Panel's finding as to the suitability of material from Inner Harbor Reaches 1 and 2 and the vicinity of station 3aa.

3) The number of original and supplemental (Battelle) samples taken from the Inner Harbor around stations 3cc and 3dd is sufficient to address horizontal variations in the material. Better definition of the limits of the unacceptable material located near the Inner Harbor Turning Basin sampling stations 3cc and 3dd could be achieved by physical and chemical analysis of additional vertical horizons. If such further analysis are conducted, the chemical parameters considered must be consistent with those previously presented. These analyses may serve to reduce the volume of material deemed unsuitable for ocean disposal.

III. OUTER HARBOR

Finding: The data presented to the Panel were determined to be insufficient to adequately characterize the Outer Harbor. The material to be dredged from the Outer Harbor requires further physical, chemical, and biological evaluation prior to reaching a determination as to suitability for ocean disposal.

Conclusions Reached

1) The additional testing for material to be dredged from the Outer Harbor should take into account horizontal variation (without compositing of individual cores) and should include the following for each core:

a. Physical [illegible]

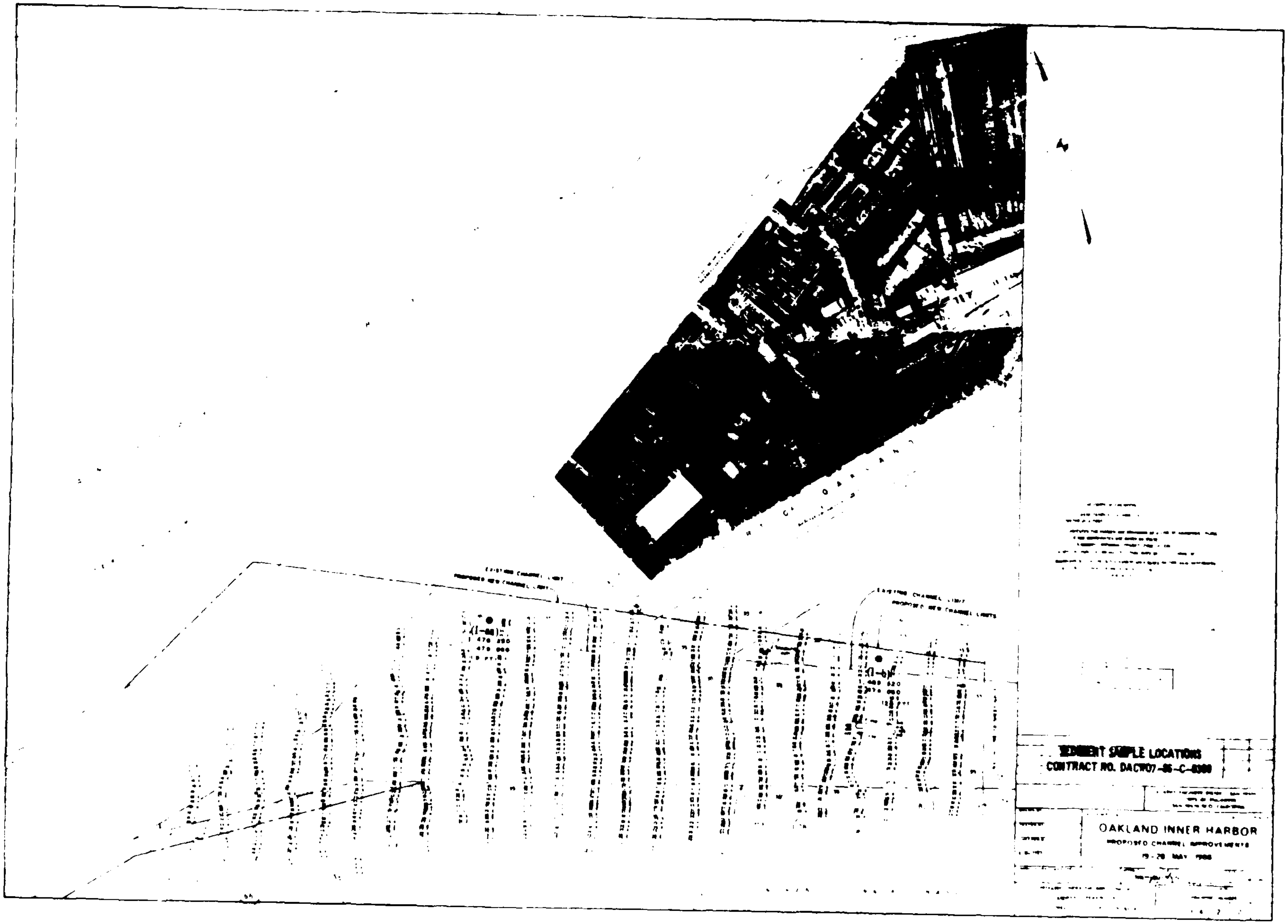
b. Chemical [illegible] chemical parameters must be consistent [illegible] previously presented in the Inner Harbor [illegible]

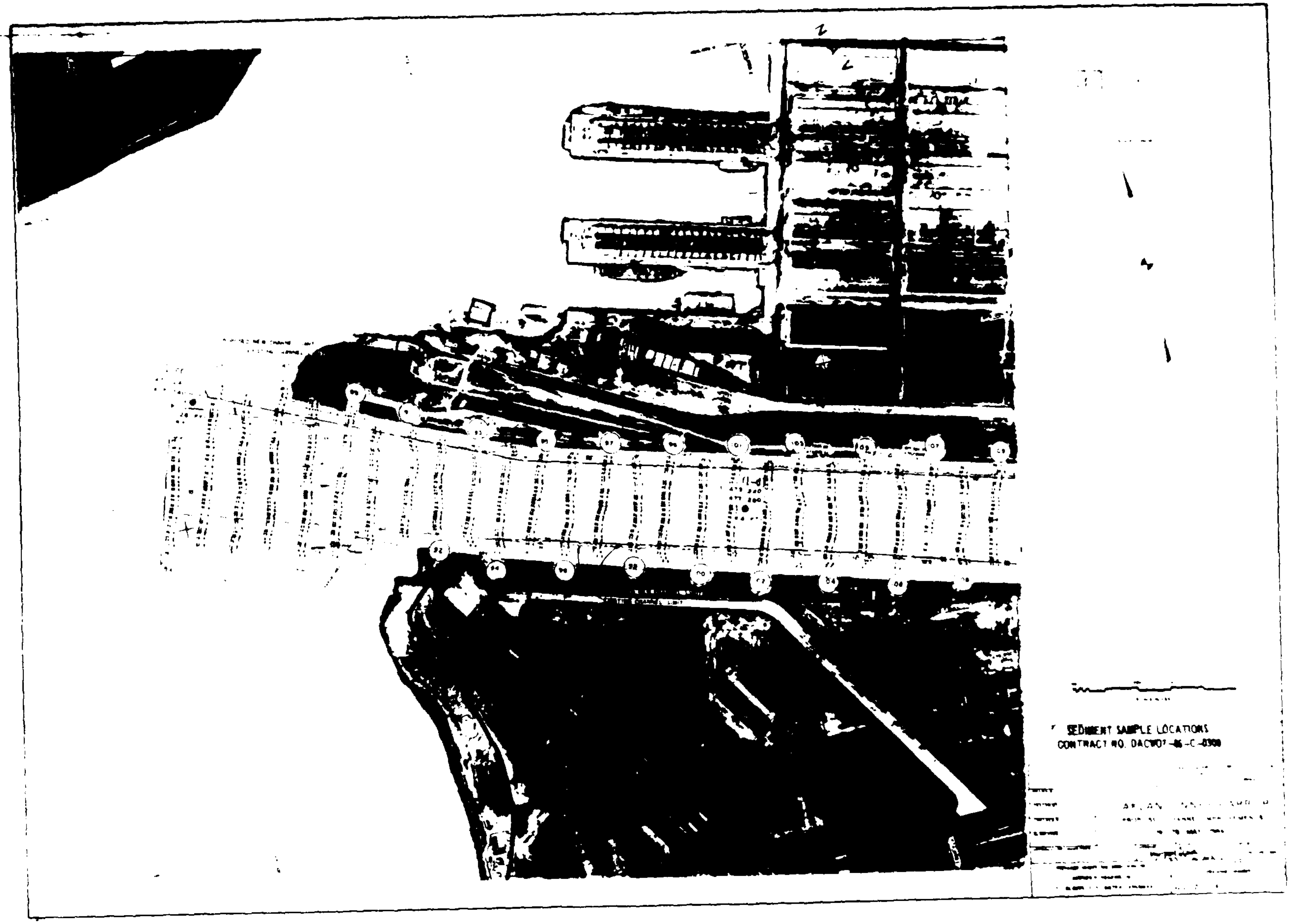
c. Solid phase [illegible] applicable, bioaccum[illegible]

A detailed study [illegible] Panel for evaluation prior to initiation [illegible]

ATTACHMENT A
(for Panel findings on Suitability of material)

Map Showing Harbor Reaches and Sampling Locations


OAKLAND INNER HARBOR



SEDIMENT SAMPLE LOCATIONS
CONTRACT NO. DACW07-86-C-0300


SEDIMENT SAMPLE LOCATIONS
OAKLAND INNER HARBOR
PROPOSED CHANNEL IMPROVEMENTS


SEDIMENT SAMPLE LOCATIONS
CONTRACT NO. DACW07-86-C-0300

PANEL FINDINGS ON OCEAN DISPOSAL SITE

I. INFORMATION RELIED ON

The findings and conclusions of the Panel are based upon consideration of data from the following sources:

1) Draft Supplement I to the Final Environmental Impact Statement Oakland Outer and Oakland Inner Harbors Deep-Draft Navigation Improvements Alameda County, California (Sept. 1987)

2) Zone of Siting Feasibility Analysis for the San Francisco/Gulf of the Farallones Ocean Dredged Material Disposal Site (Feb. 1988)

3) 1976 - 1977 fishery resources data provided by the California Department of Fish and Game (copy attached)

4) Sedimentation and Dispersion San Francisco Dredged Material Ocean Disposal Site Evaluation COE Contract No. DACW07-87-C-0015 TC-3557 Final Report (Dec. 1987)

5) Baseline Survey and Site Selection for Ocean Disposal, Gulf of the Farallones (Nybakken et al., 1984)

6) San Francisco Bay Dredged Material Disposal Site Survey (Kinnetic Laboratories, 1985)

II. GENERAL LOCATION

Finding: Based on the available data, the Panel cannot find compelling environmental reasons to choose between site 1M or a site in the vicinity of B1 for the Inner Harbor material found suitable for ocean disposal. Due to the lack of data to reach a definitive conclusion, and given that information available suggests the potential for greater conflict with fishery interests at site 1M, the Panel believes the most prudent approach is to utilize a site in the vicinity of B1.[2]

Conclusions Reached

1) The data available do not permit firm conclusions as to the environmental preferability of site 1M vs. a site in the vicinity of B1.

Discussion:

The Panel notes that in the absence of site specific quantitative data on the physical, chemical and biological oceanography and the uncertainties resulting from annual fluctuations in fishery

2 A map showing the locations discussed is attached.

18

catches, the data differentiating the two sites are not definitive. However, the fishery interests appear to be more substantial at site 1M than in the vicinity of sites near B1.

2) Of the two locations, the B1-B1A area has the greater potential for use for the Oakland project.

Discussion:

This is true both in terms of the B1-B1A area's probable lower erosion potential and its apparently lower value as a fishery resource. A certain amount of site specific information will be required during and after disposal, whichever site is selected for disposal of the 440,000 cubic yards from the Inner Harbor which the Panel judged suitable for ocean disposal. Selection of the B1-B1A area for this purpose would offer the opportunity for the collection of data relevant to selection of a disposal site for the remainder of the Oakland project. A search for a suitable ocean disposal site would involve consideration of potential on-shelf sites. The monitoring data gathered at B1 and B1A as a result of Inner Harbor disposal operations could be invaluable in the selection of a site for the remainder of the Oakland project.

III. SITE SELECTION

Finding: The final boundary of a site in the B1-B1A area should be determined on the basis of minimizing interference with the Gulf of the Farallones Marine Sanctuary, probable bottom rock habitat, and oil lease considerations.

Conclusions Reached

1) The B1 site "footprint" (boundary) is based on modeled disposal coverage and is adjacent to the Gulf of the Farallones Marine Sanctuary. Rock habitat has been reported on the southern boundary of the B1A site. Therefore, to minimize potential impacts on both of these significant resources, a rectangular site boundary located in the vicinity between the B1 and B1A sites could be finally located on the basis of existing or new side scan sonar data.

2) A monitoring program describing: a) predisposal bottom topography, current velocities, and directions; b) water column plume description and direction during disposal; and c) post-disposal description of the location, the shape, and physical stability of the disposal mound, will be required.

ATTACHMENT B
(for Panel Findings on Disposal Site)

California Department of Fish and Game Fisheries Data

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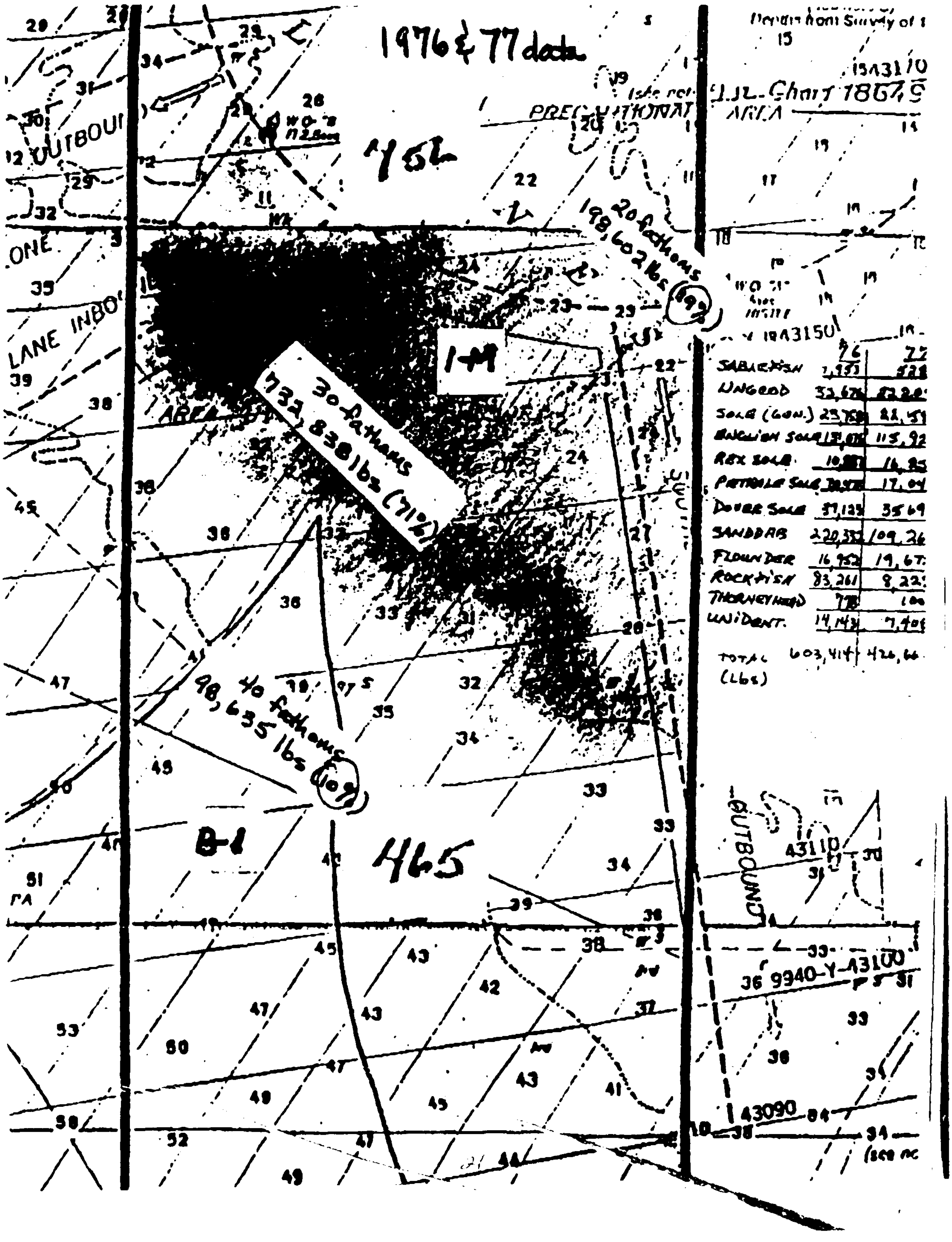

	76	77
SABLEFISH	7,953	528
LINGCOD	32,676	82,20[illegible]
SOLE (GEN.)	23,758	22,51[illegible]
ENGLISH SOLE	13,07[illegible]	115,92[illegible]
REX SOLE	10,[illegible]	16,85[illegible]
PETRALE SOLE	20,57[illegible]	17,04[illegible]
DOVER SOLE	57,128	3569
SANDDAB	220,352	109,26[illegible]
FLOUNDER	16,952	19,67[illegible]
ROCKFISH	83,261	8,22[illegible]
THORNYHEAD	778	10[illegible]
UNIDENT.	14,143	7,40[illegible]
TOTAL (Lbs)	603,414	426,6[illegible]

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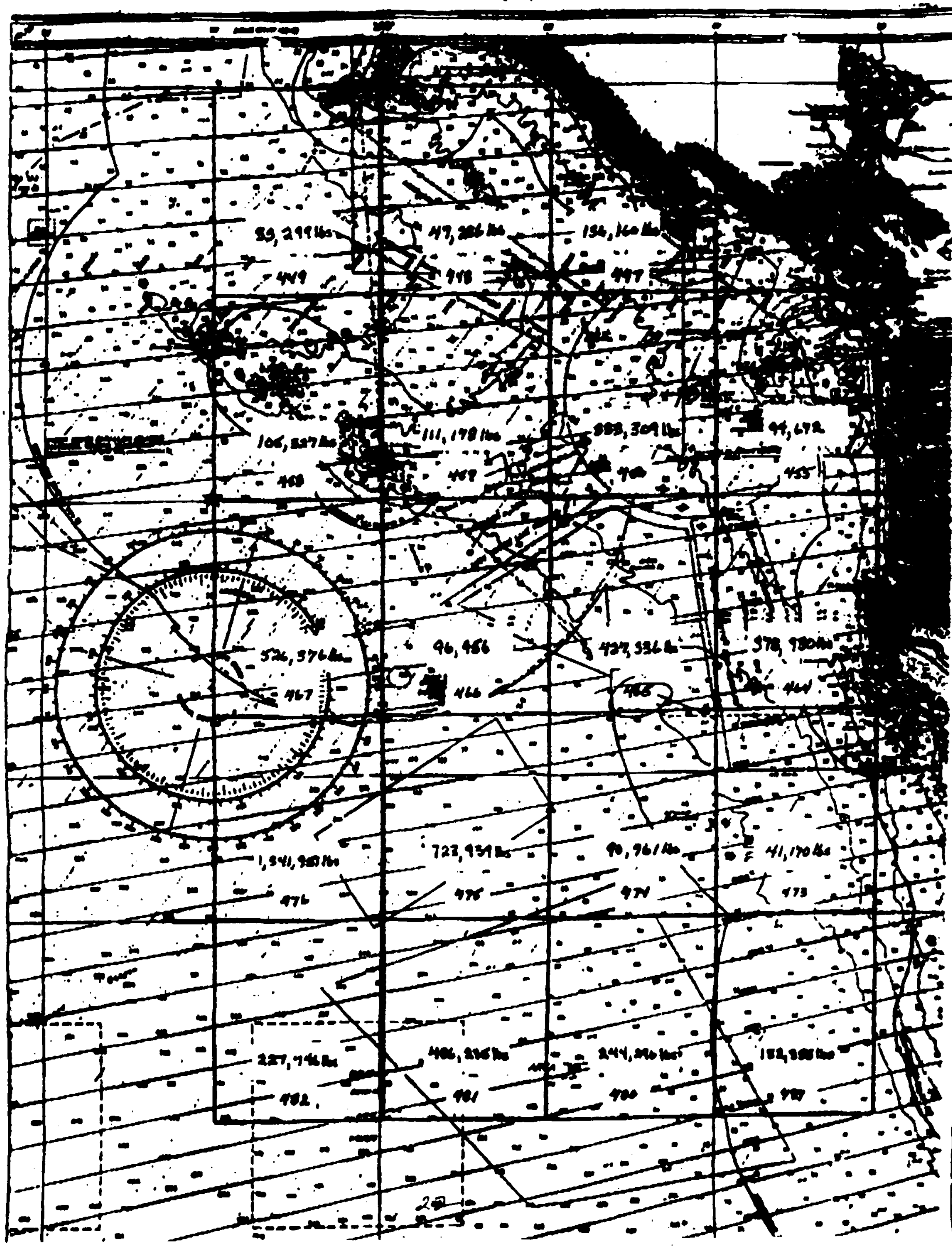
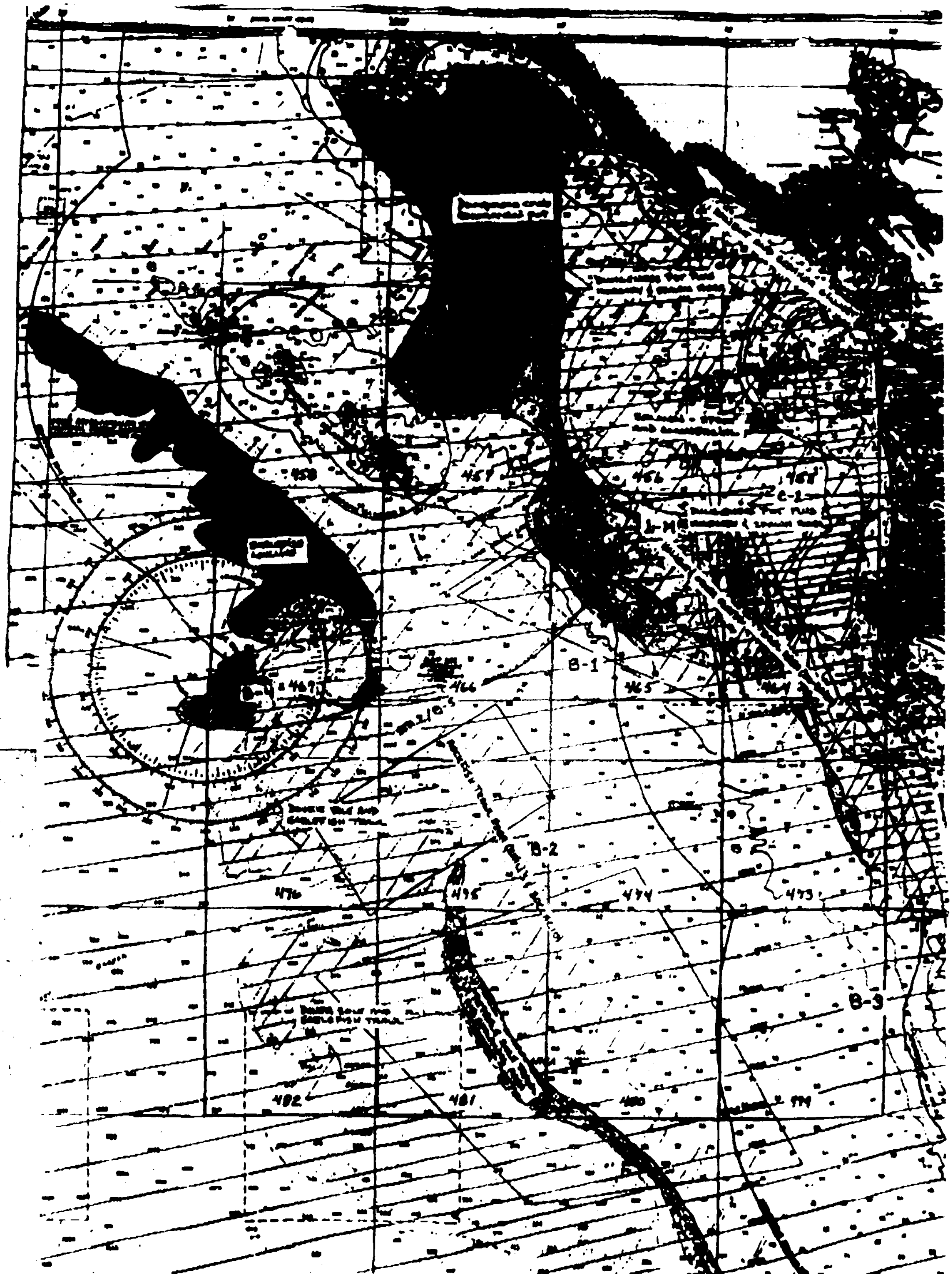
1977 Trawler Log Catch Block Data





B-1
B-2
B-3
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ATTACHMENT C
(for Panel Findings on Disposal Site)

Map Showing Site Locations

MAR 15 '88 14:51 FROM OMEP-WASH DC PAGE.009
MAR-15-'88 17:52 T-DREDGE DIV 272-1088 #059-23

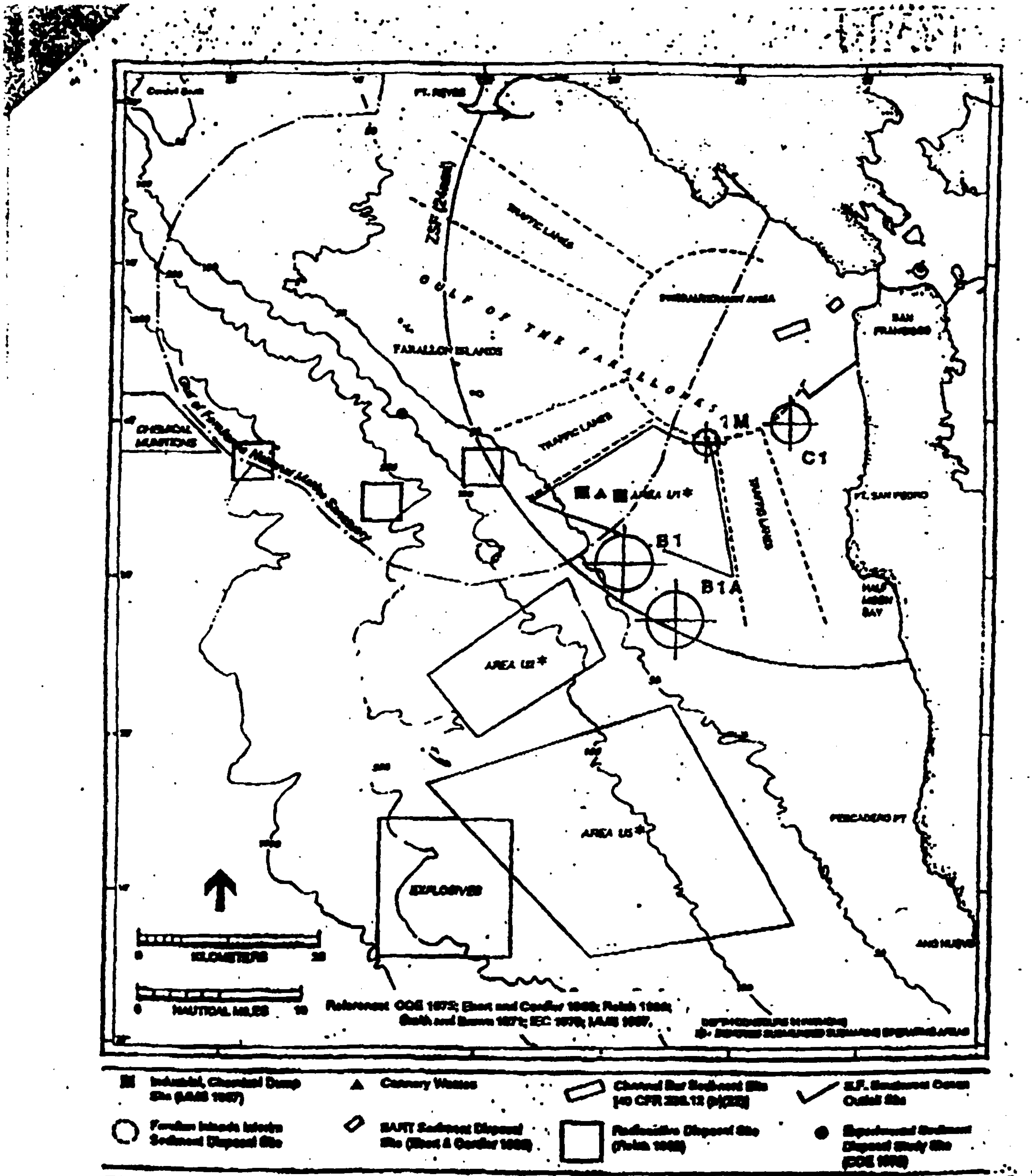

Figure 3-10. Locations of historical and active disposal sites.

DEPARTMENT OF THE ARMY

SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

NOTICE OF AVAILABILITY
DESIGN MEMORANDUM NUMBER 1 AND FINAL SUPPLEMENT NUMBER 1 [illegible]
ENVIRONMENTAL IMPACT STATEMENT
For OAKLAND INNER AND OUTER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS
Alameda County, California

\- - - - - -

The U.S. Army Corps of Engineers, San Francisco District is au[illegible] by the Water Resources Development Act of 1986 (99th Congress, 2nd [illegible], P.L. 99-662) to deepen the navigation channels at Oakland Outer and Oakland Inner Harbors. Approximately [illegible] million cubic yards of material [illegible] dredged; 6.5 million cubic yards of material will be removed from the [illegible] channels by the Corps of Engineers and an additional .5 million cubic [illegible] will be removed from the berthing areas by the local sponsor which [illegible] Oakland. Disposal of the dredged material will be at an ocean [illegible] site upon concurrence by the U.S. Environmental Protection Agency.

The environmental effects of authorized channel improvement [illegible] were thoroughly assessed in the [illegible] Environmental Impact Statements [illegible] Outer Harbor (1981) and the Inner Harbor (1985). The authorized Alcatraz disposal site was originally selected for disposal of dredged material from the Oakland projects. However, an existing accumulation of material at the Alcatraz site has created a situation where disposal of the Oakland Harbors [illegible] would reduce capacity of the site and would jeopardize its use for [illegible]enance dredging activities. The unavailability of the Alcatraz sit[illegible] required consideration of additional options for dredged material disposal [illegible] that has necessitated the preparation of this Supplement [illegible] EIS's.

A number of ocean disposal sites, as well as in-Bay and upland disposal sites have been examined. Ocean disposal site B1 (located approximately 30 nautical miles from the Golden Gate Bridge) has been sel[illegible] as the recommended site for disposal. The FSEIS fully describes [illegible]ative disposal plans considered and provides the rationale [illegible]tion.

The Corps of Engineers is [illegible]rculating the Final [illegible] [illegible]riate government agencies, interested organizations, and the publ[illegible]. All comments received on the Draft SEIS have been reviewed and [illegible] this Final report. Your written comments are requested so that [illegible] may be considered along with other relevant information in the d[illegible] making process. Please send your comments to the San Francisco District [illegible] Corps of Engineers at the address on the letterhead above by [illegible] April 1988.

Copies of the FSEIS are available for review at the main libraries in the cities of Oakland, Richmond, San Francisco, Berkeley, Alameda, and the Marin County Main Library, U.C. Berkeley Library, ABAG, and U.S. [illegible] (Region 9) Library. Single copies of the Final SEIS may be obtained by contacting Ms. Patricia Duff (415/974-0[illegible]) or Mr. Dennis Thuet (415/974-0380), of the Corps San Francisco District office.

Galen H. Yanagihara
Colonel, Corps of Engineers
[illegible]

March 18, [illegible]
Date

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT. CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

NOTICE OF INTENT TO USE OCEAN DISPOSAL SITE

(Section 103, Marine Protection, Research and Sanctuaries Act)

OAKLAND OUTER AND INNER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS

- - -

INTRODUCTION

This notice supplements the Public Notice of Availability of the Final Supplement (FSEIS) to the Final Environmental Impact Statements for the Oakland Outer and Oakland Inner Harbor Deep-Draft Navigation Channel Improvements, March 1988. The San Francisco District Engineer, under the authority contained in Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 is pursuing use of an ocean disposal site (ODS) offshore of San Francisco, California for the disposal of dredged material from the new work dredging of the Oakland Harbor deep-draft navigation channels (from an authorized -35 feet to -42 feet, MLLW). In accordance with 33 CFR Part 209.145(g), this supplemental notice announces the intended use of the ODS identified in the FSEIS.

WORK

Disposal of Dredged Material from the New Work Deepening and Maintenance Dredging of the Oakland Harbor Project as Authorized by P. L. 99-662, Water Resources Development Act of 1986.

WATERWAY:

San Francisco Bay, California, and Oakland Outer and Inner Harbor Channels, Alameda County, California

PROJECT LOCATION

Oakland Harbor, San Francisco Bay, California, and Offshore San Francisco, Pacific Ocean

Statement on the Status of State Water Quality Certification Under Section 401 of the Clean Water Act

The District Engineer has determined that a State water quality certificate (Section 401 of the Clean Water Act) will not be required for the Oakland Harbor channels deepening project, as described in this notice, since the ODS is outside the limits of State jurisdiction.

Statement on Cultural Resources

There are no known shipwrecks listed in or eligible for listing in the National Register of Historic Places in the Site B1 area. The site is within a region where the incidence of shipwrecks is low; thus impacts on cultural resources are unlikely. The State Historic Preservation Office has concurred in this determination (See Appendix D).

Statement on Endangered Species

Pursuant to Section 7 of the Endangered Species Act (16 U. S. C. 1531) and based on review of the threatened and endangered species listing, a determination of no effect has been made (FSEIS). The National Marine Fisheries Service has concurred in this determination.

Statement on the Determination of the Need for and/or Availability of an Environmental Impact Statement

The Draft SEIS was filed with EPA on 25 September 1987 (52 FR 36096) and was distributed to federal and State agencies, local officials, private interest groups, and other interested parties. The Final SEIS was furnished to EPA on March 17, 1988 for filing on March 25, 1988 and was distributed to federal and State agencies, local officials, private interest groups, and other interested parties including all those commenting on the Draft SEIS. A copy of of the FSEIS may be obtained from the U. S. Army Engineer District, San Francisco, 211 Main Street, San Francisco, California 94105-1905.

The decision whether to use the ODS for disposal of the Oakland project dredged material will be based on an evaluation of the probable impact including cumulative impacts of the activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which may reasonably be expected accrue from the activity must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the activity will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

The following additional information is furnished in accordance with Corps of Engineers regulations 33 CFR 209.145(g) and 33 CFR 337.1(a):

1. Description of the Action: The recommended plan for deep-draft navigation improvements to the Oakland Harbors would deepen the Outer and Inner Harbor channels from an authorized -35 feet [ft] MLLW to -42 ft MMLW. Approximately 3.4 miles [mi] of the Outer Harbor would be deepened and the turning basin would be relocated, deepened and enlarged. Approximately 4 mi of the Inner Harbor channel would be deepened between the Entrance channel reach and the "lay Street Pier. The channel would be widened at the Inner Harbor entrance, at project mile 3 and at the upper end of the project. A turning basin would also be provided.

The Oakland Harbors would be dredged by clamshell and an initial 500,000 cubic yards [yd^3] of the estimated 7.0 million yd^3 of material would be transported directly to ocean disposal site B1, which is located 30 nautical miles southwest of the Golden Gate Bridge. This disposal alternative represents a change from disposal at the Alcatraz site which was discussed in the Draft SEIS. The haul distance to the ocean disposal site from Oakland Harbor is approximately 37 nautical miles (nmi). A clamshell dredge would be used with the material loaded onto barges which would operate in tandem for transport to the selected ocean disposal site. The distance of the ocean disposal site from the dredge site would probably preclude use of a hopper dredge since effective hopper dredging time is reduced as the haul distance increases. With clamshell operations the dredging and hauling are accomplished by separate pieces of equipment. Dredging can be continuous if enough scows are used to transport material to the disposal site. The project would be constructed in two phases. During the first phase to lower the channel to -38 feet, MLLW, approximately 500,000 yd^3 of material suitable for ocean disposal would be dredged from Oakland Inner Harbor channel and placed at the disposal site. The second phase, to deepen the channel to 42-foot depth, would require ocean disposal of 3.3 million yd^3 of material from the Inner Harbor and 3.4 million yd^3 of material from the Outer Harbor. Further sediment testing will be performed to address potentially contaminated material for the 42-foot project.

2. Description of Disposal Area: The proposed ocean disposal site is located in the vicinity of Sites B1 and B1A. The specific description of the site is referred to as Site B1 in the supplemental environmental impact statement (See the Final SEIS, section 2.5.3. for a description of the proposed Ocean Disposal Site). It is located approximately 30 nautical miles southwest of the Golden Gate Bridge at a depth greater than 45 fathoms. The center and configuration of the site will be in accordance with the recommendations of EPA, Region 9. The site bottom is presumed to be comprised of unconsolidated sediment and slopes gently to the southwest. The proposed site has not been designated for use by the Administrator of EPA as provided by Section 102(c) of the Marine Protection, Research and Sanctuaries Act of 1972. A previously interim designated 100-fathom ocean disposal site is located within the

Gulf of the Farallones Marine Sanctuary and was removed from the interim list in February 1983. There is no designated ocean disposal site for the region and one is not likely to be designated prior to the scheduled project start; therefore, the Corps has selected this site for use under Section 103 of the Marine Protection, Research and Sanctuaries Act. The site has been evaluated pursuant to the general and specific criteria for site selection (40 CFR 228.5 and 40 CFR 228.6). Details of the evaluation and selection process are contained in the FSEIS which has been circulated for public review and comment. The site has no known historic use for dredged material disposal. The disposal of material at the ocean disposal site will occur between the months of April and November.

3. Description of Dredged Material:

The material from the Oakland Harbor channels is fine grained silt, sand and consolidated clay. Material to be disposed has been evaluated according to the evaluation criteria specified in the Ocean Dumping Regulations (40 CFR 227.13). With the exception of material from the Oakland Inner Harbor turning basin, the results of water column and bioassay tests indicate that the potential for release into the water column, or bioaccumulation in the marine environment is not significant (See Appendix A, FSEIS). However, additional testing has been recommended by a joint EPA and Corps of Engineers technical panel. This additional testing for the initial dredging and disposal to attain the 38-foot depth and for the total project dredging to 42 feet will be performed and provided to EPA, Region 9 for their concurrence. Elevated contaminant levels in the turning basin have been identified and can be treated as being unacceptable for open water disposal. However, disposal of the material from the initial deepening of the turning basin will not be placed in the aquatic environment although capping the potentially unsuitable material with the material found to be acceptable for open water disposal can be performed.

4. General Compatibility of the Material with the Disposal Site. The disposal of approximately 500,000 yd^3 of material at the proposed ocean site, Site B1, would not seriously reduce amenities or create hazards to fishing, navigation, shorelines, or beaches. Deposition is expected to occur upon dumping, and mounding will occur. The material is predominantly fine grained silt, sand and consolidated clay. Although benthic organisms will recolonize after cessation of disposal operations, long term effects are expected with alteration of bottom substrate and the establishment of bottom communities associated with the fine-grained substrate.

5. Need for Ocean Disposal. The proposed alternative for disposal of dredged material from the Oakland Harbor project is necessary for the completion of the authorized project. As originally planned, dredged material from the Oakland Harbor deepening project was to be disposed at the Alcatraz disposal site in San Francisco Bay. However, an existing accumulation of material at the Alcatraz site has created a situation where disposal of the Oakland Harbor material would greatly reduce

capacity of the site and would jeopardize it's use for maintenance dredging. Other in-Bay sites and other disposal manangement plans for the Alcatraz site, land disposal, and ocean disposal have all been examined as possible options. In-Bay disposal for the estimated 7.0 million yd^3 is not possible at this time due to the non-availability of other appropriate disposal sites, and there are no known land disposal sites which could accommodate estimated 7.0 million yd^3. Therefore, the authorized Oakland Harbor Project can only be accomplished thru ocean disposal.

6. Effects of Prohibition of Ocean Disposal. Disposal at the vicinity of Site B1 is proposed due to reasons stated in paragraph 5 above. If ocean disposal is prohibited, dredging of the authorized project could not take place.

7. Environmental Impacts of Ocean Disposal.

a. Esthetics. The disposal of the proposed dredged material at the vicinity of Site B1 would not result in an unacceptable esthetic nuisance. This is because the dredged material is much denser than sea water and will fall to the bottom upon disposal within the site; no visible turbid surface plume should last for more than a few minutes.

b. Recreational Resources. Although the area adjacent to and including Site B1 is used for recreation (e.g. sailing and sport fishing), disposal at the vicinity of Site B1 is not expected to have a long term impact on recreational values. There would be a minor temporary disturbance to recreation during disposal. Boats will have to avoid the disposal barges and the catch success of sport fishing will be affected during disposal. These effects will be limited to the immediate vicinity of the disposal area because the material is expected to settle rapidly. No change in economic values are expected because no long term effects to esthetics or sport fishing are expected.

c. Commercial Marine Resources. Disposal at the vicinity of Site B1 is not expected to have a long term impact on commercial marine resources (e.g. bottomfish, Dungeness crab, salmon) of nearby coastal areas, open ocean areas, or estuarine areas. This is because the disposed material is expected to settle to the bottom rapidly and therefore the primary impact of the disposal operation will be only a short-term and temporary increase in turbidity and disruption of organisms in the water column. The only long term impact expected is the modification of bottom substrate and associated benthic organisms. Long term changes are expected because a different community of benthic organisms will recolonize the newly deposited substrate after cessation of disposal activities.

d. Navigation. Commercial or recreational navigation will not be affected by disposal at the vicinity of Site B1 since the site is located outside of both the precautionary area and the submarine operating area. In addition, although mounding of material is expected to occur, use of the site will not impact the normal flow of incoming and outgoing vessel movements.

e. Mineral Resources. There is no known development of mineral resources in the area including and immediately adjacent to Site B1. There are no adverse impacts on existing uses. Initial coordination with the Minerals Management Service, U. S. Department of the Interior indicated that the proposed ODS is within a lease sale block (No. 463) with exploration potential. Mineral Management Service has, however, stated that disposal of dredged material at Site B1 would not conflict with planned lease sales.

f. Cultural Resources. Based on a record and literature search, there are no recorded cultural resources in the area including and adjacent to Site B1.

g. Water Quality. Sediments from the project have been tested in accordance with evaluation procedures for Section 103 as described in the Corps' Management Strategy and Decision Making Framework for dredged material. Approximately 270,000 yd^3 of fine-grained consolidated material within the turning basin at the terminus of the Inner Harbor Channel, known as the Schnitzer Steel and Todd Shipyard areas, is potentially unsuitable for unrestricted open water disposal because of potential contamination and bioaccumulation. The degree of contamination cannot be determined without time consuming additional biological testing, which would delay the start of the project construction for the 38-foot depth. The material will therefore be treated as if it were known to be contaminated. Although an appropriate control measure for potential water quality effects, referred to as capping, can be accomplished, the material from the initial dredging of material for the 38-foot depth will not be disposed at the open water ocean site. Capping of potentially unsuitable material will be considered and investigated in detail for the 42-foot project dredging and related disposal. Additional confirmatory testing will be performed to demonstrate the suitability of the material for ocean disposal for the 38-foot depth. Only material found to be acceptable for ocean disposal will be disposed at the designated site.

Based on the evaluation of test data, no water quality standards would be exceeded as a result of disposal of this material at the site. Hence, no unacceptable environmental effect would occur. The material is not expected to contain elevated concentrations of contaminants that can be released to the water column.

Chemical testing and the physical nature of the 5.7 million c.y. of non-contaminated dredged material indicate that there are no pollutants present in other than trace amounts which may have an adverse affect on humans directly or through food chain interactions. It is unlikely that pathogenic organisms which may cause a public health hazard either directly or through contamination of fisheries or shellfisheries are present in the proposed dredged material.

8. Determination and Finding. The District Engineer has reviewed the environmental documents for the authorized dredging of the Oakland Harbor project, and the Section 103 Ocean Disposal Evaluation Report. He has found that:

a. The proposed transportation of this dredged material for the purpose of disposing in ocean waters at the vicinity of Site B1 is not expected to unreasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological system, or economic potentialities.

b. No practicable alternative locations and methods of disposal or recycling are available which would have less adverse environmental impact or potential risk to the environment than ocean disposal at the vicinity of Site B1.

c. Prohibition of the use of Site B1 for disposal of the material would adversely affect the authorized Oakland Harbor navigation project, and would not allow the channels deepening to occur.

10. The proposed transportation of this dredged material for the purpose of dumping it in ocean waters has been evaluated. It has been determined that the proposed dumping will not unreasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological system, or economic potentialities. In making this determination, the criteria established by the Administrator, EPA, pursuant to Section 102(a) of the Marine Protection, Research, and Sanctuaries Act of 1972 was applied.

11. Please communicate the information herein to any person(s) known by you to be interested and who did not receive a copy of this notice. Comments on the proposed ocean disposal should be made in writing and mailed to the letterhead address (as found on the front page) and should be received within 15 days from the date of this notice. If you have any questions concerning this notice, please contact Mr. Rod Chisholm of my staff at (415) 974-0443).

Galen H Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

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Sediment Transport in-Bay
Site Selection - Ocean Disposal
Marine Protection Research and Sanctuaries Act.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
Supplement 1 to the Final Environmental Impact Statements for improving the Oakland Outer and Oakland Inner harbor channels. Channels would be widened in some areas and deepened to -42 feet MLLW. Sediment accumulation at the selected in-Bay disposal site adjacent to Alcatraz Island has required the consideration of other disposal sites and disposal alternatives. The selected plan would remove 6.5 million cubic yards of material from the Federal Channels. An additional .5 million cubic yards will be removed from the berthing areas by

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20. the local sponsor. Disposal of the dredged sediment will be at an ocean disposal site to be approved by the Environmental Protection Agency (EPA). The proposed site is located at a depth of 300' and is approximately 30 nautical miles from the Golden Gate Bridge (haul distance). The SEIS uses the criteria established by the Marine Protection Research and Sanctuaries Act in selecting the appropriate ocean disposal site for use under Section 103 of the Act.

OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS
DESIGN MEMORANDUM NUMBER 1, GENERAL DESIGN

ABSTRACT

The purpose of this report is to recommend for construction a plan of improvement for Oakland Harbor, in order to permit safe and more efficient navigation of container vessels. Construction of both the Oakland Outer Harbor Deepening Project and the Oakland Inner Harbor Deepening Project was authorized by the Water Resources Development Act of 1986, 99th Congress, 2nd Session, PL99-662.

The Port of Oakland is a complete transportation/distribution center with access to modern marine terminals specializing in containerized shipments. This world class port is the largest on San Francisco Bay, and one of the largest container ports on the west coast. The Port of Oakland consists of an Outer Harbor, a Middle Harbor and an Inner Harbor. The entrance channel to all three is known as the Bar Channel, and will be included in the Oakland Outer Harbor portion for purposes of this Design Memorandum.

Oakland Outer Harbor includes the Oakland Bar Channel, an Outer Harbor Entrance Channel, an Outer Harbor Turning Basin Reach, and the North End Reach. The recommended plan of improvement for Oakland Outer Harbor would deepen the existing 3.4-mile Outer Harbor Channel from 35 feet below MLLW to 42 feet below MLLW, and to relocate, deepen and enlarge the turning basin.

Oakland Inner Harbor is 8.5 miles long. It includes an Inner Harbor Entrance Reach, an Inner Harbor Reach, the Brooklyn Basin Reach, Park Street Reach and a Tidal Canal that connects with San Leandro Bay at Project Mile 8.5. The recommended plan of improvement for Oakland Inner Harbor would deepen approximately four miles of channel between the Entrance Channel reach and the Clay Street Pier from 35 feet below MLLW to 42 feet below MLLW. The channel would be widened at the entrance to Inner Harbor, at Mile 3 of the Inner Harbor Channel and at the upper project terminus. In addition, a turning basin would be provided.

The channel configuration for Oakland Outer and Inner Harbors was optimized by means of a navigation simulation study which modeled conditions including vessel size and maneuverability, winds, waves, currents, bottom and bank conditions, visibility and mode of operation.

Disposal of all new work dredged material is proposed to be at the Ocean Disposal Site B1 located 25 nautical miles outside the Golden Gate. Maintenance dredging will be disposed of at the existing Alcatraz site.

OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS
DESIGN MEMORANDUM NUMBER 1, GENERAL DESIGN

PERTINENT DATA

GENERAL DATA

Name	Oakland Outer and Inner Harbors, California
Authorization	Water Resources Development Act of 1986 Public Law 99-662
Location	Alameda County, California
Purpose	Navigation Improvements
Local Sponsor	Port of Oakland

NAVIGATION DATA

Location	East-Central San Francisco Bay near the Cities of Oakland and Alameda, California
Length	7.4 miles
Depth	42 feet below MLLW
Bottom Width	Varies
Side Slopes	1 Vertical to 3 Horizontal
Dredging	6.5 million cubic yards
Disposal	Ocean, Site B1

ECONOMIC DATA

Total Project First Cost	$54,000,000
Associated Costs	$4,481,000
Interest During Construction	$3,189,000
Operations and Maintenance	$753,000
Average Annual Cost	$6,158,000
Annual Benefits	$26,800,000
Net Benefits	$20,642,000
Benefit/Cost Ratio	4.4

OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS
DESIGN MEMORANDUM NUMBER 1, GENERAL DESIGN

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APPENDIX C Groundwater Monitoring Program *

APPENDIX D Computer-Aided Operations Research Facility Model Simulation (CAORF) *

* Appendicies held in District Office - available upon request

SECTION ONE

1. - INTRODUCTION

1.1. - Project Purpose

The Oakland Harbor channels are no longer adequate to efficiently and cost-effectively accommodate modern deep-draft vessels. The recommended project will improve navigational safety and efficiency of vessel movement in the harbors. The proposed construction will reduce the potential for vessel collisions and groundings, and will eliminate tidal delays by deepening and widening the channels.

1.2. - Project Location

The project area of Oakland Harbor is on the eastern shore of central San Francisco Bay, in Alameda County. The Outer Harbor Channel is immediately south of the San Francisco-Oakland Bay Bridge and the Inner Harbor Channel, locally called "The Estuary", is developed in the natural estuary of San Antonio Creek which is extended landward to Brooklyn Basin and separates the City of Alameda from the City of Oakland.

1.3. - Existing Navigation Improvements

In the Oakland Outer Harbor, existing improvements consist of a main waterfront deep-draft channel originating in the natural deepwater of the Central Bay just southeast of Yerba Buena Island, and extending across Oakland's bay frontage. The existing 5.5-kilometer (3.4-mile) long channel is maintained at a depth of -10.7 meters (35 feet) MLLW. The Oakland Bar Channel, 1.1-kilometer (0.7-mile) long and 240 meter (800 feet) wide, provides an approach to the junction of the Oakland Outer and Inner Harbor Channels. The Outer Harbor Channel continues for 1.6 kilometers (1 mile), varying from 240 to 180 meters (800 to 600 feet) in width, then "doglegs" for 0.2 kilometer (0.1 mile) at a width of 185 meters (600 feet). Next, the 1.3-kilometer (0.8-mile) channel configuration is used as a turning basin, followed by a 290 meter (950 foot) wide channel 0.8 kilometer (0.5 mile) long. After an abrupt right turn, the channel width tapers to 210 meters (700 feet). Approximately 580 meters (1,900 feet) of the Bay Area Rapid Transit (BART) Transbay Tube crosses under the northeasterly aligned 1.6-kilometer (1.0-mile) long Entrance Channel at a 29° angle to the channel alignment where the channel has narrowed to about 210 meters (700 feet) in width. See Figure 1.

Oakland Inner Harbor branches easterly from the entrance of the Outer Harbor, with the initial 0.8-kilometer (0.5-mile) length located in the City of San Francisco. It continues along the common boundary of the Cities of Oakland and Alameda, and consists essentially of an improved estuary channel 10.7 meters (35 feet) deep and 180 to 240 meters (600 to 300 feet) wide, and includes widened areas and a turning basin contiguous with the tidal channel at the eastern terminus of the Inner Harbor. These improvements,

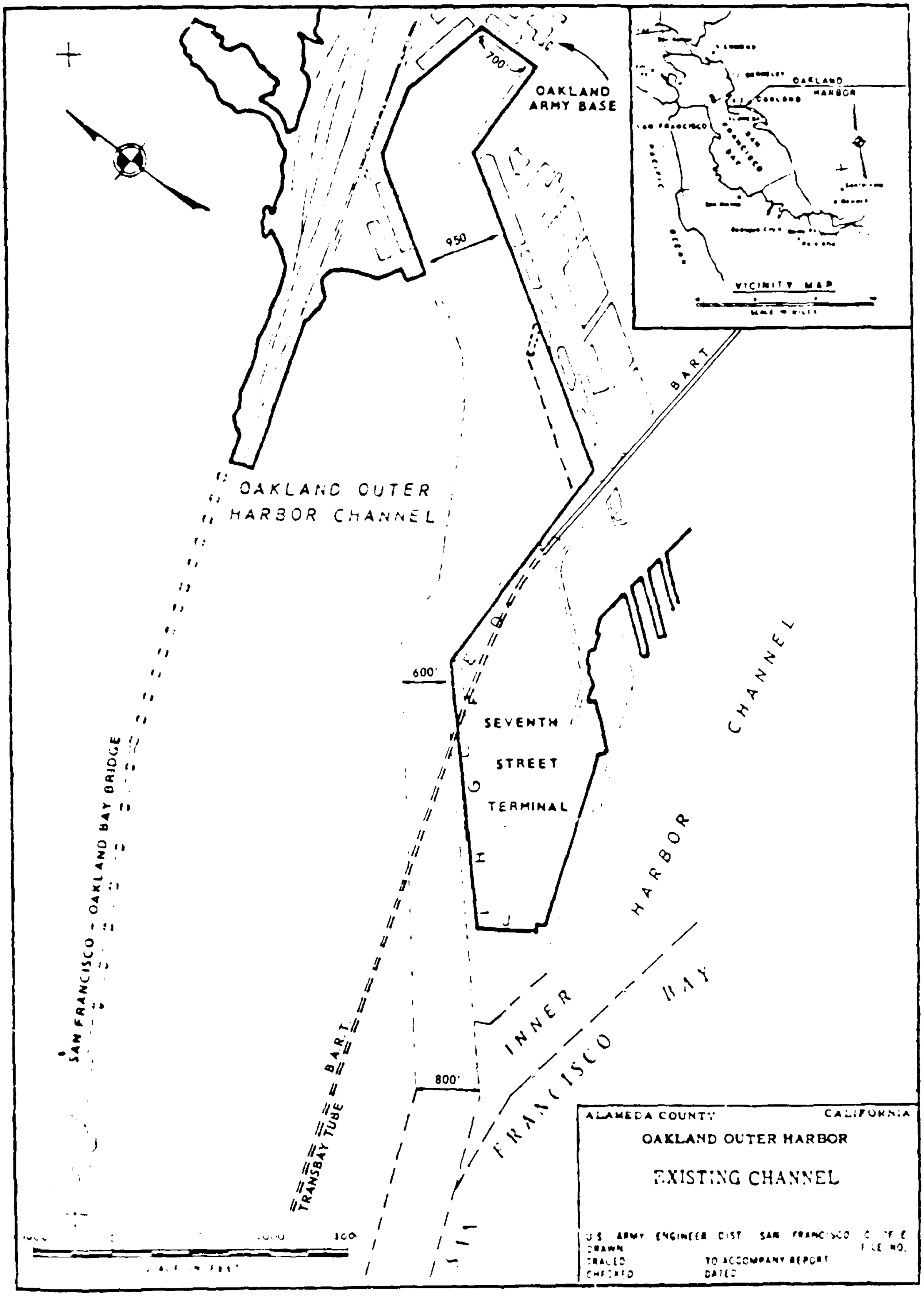

OAKLAND ARMY BASE
700'
950
OAKLAND HARBOR
VICINITY MAP
BART
OAKLAND OUTER HARBOR CHANNEL
600'
SEVENTH STREET TERMINAL
INNER HARBOR CHANNEL
SAN FRANCISCO - OAKLAND BAY BRIDGE
TRANSBAY TUBE B.A.R.T.
800'
SAN FRANCISCO BAY
ALAMEDA COUNTY
CALIFORNIA
OAKLAND OUTER HARBOR
EXISTING CHANNEL
U.S. ARMY ENGINEER DIST. SAN FRANCISCO
DRAWN
TRACED
CHECKED
TO ACCOMPANY REPORT
DATED
FILE NO.

FIGURE 1

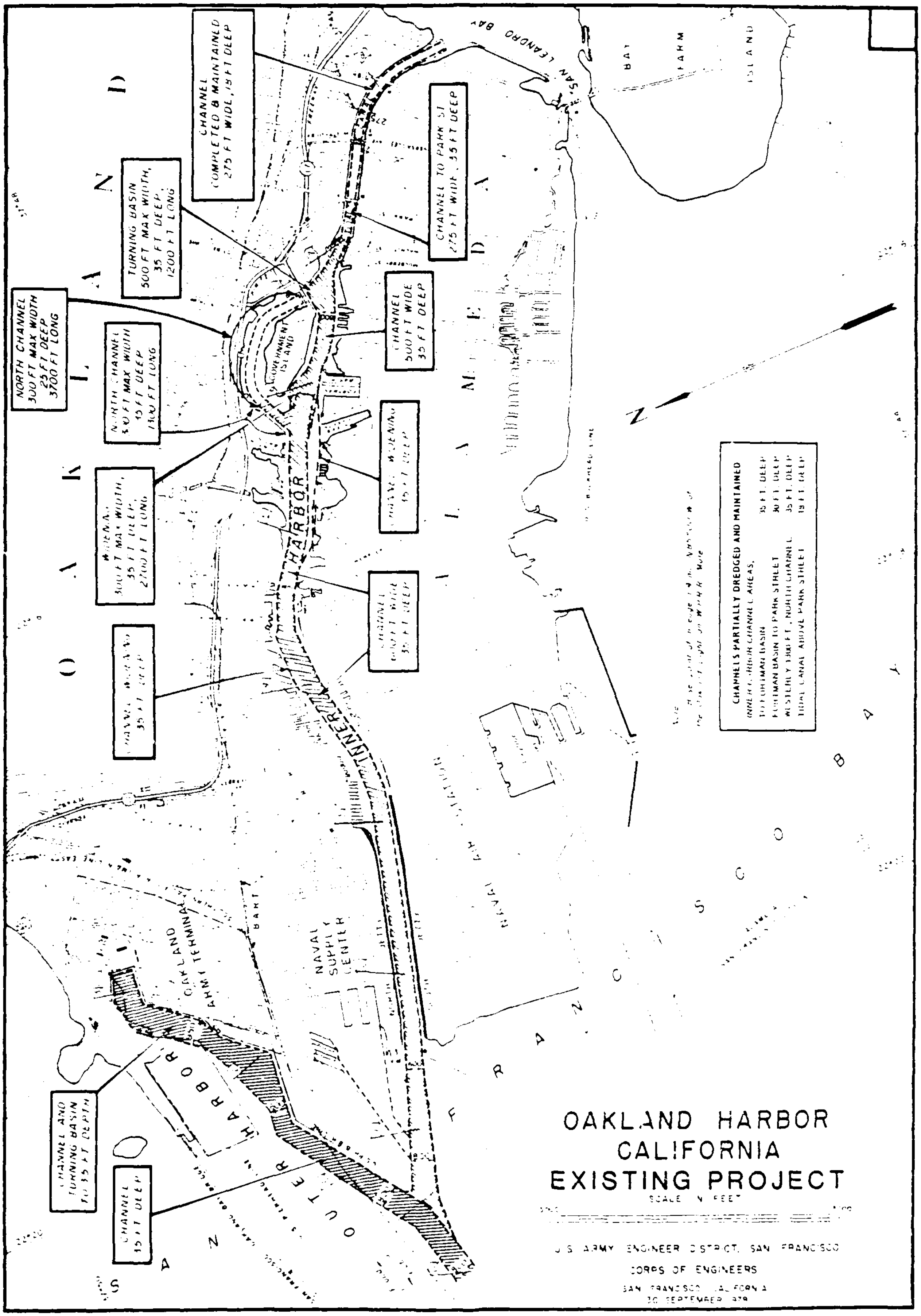

OAKLAND HARBOR
CALIFORNIA
EXISTING PROJECT
SCALE IN FEET
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA
CHANNEL COMPLETED & MAINTAINED 275 FT WIDE, 19 FT DEEP
CHANNEL TO PARK ST 275 FT WIDE, 35 FT DEEP
TURNING BASIN 500 FT MAX WIDTH, 35 FT DEEP, 1200 FT LONG
NORTH CHANNEL 300 FT MAX WIDTH 25 FT DEEP 3700 FT LONG
CHANNEL 500 FT WIDE 35 FT DEEP
GOVERNMENT ISLAND
CHANNEL 35 FT DEEP
CHANNELS PARTIALLY DREDGED AND MAINTAINED
INNER HARBOR
OUTER HARBOR
OAKLAND ARMY TERMINAL
NAVAL SUPPLY CENTER
CHANNEL AND TURNING BASIN TO 35 FT DEPTH
SAN FRANCISCO BAY
SAN LEANDRO BAY
BAY FARM ISLAND
OAKLAND
ALAMEDA

FIGURE 2

all maintained at an elevation of -10.7 meters (35 feet) MLLW, include parallel rockfill jetties about 2.4 kilometers (1.5 miles) long located near the waterway's entrance. A channel is also maintained at 7.6 meters (25 feet) deep and 90 meters (300 feet) wide around the north side of Government Island (Fig 2).

1.4. - Prior Reports

Oakland Inner Harbor California, Deep-Draft Navigation Final Feasibility Study and Environmental Impact Statement - April 1984. The Final Feasibility Study for Oakland Inner Harbor was prepared under the direction of a Congressional Resolution dated May 10, 1977. The draft Feasibility Report recommended an optimum depth for the Inner Harbor of 13.1 meters (43 feet) below Mean Lower Low Water (MLLW). Revisions of the benefits by the Board of Engineer for Rivers and Harbors (BERH) indicated an optimum depth of 12.8 meters (42 feet) and inclusion of the turning basin.

Oakland Outer Harbor California, Deep-Draft Navigation Improvements - Feasibility Report - February 1977. The Feasibility Report was prepared under direction of the House Resolution dated 14 June 1973. The study was undertaken as an interim report under the San Francisco Bay In-Depth Study. The Feasibility Report determined that it was in the best interest of the Federal Government to provide a wider channel and turning basin area deepened to -12.8 meters (42 feet) MLLW.

Oakland Inner Harbor - General Design Memorandum No. 1 - October 1970, Revised December 1972. Oakland Inner Harbor has been developed over many years. The first improvements were authorized in 1874. The present channel was constructed in accordance with the 1972 General Design Memorandum. This provided for 11.1 kilometers (6.9 miles) of Inner Harbor Channel to a depth of -10.7 meters (35 feet).

SECTION TWO

2. - PROJECT AUTHORIZATION AND RECOMMENDED PLAN

2.1. - Project Authorization

Construction of both the Oakland Outer and Inner Harbor Deepening Projects was authorized by the Water Resources Development Act of 1986, 99th Congress, 2nd Session, Public Law 99-662.

2.2. - Authorized Plan

The plan authorized for Oakland Outer Harbor in 1986 called for widening and deepening of the existing 5.5-kilometer (3.4-mile) Oakland Outer Harbor Channel to -12.8 meter (42 feet) MLLW. The width of the Outer Harbor Entrance Channel would vary from 340 to 240 meters (1,100 to 800 feet). The next 1.4 kilometers (0.9 mile) would be widened to eliminate the "dogleg" and to form a turning basin 550 meters (1,800 feet) in diameter. The next 0.8 kilometers (0.5 mile) would be reduced to 260 meters (850 feet) in width, and the 0.5 kilometer (0.3 mile) long sharp right turn would be tapered to 180 meters (600 feet) because of channel constrictions. This plan would require the dredging of approximately 3.75 million cubic meters (4.9 million cubic yards) of bottom sediments, which would be disposed of at the Alcatraz Site SF-11 during the ebb tide cycle. Maintenance of the channel would result in the dredging and disposal of an additional 67,000 cubic meters (88,000 cubic yards) of material annually. Channel widening would require an extension of the stone blanket protection over the Bay Area Rapid Transit (BART) Transbay Tube, and the relocation of six anode trays and support platforms.

The authorized plan for Oakland Inner Harbor called for deepening the existing navigational channels from -10.7 meters (35 feet) to -12.8 meters (42 feet) MLLW, between the Oakland Inner Harbor Entrance Channel and the Clay Street Pier at Project Mile 4.4. The channel width would taper from 360 meters (1,175 feet) to 160 meters (525 feet) at the Entrance Channel, and then narrow to 140 meters (460 feet) between the rubblemound jetties. Bend widening at Project Mile 3.0 (4.8 kilometers) would provide the minimum clearance for a vessel with an overall length of 290 meters (960 feet) to safely navigate a 27^{o} turning angle. The widened area varies from 270 to 180 meters (900 to 600 feet). A 370-meter (1,200-foot) diameter turning basin would be provided between the American Presidents Lines and the Charles P. Howard terminals. The upper end of the project, adjacent to the Charles Howard terminal, would be widened ranging from 220 to 300 meters (700 to 1,000 feet). This plan would require the dredging and disposal of 3.36 million cubic meters (4.4 million cubic yards) of material, which would be disposed of at Alcatraz. The annual maintenance with this project would require the dredging and disposal of an additional 54,000 cubic meters (70,000 cubic yards) of material.

2.3. - Recommended Plan

For the Oakland Outer Harbor, the recommended plan of improvement calls for deepening the harbor from -10.7 meters (35 feet) to -12.8 meters (42 feet) MLLW and widening the south side of the Bar Channel from 240 to 270 meters (800 feet to 900 feet). The apex of the bend between the Bar and Entrance Channels will be removed, and the north side of the channel widened. The knoll adjacent to the end of the Seventh Street Complex is recommended for removal. The "dogleg" at the northeastern end of the Seventh Street Terminal will be eliminated, and the turning basin will be relocated and enlarged by widening the north side of the channel opposite berths 32 and 33 (formerly D and E) in the Matson Terminal near Project Mile 2.0 (3.2 kilometers). At Project Mile 2.25 (3.6 kilometers), approximately 580 meters (1,900 feet) of channel will be widened 110 meters (350 feet) to accommodate the existing wharf. In the final 1,400 meters (4,600 feet) of the project, the berths will be widened to 38.1 meters (125 feet), which will narrow the channel to a width which varies from 260 to 180 meters (850 to 600 feet). See Plates 1 and 2.

Modifications to the BART appurtenances will not be necessary due to channel realignment that resulted from the navigation simulation study conducted by CAORF (see Section 3.11 and Appendix D). Channel widening called for in the Feasibility Report required four anode array platforms to be relocated, along with their cathodic protection cables which connect to the BART Transbay Tube. The simulation study was performed to provide the minimum dimensions required for safe and efficient ship transit through the Bar and Outer Harbor entrance Channels. The Recommended Plan widens the Entrance Channel west of the BART tube. The only BART facilities that would be affected by this project are anode cables which cross the channel. These cables are deeper than -16.8 meters (55 feet) MLLW. The Transbay Tube is over 18.3 meters (60 feet) below MLLW. Coordination with BART officials has been made and the BART District is in agreement that the modifications will not be required.

For the Oakland Inner Harbor, the recommended plan of improvement specifies the deepening of the Inner Harbor channel from -10.7 meters (35 feet) to -12.8 meters (42 feet) MLLW between the Entrance Channel reach and the Clay Street Pier, a distance of approximately 6.4 kilometers (4 miles). (Refer to Plates 3 thru 6). The recommended plan also includes widening within the Entrance Channel Reach as follows:

The northern channel boundary will be moved northward to coincide with the U.S. Pierhead and Bulkhead line off the end of the Seventh Street Terminal, and then taper in to meet the existing channel limit at approximate Project Mile 1.0 (1.6 kilometers).

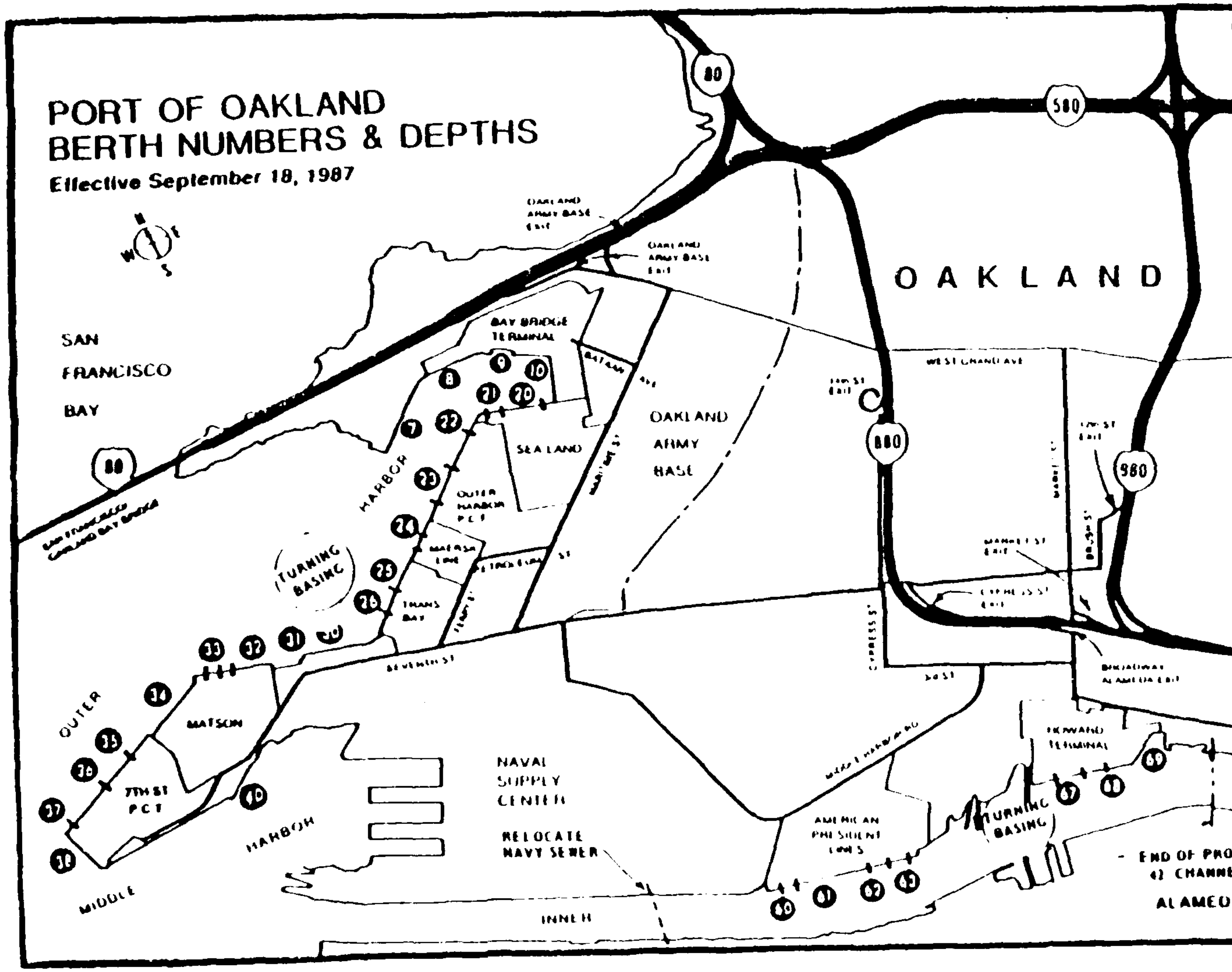
The southern channel boundary will be shifted south by 61.0 meters (200 feet) at the turn into the Entrance Reach, and by 45.7 meters (150 feet) beyond the turn. East of the mouth of the Middle Harbor, the widened channel will taper in to meet the existing channel limit at approximate Project Mile 1.0 (1.6 kilometers).

The modifications described above result in a channel width of 360 meters (1,180 feet) off the southeast corner of the Seventh Street Terminal which transitions to 220 meters (720 feet) at approximately Project Mile 1.0 (1.6 kilometers). The channel then gradually narrows to a minimum width of 130 meters (435 feet) between the stone jetties near Project Mile 1.6 (2.6 kilometers), then widens to 140 meters (460 feet), and flares out to 175 meters (575 feet) at the beginning of the channel bend opposite the terminals for the American Presidents Lines. This channel bend will be widened to a maximum width of 270 meters (900 feet), and then taper to 180 meters (600 feet) to meet the existing width of the channel. Additional project features include providing a 370-meter (1,200-foot) diameter turning basin between the Schnitzer Steel Products Company and the Alameda Gateway Properties, and providing a 300-meter (1,000-foot) radius fan-shaped area adjacent to the eastern end of the Charles P. Howard Terminal. The project reach will terminate approximately 170 meters (550 feet) west of the Webster Street tube.

The existing U.S. Navy Sanitary Sewer Export Main, a 40.6-centimeter (16-inch) diameter cast iron pipe located under the Inner Harbor Channel at approximate Project Mile 2.5 (4.0 kilometers), must be lowered to accommodate the proposed channel improvements. Dredging of the ship channel necessitates relocation of the existing sewer main from an invert elevation of -13.7 meters (45 feet) MLLW to a depth approximately 3.7 meters (12 feet) lower.

Approximately 5.0 million cubic meters (6.5 million cubic yards) of material will be dredged from the Federal portion of Oakland Harbor Channel. Dredged material will be disposed of at Site B1, an ocean disposal site located approximately 46.0 kilometers (24.9 nautical miles) outside the Golden Gate.

The original dredging concept was to use hydraulic cutterhead dredges only for both Inner and Outer Harbors. The Outer Harbor dredged spoils were restricted to ebb tide disposal only. The present dredging concept calls for dredging with clamshell and disposal at the designated ocean site B1.



BERTH DIRECTORY

BERTH NO Old	BERTH NO New	DEPTH, FT BELOW MLLW Maintained	DEPTH, FT BELOW MLLW Proposed	TERMINAL
OUTER HBR.				
7	7	37	42	Oakland Army Base
11–12	8–9	37	42	Bay Bridge
10	10	36	36	Bay Bridge
8–9	20–	42	42	Sea–Land
5–6	22–23	42	42	Outer Hbr. P.C.T
4	24	42	42	Maersk Line
2–3	25–26	37	42	Transbay
–	30–31	–	42	Carnation
D–F	32–34	37	42	Matson
6	35	37	42	7th St. P.C.T.
H–J	36–38	40	42	
INNER HBR				
A–B	60–61	37	42	American President Lines
C–D	62–63	40	42	
H–I	67–68	42	42	C P Howard
J	69	35	35	
1–3	82–84	35	35	9th Ave (Channel Remains @ 35')

MAP FURNISHED BY PORT OF OAKLAND

FIGURE 3

SECTION THREE

3. - BASIS OF DESIGN

3.1. - Geology

Oakland Harbor is situated in a natural depression or drainage area in the broad, low-lying plain bordering the eastern shores of San Francisco Bay. Ground level elevation in the vicinity of the harbor ranges from sea level to approximately 9.1 meters (30 feet). The bedrock beneath the Bay plain, consisting of Franciscan sandstone and shale, forms a trough-like depression which cants eastward. The Oakland Harbors have been excavated into late Pleistocene and Recent sediments of eastern San Francisco Bay. Recent sediments deposited in the bay consist of very soft to soft silty clays and loose silty and clayey sands, and are commonly referred to as Younger Bay Mud, or just Bay Mud. The Younger Bay Mud varies in thickness from a few meters along the shoreline to greater than 15.2 meters (50 feet) at the entrance to the Oakland Outer Harbor. The Younger Bay Mud has been undergoing deposition in the Oakland area for approximately the last 6,000 to 8,000 years. Underlying the Younger Bay Mud is the dense to very dense, fine grained Merritt Sand, probably a beach sand, and stiffer clays with interbedded sands of the Posey Formation (upper part of the Older Bay Mud). Both the Merritt Sand and the upper part of the Older Bay Mud are late Pleistocene deposts. The stiff clays of the upper part of the Older Bay Mud are considered to be overconsolidated and, therefore, may have either had a greater thickness of sediment overlaying them or, more probably, were exposed to consolidation by desiccation during a lower sea level stand. A lower stand of sea level would have been caused by a glacial ice sheet advance during the Wisconsin glacial period. The Older Bay Mud under the Oakland Harbor area is considerably thicker than the Younger Bay Mud. Bedrock is as deep as -132 meters (433 feet) MLLW, and may be deeper under the Oakland Outer Harbor.

The Older Bay Mud consists of the Alameda, San Antonio and Posey formations. The Alameda formation is Middle Pleistocene in age and is a thick section of stiff to very stiff alluvial and marine-estuarine sediments with gravelly and sandy layers and lenses. The San Antonio formation is Upper Pleistocene in age and consists of very stiff to stiff marine-estuarine clays, probably deposited during the Sangamon interglacial period, 70,000 to 100,000 years ago. Overlying the San Antonio formation is the Posey formation which consists of stiff clays with sand layers and lenses. There appears to be a sand layer near its base.

3.2. - Seismicity

Oakland Harbor lies on the eastern side of the San Francisco Bay region, an area of high seismic activity. The Oakland Outer Harbor project lies 7.2 to 11.3 kilometers (4.5 to 7.0 miles) west of the Hayward Fault and 18.5 to 22.5 kilometers (11.5 to 14 miles) east of the San Andreas Fault which traverses the San Francisco Peninsula. Both faults have a right lateral, strike-slip sense of movement and trend in a general north/northwest direction. Because of the low strength of the Bay mud and comparably steep cut slopes in the existing harbor area, it is assumed that local slope failures will occur during moderate to strong earthquakes.

3.3. - Soils

Subsurface soils explorations were performed to classify the soils within the immediate project area. The soils encountered were soft, silty clays and loose, silty and clayey sands of the Younger Bay Muds, stiff, sandy to silty clays of the Older Bay Mud with interbeds of medium dense to dense, silty and clayey sands, and dense to very dense, fine-grained Merritt Sand. The Merritt Sand, generally a silty sand, can vary locally to a poorly graded, fine sand or to a clayey sand. See Appendix B.

3.4. - Side Slopes

Oakland Outer Harbor: The undrained shear strength of the soft, plastic clays was taken as 1,500 kgs/sq. meter (300 psf) based on laboratory test results. The strength (angle of internal friction) for sands and slightly plastic silty sands was chosen as 32°, with a shear strength (cohesion value) of 240 kgs./sq. meter (50 psf). Slope stability analyses were run using the Modified Swedish Arc Method and side slopes of three horizontal to one vertical. The design slope in soft, plastic clays has a static factor of safety of 2.48, but is unstable under dynamic conditions with a seismic coefficient of 0.15. The limiting value for maintaining a safety factor of approximately 1.14 for the slope in soft, plastic clays is a seismic coefficient of 0.08. The design slope in sands and slightly plastic, silty sands has a static factor of safety of 3.22 and is stable under dynamic conditions with a seismic coefficient of 0.15. A seismic coefficient of 0.24 is the limiting value for maintaining a safety factor of approximately 1.13 for the slope in sands and slightly plastic, silty sands. A major seismic event in the project vicinity could be expected to cause slight sloughing of the side slopes in the sands.

. Oakland Inner Harbor: Slope stability analyses were performed for the existing riprap slopes within the entrance channel, for the slope at the Naval Air Station Fuel Pier and for the 1V:3H design slope of the channel deepening along the toe of the existing slopes. These sites are considered critical areas due to the lateral restrictions within the channel boundary limits. A 1V:3H design slope is selected because of these restrictions and the need for some stability under minor seismic conditions. The undrained shear strength of the soft, plastic clays and silts is taken as 1,500 kgs./sq. meter (300 psf), based on laboratory test results. The strength (angle of internal friction) for nonplastic silts and sands is chosen as 31° with no cohesion. Slope stability analyses were performed using the Modifed Swedish Arc Method. The design slope in the soft, plastic clays and silts has a static factor of safety of 1.86, but is unstable under dynamic conditions with a seismic coefficient of 0.15. The limiting factor for maintaining a safety factor of 1.13 is a seismic coefficient of 0.07. The design slope in nonplastic silts and sands has a static factor of safety of 1.31, but is unstable under dynamic conditions with a seismic coefficient of 0.15. The limiting factor for maintaining a safety factor of 1.04 in the slopes of nonplastic silts and sands is a seismic coefficient of 0.04. The results of the analysis for the existing slope provides values equal to or slightly greater than the values of the design slope. The factor of safety at other locations within the project is expected to be equal to or greater than the values given above.

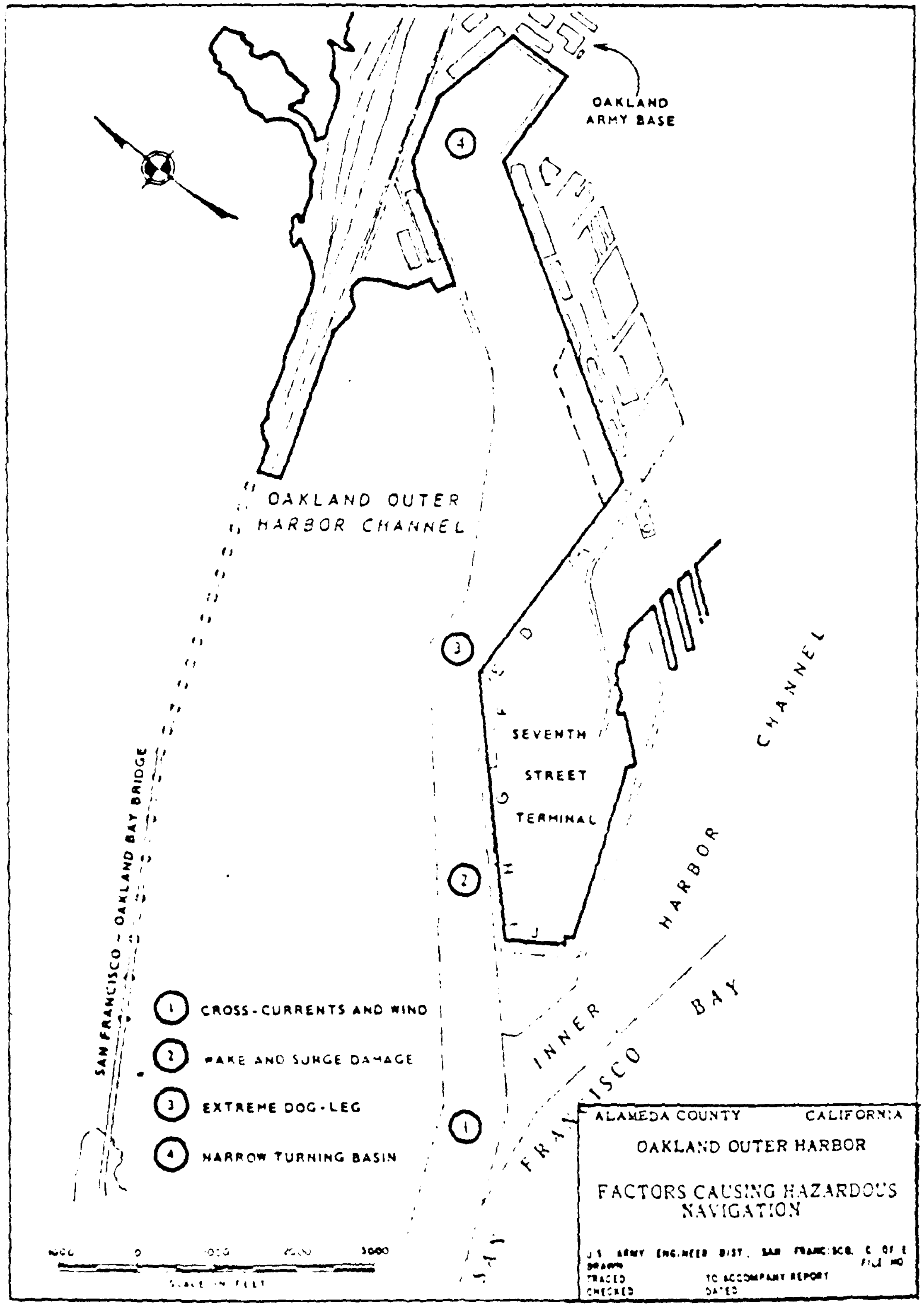
3.5. - Cross Winds and Currents.

The maneuverability of vessels in a navigation channel is affected by the external forces exerted by currents. The magnitude and direction of these forces dictate to what degree consideration should be given to currents in the design of a navigation channel. When the currents are generated parallel to the direction of vessel motion, the momentum of the vessel will be increased or decreased, depending on the direction of current relative to the vessel. In such cases, the length of the navigation channel and the distance required to stop a vessel are crucial. When the currents are perpendicular to the direction of motion, the vessels tend to move laterally in the direction of the current. In this case, vessels must enter the channel on the up-current side to avoid being grounded on the down-current bank of the channel. The currents at the fork of the Outer and Inner Harbor Channels run basically perpendicular to the channel. Ebb currents run in a northwest direction with maximum velocities exceeding two knots, and tend to set ships toward the northern bank of the channel. Flood currents run in a southeasterly direction and are generally not as critical as ebb currents, due to their lower velocities.

Winds also exert an external force on vessels operating in the channel, and tend to set a ship in the downwind direction. Winds at Oakland Harbor are predominantly from the west-southwest through west-northwest. These adverse conditions are as shown on Fig. 4.

3.6. - Physical Constraints

There are no constraints to widening the Oakland Bar Channel. The Outer Harbor Entrance Channel is unconfined on the north side, except for some BART anode cables and array platforms located just outside of the existing channel slope near the southerly end of the Seventh Street Terminal. Berthing piers impose widening restrictions on the right side at the Outer Harbor Entrance Channel (Seventh Street Terminal), at the "dogleg" and at the turning basin. The remaining 1.3-kilometer (0.8-mile) reach is lined on both sides with piers parallel to the channel. The width of this terminal portion of the channel is the distance between the outside edges of the berthing areas. The Local Sponsor plans to widen the berthing areas to 38.1 meters (125 feet), which will reduce the channel width by 30.5 meters (100 feet). This area is restricted to one-way traffic, and ships entering this area must turn with tug assistance, when vessel length allows, or back down to the turning basin.



OAKLAND ARMY BASE
OAKLAND OUTER HARBOR CHANNEL
SEVENTH STREET TERMINAL
INNER HARBOR CHANNEL
SAN FRANCISCO BAY
SAN FRANCISCO - OAKLAND BAY BRIDGE
1 CROSS-CURRENTS AND WIND
2 WAKE AND SURGE DAMAGE
3 EXTREME DOG-LEG
4 NARROW TURNING BASIN
ALAMEDA COUNTY CALIFORNIA
OAKLAND OUTER HARBOR
FACTORS CAUSING HAZARDOUS NAVIGATION
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C. OF E.

FIGURE 4

In Oakland Inner Harbor, existing piers, wharves and riprapped banks impose constraints to channel widening at many locations. The channel is severely confined between Project Miles 1.5 and 3.0 (2.4 and 4.8 kilometers) due to containment between two historical rubble jetties which form the channel banks. The presently authorized width of the channel to Fortmann Basin is 180 meters (600 feet). A channel bottom width of less than 180 meters (600 feet) exists at certain constricted locations along the channel with the current depth of -10.7 meters (35 feet) MLLW. The minimum channel width occurs between the riprapped banks near Project Mile 1.6 (2.6 kilometers). Deepening the channel within the confines of the rock slopes will require a further reduction in channel bottom width to prevent undermining of the existing banks.

3.7. - Description of Design Vessels

The vessels for which the Oakland Harbor Channels were sized are Third Generation Panamax container ships. The Panamax is built in two versions: the first has a 32.0-meter (105-foot) beam, an overall length of 260 meters (860 feet) and a capacity of 3,000 TEU's (twenty-foot equivalent units; a container with dimensions of 6.1 m x 2.4 m x 2.6 m [20' x 8' x 8-1/2']); the second has a 32.0-meter (105-foot) beam, an overall length of 290 meter (950 feet) and a capacity of 4,000 TEU's. Maximum velocities for the two Panamax versions are 42.6 and 31.5 kilometers/hr. (23 and 17 knots), respectively.

The design vessels used for model simulation was the Econ containership. Length over all (LOA) was 290 meters (950 feet) with a beam of 32.3 meters (106 feet) and a 11.0 meter (36 foot) draft. The baseline vessel used for verifying the present conditions was the SL-18 (220 m [723'] LOA, 29 m [95'] beam and 9.7 m [32'] draft). Dimensions of these ships are as follows:

SHIP TYPE	BEAM (m)	BEAM (ft)	OVERALL LENGTH (m)	OVERALL LENGTH (ft)	LOADED DRAFT (m)	LOADED DRAFT (ft)	SPEED (km/hr)	SPEED (kn)
Panamax - 1	32	105	262	860	10	33	43	23
Panamax - 2	32	105	290	950	12	38	32	17
SL-18	29	95	220	723	10	32	37	20
Econo-ship	32	106	290	950	11	36	33	18

3.8. - Navigation Requirements

The Oakland Bar Channel, an unconfined, 240-meter (800-foot) wide channel which provides ingress and egress for ships operating between San Francisco Bay and the Oakland Harbor Channels, is subject to severe cross winds and currents which make maneuvering the larger vessels very difficult. In response to the concerns of bar pilots, widening of the Bar Channel was investigated as part of the navigation simulation studies conducted for Oakland Harbors See Fig. 6.

Strong cross-currents and winds at the fork of the Inner and Outer Harbors, combined with the knoll adjacent to the end of the

Seventh Street Terminal and the short radius of the turn into the Inner Harbor, make navigation in this area difficult. Inbound vessels operating during strong ebb tides risk running aground in the shallow water off the end of the Seventh Street Terminal.

Another area of concern is the Inner Harbor channel bend at Project Mile 3.0 (4.8 kilometers). Panamax vessels of 260 meter (860 foot) length are presently turned in front of the American Presidents Lines Terminal. Because of the restricted width of the channel, this maneuver requires a highly skilled pilot and ideal conditions. The construction of a turning basin will be required to accommodate the 290-meter (950-foot) design vessels, since they will not be able to turn within the confines of the existing channel.

3.9. - One-Way Design Considerations

Upstream from the 1.1-kilometer (0.7-mile) long Oakland Bar Channel, the 1.6-kilometer (1.0-mile) long Outer Harbor Entrance Channel is constrained to one-way ship passage when wind and current conditions warrant. In addition, there are width limitations of 180 meters (600 feet) at its northeastern end and 160 meters (530 feet) at the adjoining 0.2-kilometer (0.1-mile) long "dogleg" which make maneuvering the large container ships an extremely difficult task. Following the 1.3-kilometer (0.8-mile) long widened area which serves as a turning basin, the remaining 1.3 kilometer (0.8-mile) channel is lined on both sides with piers parallel to the channel. Widening the berthing areas to 38 meters (125 feet) will reduce the channel width by 30.5 meters (100 feet). This area is restricted to one-way traffic, and ships entering this area must turn with tug assistance, when vessel length allows, or back down to the limited turning basin.

The Bar pilots assert that they will not operate in a two-way mode in the Bar Channel, due to severe cross-currents in this reach. Navigation in these currents requires the use of various strategies, and differing ship paths, for inbound and outbound transits to and from the Harbors, dependent on the tidal stage. The only reach that is available, at least some of the time, for two-way operations is the Entrance Channel. Considering that a transit of this 1.6-kilometer (1.0-mile) long reach takes only ten minutes, there is a BART anode tray platform about midway along the northern edge of this reach that would need to be relocated if the channel were widened, and that ships are required to pass the vessels docked near the end of the Seventh Street Terminal as far away and as slowly as possible so as not to damage them, it is unjustified to operate the Entrance Channel in a two-way mode.

Statistics in "Waterborne Commerce of the United States", Part 4: Waterways and Harbors, Pacific Coast, Alaska and Hawaii, by the Water Resources Support Center indicated that a total of 10,509 inbound and outbound vessel trips were made in 1984 in Oakland Harbor. This amounts to 15 ships per day in each direction in the Bar Channel. The probable distribution of this traffic, each way, is seven ships per day to Outer Harbor and eight to Inner Harbor. Based on this assumption, ships will enter the Bar Channel every 48 minutes and the Entrance Channel every hour and 43 minutes. Since traffic to Oakland is predominantly liner service which adheres to strict arrival and departure schedules, there is little likelihood of random vessel trips causing traffic congestion.

One-way traffic operations could cause occasional delays of 10 to 15 minutes if two ships approached the channel concurrently from opposite directions. However, as the result of a survey of the major steamship lines calling on the Outer Harbor terminals in the heavy traffic month of July 1986, the Port of Oakland noted that there were no passings in the channel for the entire period.

In Oakland Inner Harbor, existing piers, wharves and riprapped banks impose constraints to two-way navigation at many locations. The minimum channel width of approximately 150 meters (500 feet) occurs between the riprapped banks near Project Mile 1.6 (2.6 kilometers), where deepening the channel within the confines of the rock slopes will require a further reduction in channel bottom width. This does not detract from the usefulness of the channel where one-way passage for large vessels is already in effect in accordance with safe piloting practices. Larger container ships utilizing the harbor can be expected to experience some delays under adverse weather and water conditions.

Although the design for the Outer Harbor was based on two-way operation in the Feasibility Report, discussions with the Bar pilots and representatives of the Port of Oakland resulted in the decision to design both the Outer and Inner Harbors for one-way operation, based on the design constraints.

3.10. - Model Simulation Studies

The Computer Aided Operations Research Facility (CAORF) of the U.S. Maritime Administration was commissioned to perform a navigation simulation study of the Oakland Harbor Channels, using the guidelines in ER 1110-2-1403, 21 January 1985, Engineering and Design: "Hydraulic and Hydrologic Studies by Corps Separate Field Operating Activities and Others". The Waterways Experiment Station Hydraulics Laboratory (WES) provided technical assistance to the San Francisco District and the San Francisco Bay-Delta Model provided current data for use in CAORF's simulator.

Two variations from the authorized plan were prepared for Oakland Outer Harbor (Plan Y and Plan Z), utilizing suggestions from the Bar Pilots Association and the design criteria in EM 1110-2-1613, 8 April 1983, Engineering and Design: "Hydraulic Design of Deep-Draft Navigation Projects". (See Figures 5-7). Utilization of a navigation ship simulator, operated by the Bar Pilots to test the design vessel in the alternative channels, permitted the optimization of the channel design. The study included simulation of turning maneuvers and the effects of passing ships on ships moored at the Seventh Street Terminal. The results of the simulation study report: "An Evaluation of Alternative Channel and Turning Basin Designs for the Inner and Outer Harbors of Oakland, CA" is included in Appendix D. The geometrics resulting from the simulator study are shown on Fig. 8.

Significant safety benefits would be derived from widening both sides of the bar channel and removing the knoll adjacent to the end of the Seventh Street Complex. The knoll has been the location of several groundings and near groundings during simulator runs. In addition, the ship maneuvering options available to the pilot would be greatly increased by bringing this area down to project depth. Removing the knoll would also improve access to berth 24 (formerly berth "J") of the Seventh Street Terminal (the roll-on, roll-off facility).

North side widening primarily benefits the Outer Harbor by minimizing wake damage to moored ships. Channel boundaries determined by the simulation study will provide for a turning basin adequately sized for the design ship to negotiate a safe turn, considering the variable current and wind conditions in this area.

South side widening largely benefits the Inner Harbor. Ships entering or leaving the Inner Harbor Entrance Channel must negotiate a 30° turn. The model simulation indicated that the proposed widening of the southern side of the Bar Channel and Entrance Channel is required for safe transit of large containerships on flood tide.

3.11. - Channel Configuration

The design width for safe navigation in a channel is based on vessel size and maneuverability, traffic conditions, winds, waves, currents, bottom and bank conditions, visibility, traffic conditions, mode of operation and ship turning basin requirements, etc. Conditions vary throughout the length of the harbor channel. Therefore, channel dimensions are addressed by reaches.

3.11.1. - Oakland Bar Channel.

This 1.1-kilometer (0.7-mile) long channel provides ingress and egress for Outer and Inner Harbor Channels. The Bar Channel is an unconfined 240-meter (800-foot) wide channel subject to cross-winds and currents which can accommodate two-way traffic under ideal conditions: smaller vessels, light winds, light currents, good visibility and no extreme shoaling. This channel will be widened to 270 meters (900 feet) to accommodate the design ship, and the northerly angle point joining the Entrance Channel will move 640 meters (2,100 feet) westerly to permit better approach and exit paths.

3.11.2. - Outer Harbor Entrance Channel.

This 1.6-kilometer (1.0-mile) long channel provides entrance to the Outer Harbor from the junction with the Inner Harbor Channel, and also accesses the Seventh Street Terminal located to the right upon entering the channel. The Outer Harbor Entrance Channel is unconfined on the left, except for some BART anode cables and array platforms located just outside of the existing channel slope near the southerly end of the Seventh Street Terminal. General conditions for the Entrance Channel are variable. Adverse factors consist of shoaling on the northwesterly side of the channel along the southerly end, and maneuverability constraints due to the short turning radius entering from the Bar Channel. This reach is more likely to be subjected to strong currents and winds, and on occasion to seasonal fog and low visibility. Lack of adequate channel width promotes the risk of a moving vessel colliding with berthed ships at the Seventh Street Terminal or setting up a wake or surge which could damage berthed ships or break mooring lines. The channel width will vary from 360 meters (1,175 feet) at the confluence with the Inner Harbor to 180 meters (600 feet) near the existing "dogleg" at the junction of the Turning Basin Reach.

3.11.3. - Outer Harbor Turning Basin Reach.

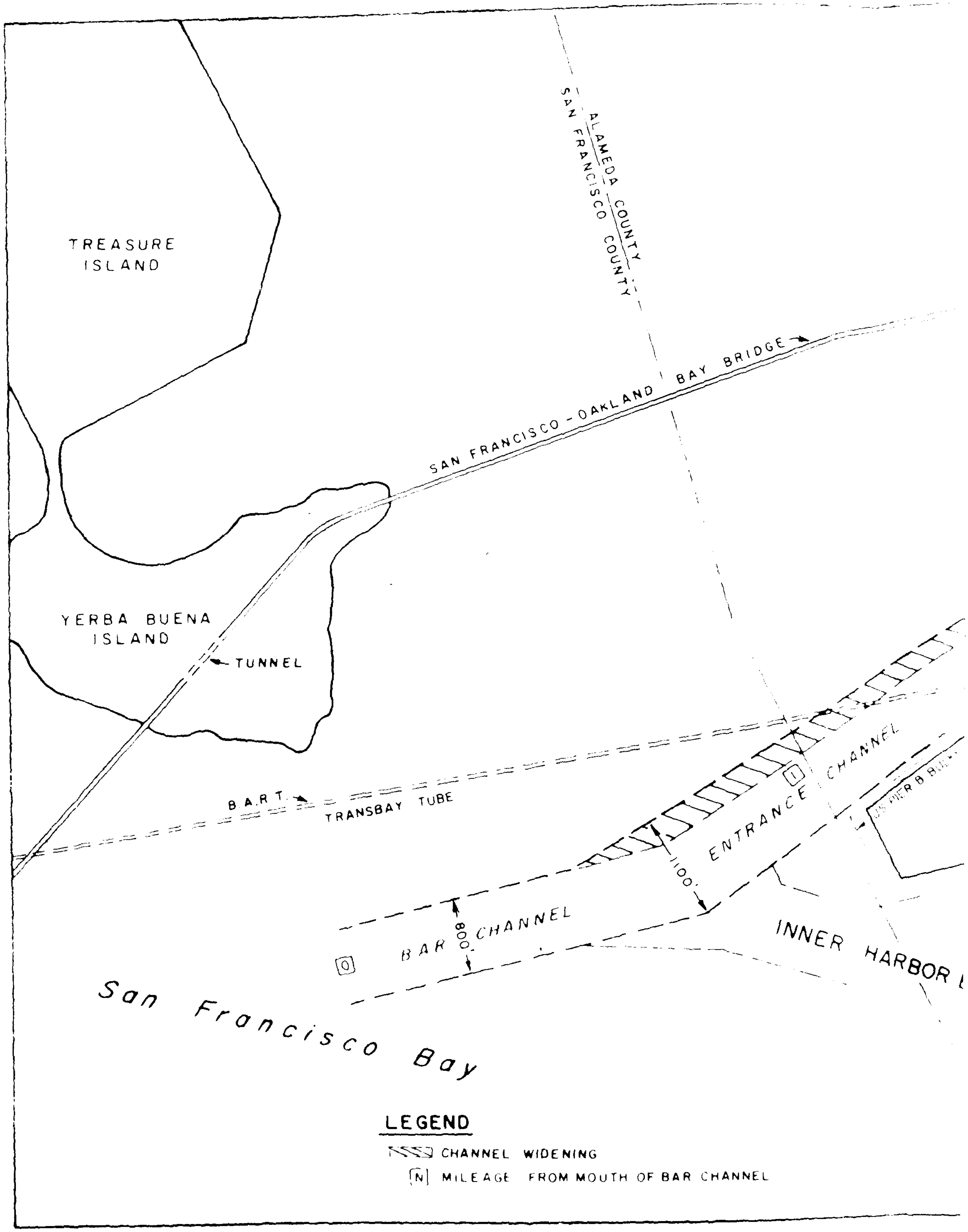
The next 1.4 kilometers (0.9 mile) includes both the existing "dogleg" and the area presently used as a turning basin. Although the designated location of the turning basin is at the bend in the upstream reach of the harbor, it is narrow and confined by service terminals on both sides; the area adjoining the "dogleg" is actually used for turning large ships because it provides more room and has berths along the south side only. The configuration of this channel reach will be widened on the westerly and easterly sides to eliminate the constriction imposed by the "dogleg", with its potential for grounding vessels trying to make radical changes in course, and to include an enlarged turning basin. Channel boundaries determined by the simulation study call for a 430-meter (1,420-foot) diameter turning basin, adequately sized for the design ship to negotiate a safe turn. Variable current and wind conditions in this area require good pilotage and close tug control during the ship turning operation, particularly concerning the design-sized ship. Presently, 260-meter (850-foot) long container ships turn in this area using bow and stern thrusters.

3.11.4. - North End of Oakland Outer Harbor.

The North End is a dead-end harbor channel extending for an additional 1.3 kilometer (0.8 mile) beyond the turning basin and confined between rows of existing piers. This is a congested reach into which, if large container ships enter, they have to back out of again, often requiring tug assistance to reach the turning basin. A decreasing channel width and adverse wind effects further contribute to poor conditions. The existing width between pierhead lines varies from about 340 meters (1,100 feet) to as little as 260 meters (850 feet). Subtracting the 38-meter (125-foot) berthing area from either side of the channel leaves a total of 260 meters (850 feet) to 180 meters (600 feet) remaining for navigation. Pier constraints do not allow further widening of this channel.

3.11.5. - Oakland Inner Harbor Entrance Channel.

This reach provides straight access to Inner Harbor, and by a turn of approximately 35°, access to the Oakland Middle Harbor facilities of the Oakland Naval Supply Center. Ships operating in this unconfined channel are subject to cross-winds and currents, and the eddy shed by the Seventh Street Terminal during flood tides. Simulation study results demonstrated the need for widening both


TREASURE ISLAND
YERBA BUENA ISLAND
TUNNEL
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
SAN FRANCISCO - OAKLAND BAY BRIDGE
B.A.R.T.
TRANSBAY TUBE
ENTRANCE CHANNEL
1100'
1
BAR CHANNEL
800'
0
INNER HARBOR
San Francisco Bay
LEGEND
CHANNEL WIDENING
N MILEAGE FROM MOUTH OF BAR CHANNEL

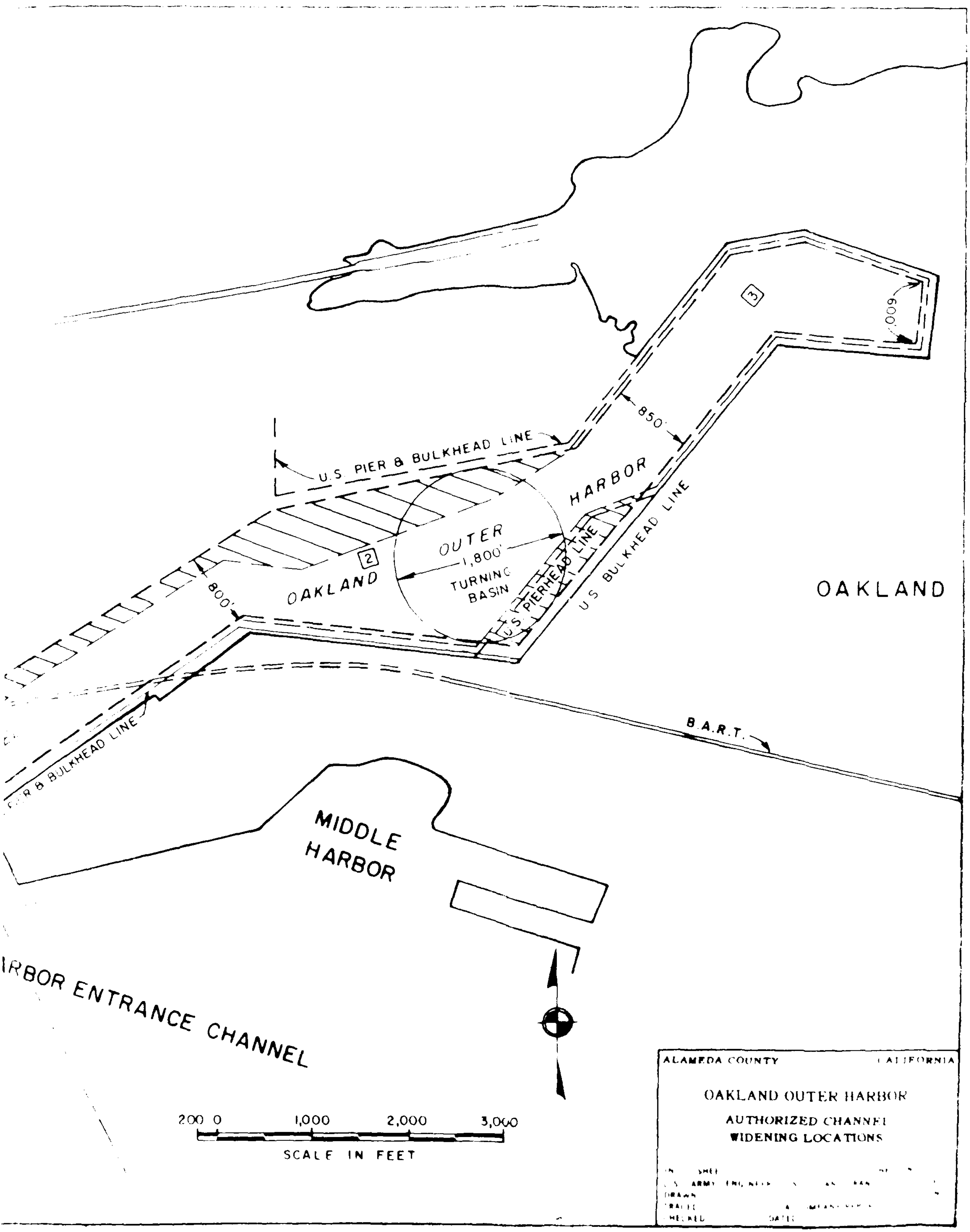
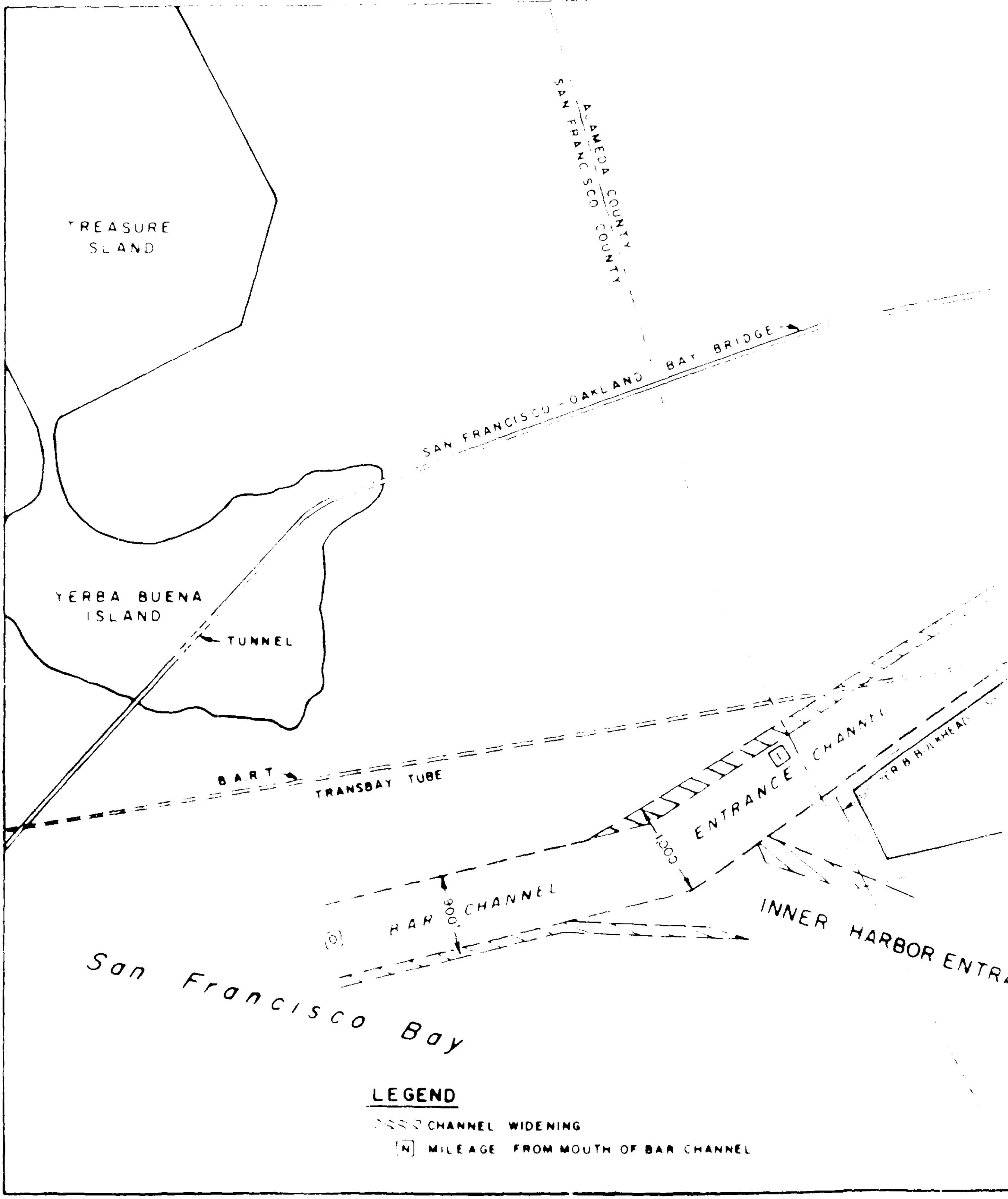
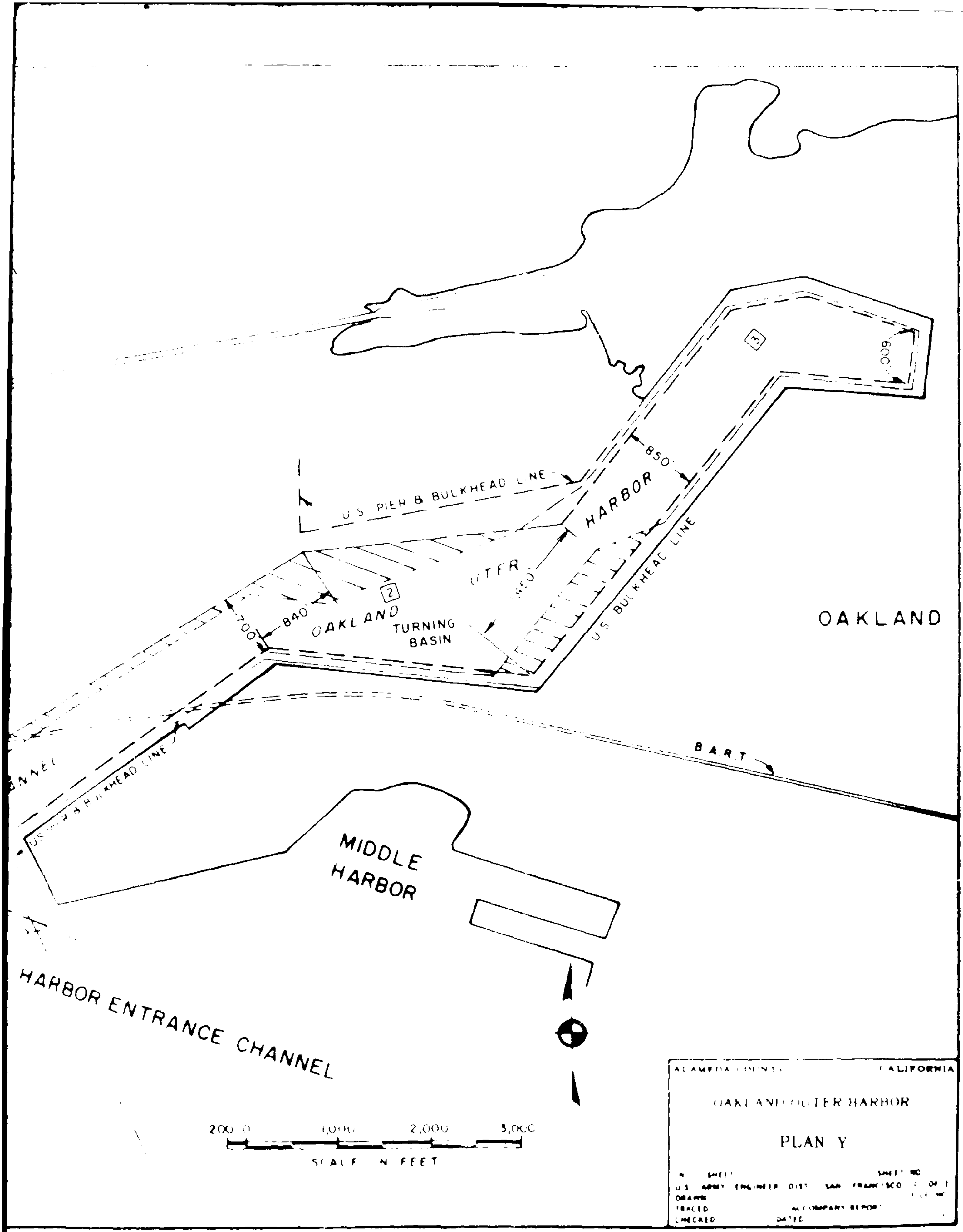

U.S. PIER & BULKHEAD LINE
850'
600'
HARBOR
OUTER
1,800'
TURNING
BASIN
OAKLAND
800'
U.S. PIERHEAD LINE
U.S. BULKHEAD LINE
OAKLAND
B.A.R.T.
R & BULKHEAD LINE
MIDDLE
HARBOR
RBOR ENTRANCE CHANNEL
200 0
1,000
2,000
3,000
SCALE IN FEET
ALAMEDA COUNTY
CALIFORNIA
OAKLAND OUTER HARBOR
AUTHORIZED CHANNEL
WIDENING LOCATIONS

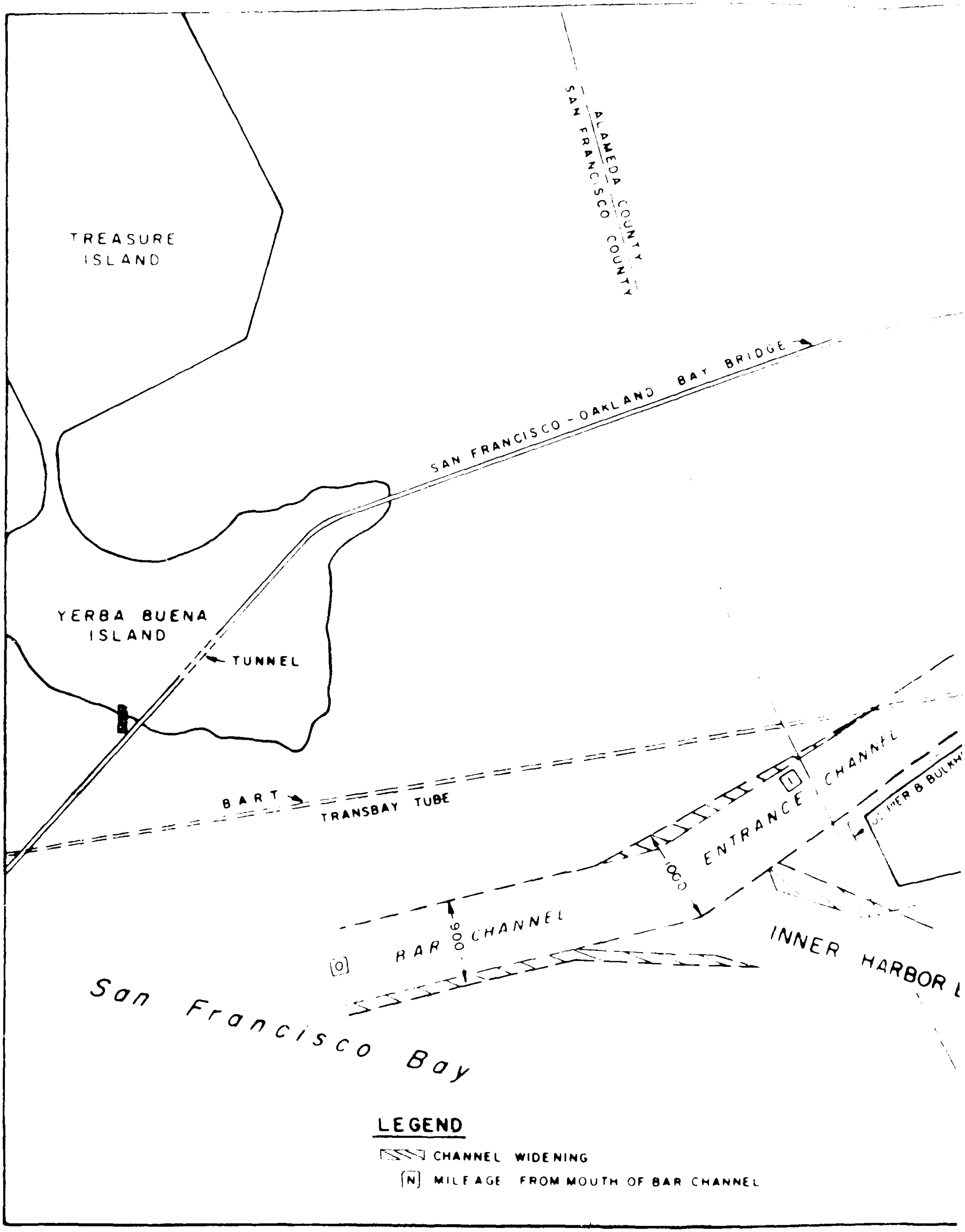
FIGURE 5



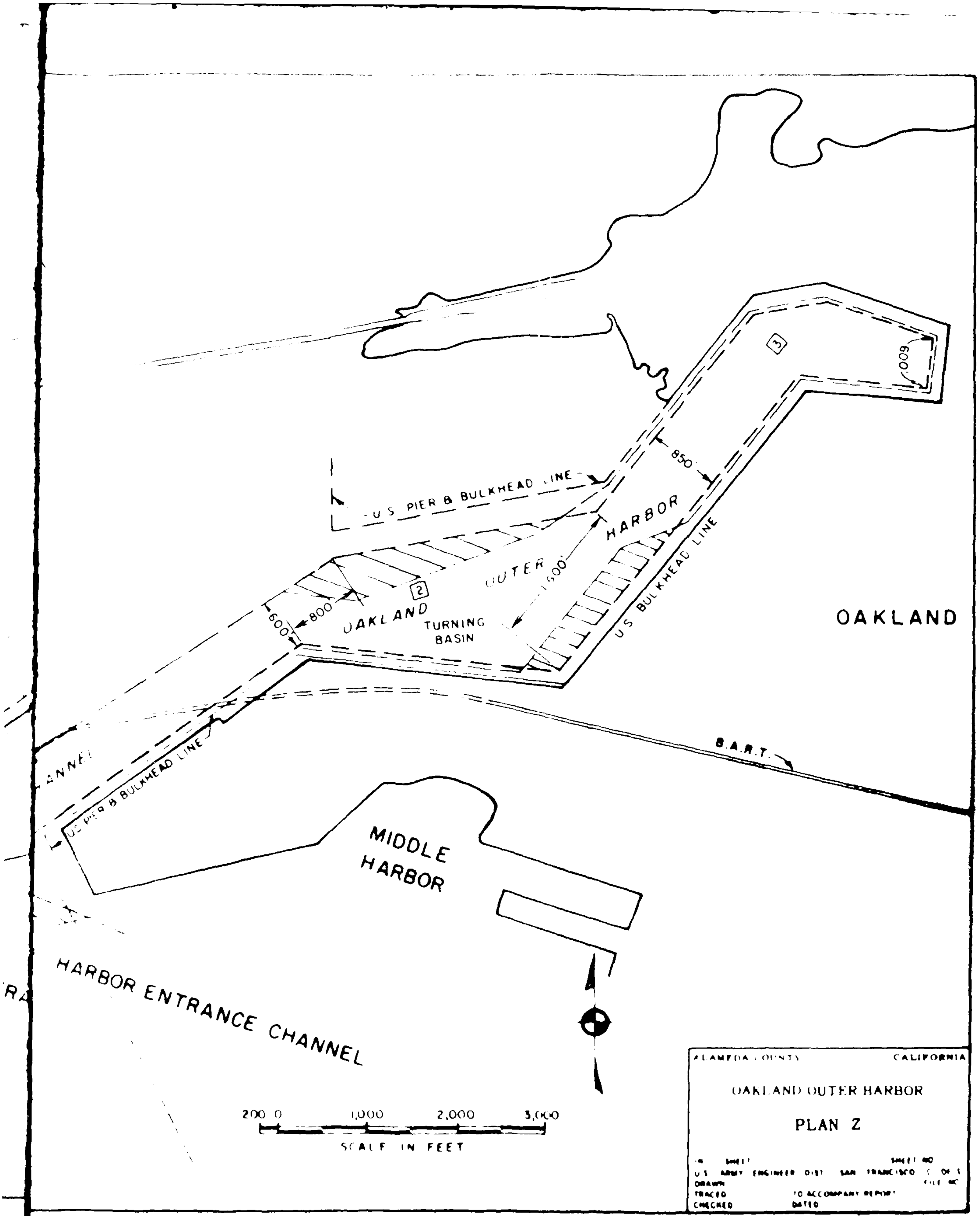
TREASURE ISLAND
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
SAN FRANCISCO - OAKLAND BAY BRIDGE
YERBA BUENA ISLAND
TUNNEL
BART
TRANSBAY TUBE
ENTRANCE CHANNEL
1
1000
900
BAR CHANNEL
0
INNER HARBOR ENTRA
San Francisco Bay
LEGEND
CHANNEL WIDENING
N MILEAGE FROM MOUTH OF BAR CHANNEL



U.S. PIER & BULKHEAD LINE
HARBOR
OAKLAND
TURNING BASIN
U.S. BULKHEAD LINE
850'
600'
840'
700'
OAKLAND
BART
MIDDLE HARBOR
HARBOR ENTRANCE CHANNEL
SCALE IN FEET
ALAMEDA COUNTY
CALIFORNIA
OAKLAND OUTER HARBOR
PLAN Y
U.S. ARMY ENGINEER DIST. SAN FRANCISCO

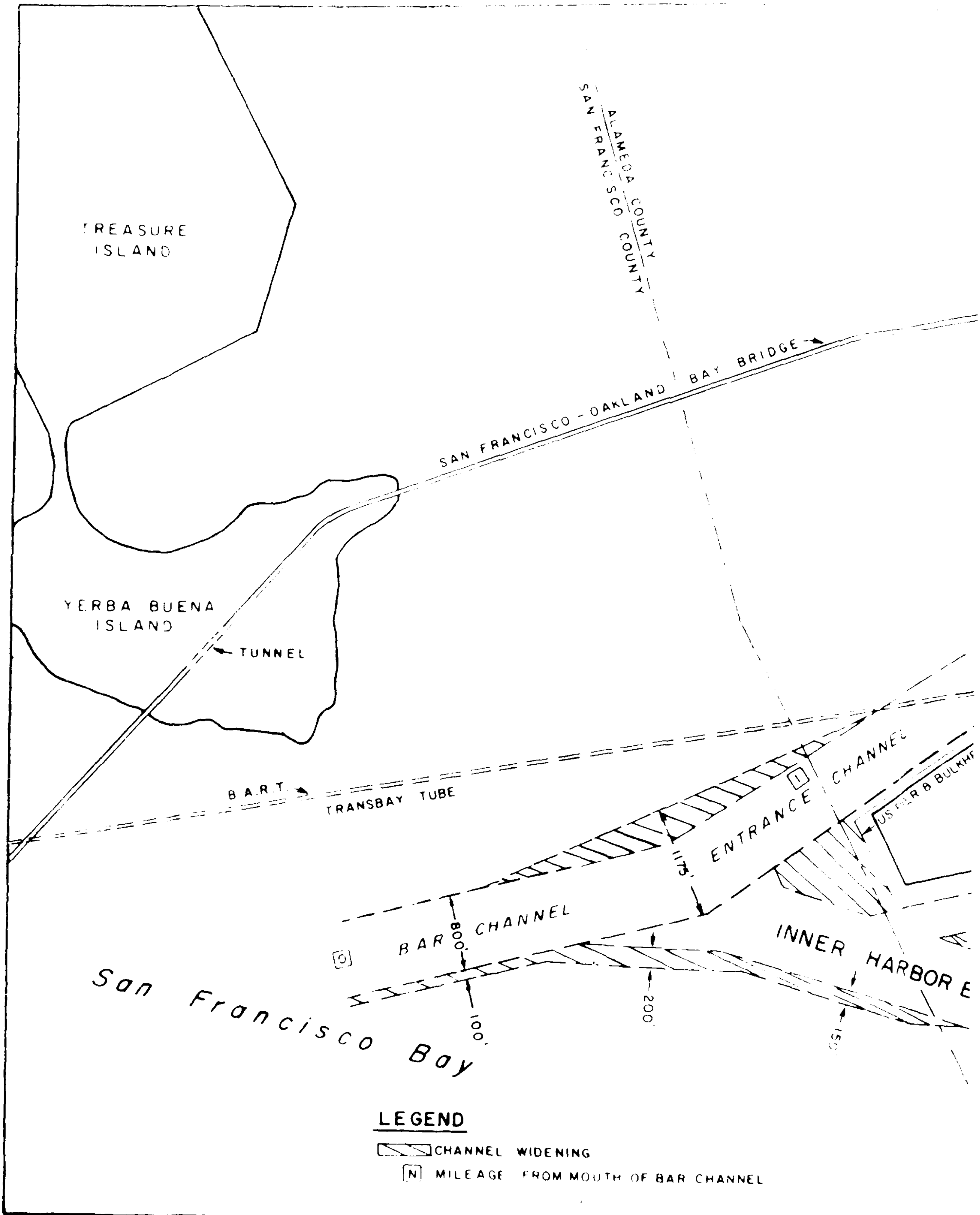


TREASURE ISLAND
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
SAN FRANCISCO - OAKLAND BAY BRIDGE
YERBA BUENA ISLAND
TUNNEL
BART
TRANSBAY TUBE
ENTRANCE CHANNEL
1000
BAR CHANNEL
900
INNER HARBOR
San Francisco Bay
LEGEND
CHANNEL WIDENING
N MILEAGE FROM MOUTH OF BAR CHANNEL

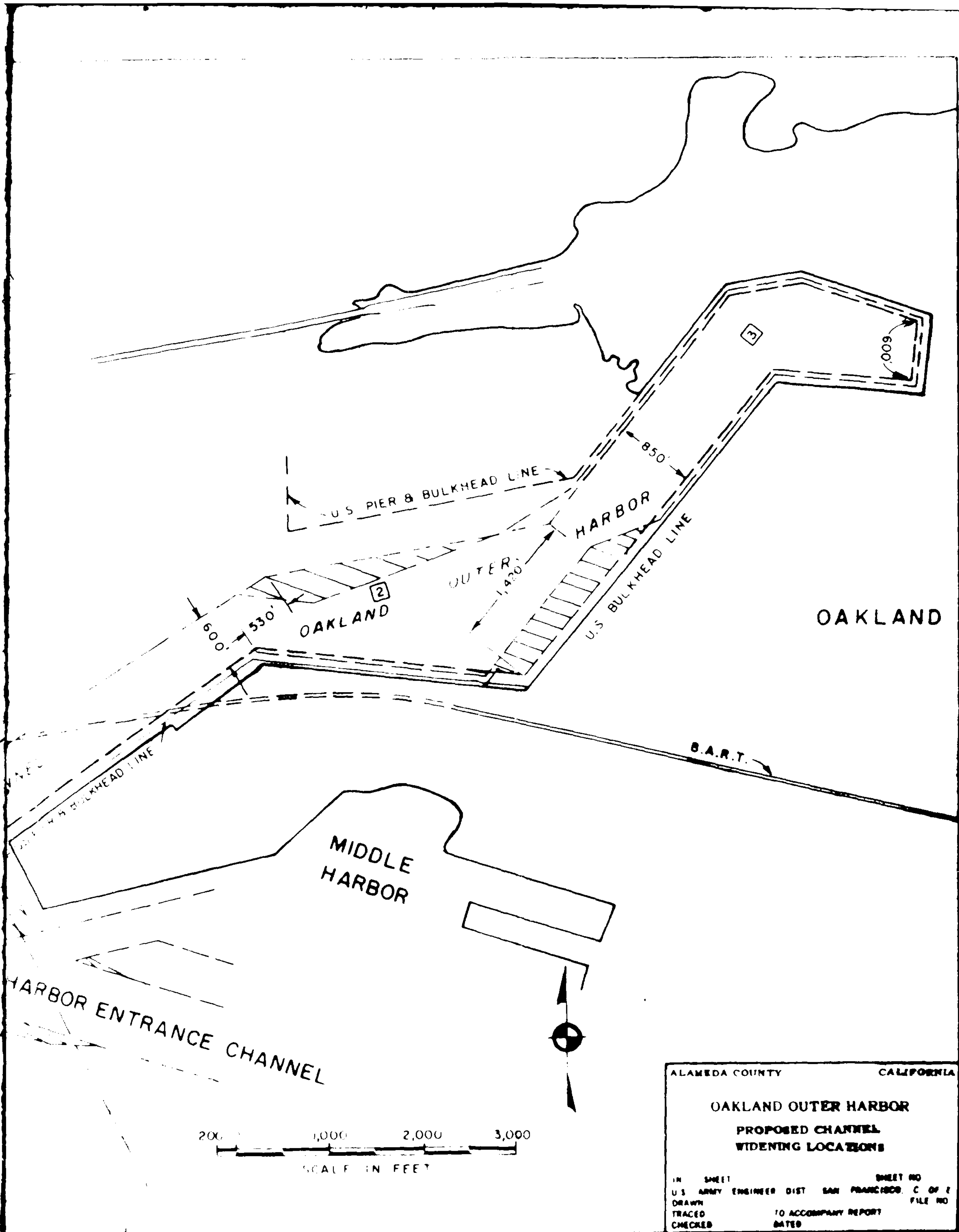


OAKLAND
OAKLAND OUTER HARBOR
TURNING BASIN
U.S. PIER & BULKHEAD LINE
U.S. BULKHEAD LINE
850
600
800
600
1600'
2
3
B.A.R.T.
MIDDLE HARBOR
HARBOR ENTRANCE CHANNEL
200 0 1,000 2,000 3,000
SCALE IN FEET
ALAMEDA COUNTY
CALIFORNIA
OAKLAND OUTER HARBOR
PLAN 2
U.S. ARMY ENGINEER DIST. SAN FRANCISCO
DRAWN
TRACED
CHECKED
TO ACCOMPANY REPORT
DATED

FIGURE



TREASURE ISLAND
YERBA BUENA ISLAND
TUNNEL
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
SAN FRANCISCO - OAKLAND BAY BRIDGE
B.A.R.T.
TRANSBAY TUBE
ENTRANCE CHANNEL
BAR CHANNEL
INNER HARBOR
800'
1175'
100'
200'
San Francisco Bay
LEGEND
CHANNEL WIDENING
[N] MILEAGE FROM MOUTH OF BAR CHANNEL



U.S. PIER & BULKHEAD LINE
850'
600'
3
2
OUTER
HARBOR
OAKLAND
1,420'
530'
600'
U.S. BULKHEAD LINE
OAKLAND
B.A.R.T.
MIDDLE
HARBOR
HARBOR ENTRANCE CHANNEL
1,000
2,000
3,000
SCALE IN FEET
ALAMEDA COUNTY
CALIFORNIA
OAKLAND OUTER HARBOR
PROPOSED CHANNEL
WIDENING LOCATIONS
IN SHEET
SHEET NO
U.S. ARMY ENGINEER DIST SAN FRANCISCO
DRAWN
FILE NO
TRACED
TO ACCOMPANY REPORT
CHECKED
DATED

FIGURE 8

sides of the channel to provide for safe transit of large containerships during extreme tidal conditions. The northern channel boundary will be moved to coincide with the U.S. Pierhead and Bulkhead line off the end of the Seventh Street Terminal, and then taper in to meet the existing channel limit near Project Mile 1.0 (1.6 kilometer). The southern channel boundary will be shifted out by 61.0 meters (200 feet) at the turn into the Entrance Reach, and by 46 meters (150 feet) beyond the turn to a point east of the mouth of Middle Harbor. The channel then tapers in to meet the existing channel limit at approximate Project Mile 1.0 (1.6 kilometer). From this point, the channel narrows to a minimum width of 130 meters (435 feet) inside the entrance to the riprapped channel banks at Project Mile 1.6 (2.6 kilometers).

3.11.6. - Oakland Inner Harbor Reach to the End.

The channel is severely confined between Project Miles 1.5 and 3.0 (2.4 and 4.8 kilometers) due to containment between two historical rubble jetties which form the channel banks. Channel dimensions are based on a series of cross sections taken within the confined reach, and are designed to the maximum width permissible without undermining the existing slopes. Channel dimensions are determined to be 130 meters (435 feet) at Project Mile 1.6 (2.6 kilometers), widening to 140 meters (460 feet) at Project Mile 2.0 (3.2 kilometer) and to 180 meters (575 feet) at the beginning of the channel bend at Project Mile 2.9 (4.7 kilometers).

The confined channel reach is subject to mild longitudinal currents and prevailing winds which act in close alignment with the channel. For a poorly handling vessel operating under one-way traffic conditions in a channel with strong yawing forces, Corps of Engineers criteria specifies a maneuvering lane equal to 200 percent of the beam width of the design vessel and bank clearances equal to 150 percent. (See Figure 9). This results in a minimum channel width of 160 meters (525 feet); however, because of the relatively protected nature of the channel within the confines of the riprapped banks, and the assumption that ship transits will occur under favorable weather and current conditions, under navigation by skilled and experienced pilots, the recommended channel widths are considred adequate. It must be recognized, however, that larger ships may experience delays under less favorable conditions.

At Project Mile 2.9 (4.7 kilometers) opposite the American President Lines terminal, the channel will be widened from 180 meters (575 feet) to a maximum of 270 meters (900 feet), to enable ships to safely negotiate the 27° bend in the channel. The bend widening will also facilitate tug assisted turns of vessels up to 860 feet in length, which currently turn in this area. The proposed widening is fully supported by the local pilots association and the local sponsor. The channel then tapers to conform with the existing channel width of 180 meters (600 feet) at Project Mile 3.5 (5.6 kilometers), and follows the existing channel limits to the terminus at Project Mile 4.4 (7.1 kilometers).

Additional project features include a 370-meter (1,200-foot) diameter turning basin between the Schnitzer Steel Products Company and the Alameda Gateway Properties to accommodate the design vessel, and a 300-meter (1,000-foot) radius fan-shaped area off the eastern end of the Charles P. Howard Terminal. Corps criteria specifies a turning basin diameter equal to 150 percent of the length of the design vessel, or 1.5 x 290 meters (950 feet) = 430 meters (1,425 feet). In recognition of the protected nature of the Inner Harbor and the limited open water space available between the permanent shore structures, the 370 meter (1,200 foot) diameter turning basin was determined to be appropriate for this channel. Discussions with the local pilots association in June 1985 resulted in the confirmation of this dimension.

The fan-shaped area is needed for vessels to efficiently utilize the facilities of the Charles P. Howard Terminal. This feature will enable vessels to nose into and pivot out of the "v" shaped notch prior to docking. Without this improvement, vessels would need to be backed into the berths after turning in the recommended turning basin. This mode of operation is not only inefficient, but would cause undue wear on the ship propellers, which are not intended to be operated in reverse. The dredging associated with this feature (approximately 45,900 cm [60,000 cy]) is less than one percent of the total project dredging, and for this relatively small amount, the project will be enhanced.

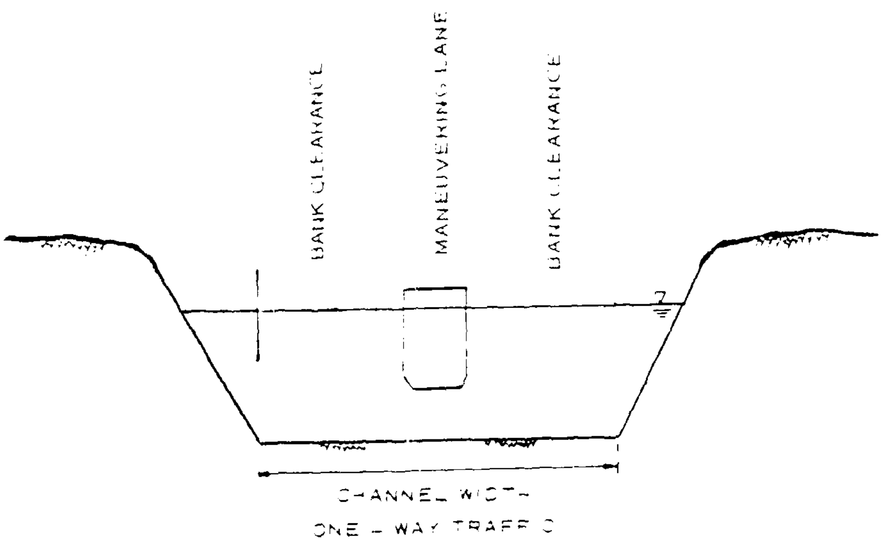
Correspondence in support of the dimensions and locations of the proposed turning basin and fan-shaped maneuvering area have been received from the Port of Oakland, American Presidents Lines, Ltd., San Francisco Bar Pilots and California Inland Bar Pilots Association.

3.12. - Channel Depth

It is not economically optimum to improve channel depths to eliminate all delays for the largest vessels projected to use the Oakland Harbors. Channel dimensions provided are adequate to accommodate most foreign and domestic vessels expected to be serviced over the near term. The optimization of channel depth assumes underkeel clearance allowances consistent with observed operation of container ships at Oakland Harbor. Based on the economic analysis in the feasibility study, net National Economic Development (NED) benefits are maximized at project improvement depth of -12.8 meters (42 feet) MLLW.

3.13. - Aids to Navigation

Channel widening in various reaches will necessitate the relocation of existing navigation aids or installation of new equipment at angle points and channel boundaries. These relocations or installations would be made by the U.S. Coast Guard, with the cooperation of the San Francisco Bar Pilots Association. As part of their maintenance program, the U.S. Coast Guard has plans to relocate and replace the three buoys in the new Outer Harbor turning basin area with fixed pile structure beacons. Since this work was



CHANNEL WIDTH ELEMENTS

FIGURE 4

scheduled regardless of channel improvements, no project costs are assigned to this action. Five new buoys will be needed in the Inner Harbor. Two buoys will define the southern boundary of the widened Bar and Entrance Channel, and three bouys will define the boundaries of the 365.8 meter (1,200 foot) diameter turning circle. This work will be performed by the Coast Guard at an estimated cost of $60,000.

3.14. - Modifications and Relocations

The only relocation for this project involves the U.S. Navy Sanitary Sewer Export Main. The existing 40.6-centimeter (16-inch) diameter cast iron sewer main crossing, located under the Inner Harbor Channel at approximately Project Mile 2.5 (4.0 kilometers), must be lowered to accommodate the proposed channel improvements. Dredging of the ship channel necessitates relocation of the existing sewer main from an invert elevation of -13.8 meters (45 feet) MLLW to approximately -17.8 meters (58.5 feet) MLLW. Construction of the relocation will involve trenching excavation (including removal of rock protection from the channel side slopes) for the installation of valves, laying of approximately 290 meters (950 feet) of new pipe on a bypass alignment, removal of the 200-meter (660-foot) length of existing pipe located under the channel bottom, backfill and placement of new riprap on the side slopes. The detailed project cost estimate for performing this work is presented in Table VIII.

No modifications will be required by this project for the BART facilities or cable crossings, all of which are sufficiently deep for the recommended construction. Caution will have to be exercised during dredging to avoid damage to these facilities.

3.15. - Rights-of-Way

The rights-of-way necessary for project implementation include three piers that are in the proposed project area. Part or all of these piers must be removed to clear the ship turning basin in Oakland Inner Harbor. Pier No. 2, located on the Oakland side of the harbor, is owned by the local sponsor and is presently under lease to Schnitzer Steel, a scrap metal operator. On January 16, 1987, the Sponsor served written notice to the lessee to terminate the lease and vacate the pier. The property will be vacated by April 1, 1988. No problems are anticipated in removing the pier. The other two piers, Nos. 2 and 4 located on the Alameda side of the channel, are owned by the City of Alameda and a private interest. The exercise of Navigational Servitude by the Government will provide all rights needed for the project.

3.16. - Contaminated Material

Sediments from the project have been tested in accordance with evaluation procedures for Section 103 as described in the Corps' Management Strategy and Decision Making Framework for dredged material. Approximately 206,000 cubic meters (270 cubic yards) of fine-grained consolidated material within the turning basin at the terminus of the Inner Harbor Channel, known as the Schnitzer Steel and Todd Shipyard areas, is potentially unsuitable for unrestricted open water disposal because of potential contamination and bioaccumulation. Degree of contamination cannot be determined without time consuming additional biological testing, which would delay start of construction of the project. The material will, therefore, be treated as if it were known to be contaminated. In accordance with the Management Strategy, an appropriate control measure for potential benthic effects is capping. The technical feasibility for capping as an alternative for disposal of the contaminated sediments from the Inner Harbor Turning Basin is described.

The capping concept can be summarized as three basic components: (1) controlled, accurate, subaqueous placement of the contaminated dredged material; (2) isolation of the contaminated material from the receiving environment (typically with a covering or cap of clean sediments); and, (3) monitoring and maintenance of the site. The term "contaminated" refers to those sediments which are considered unsuitable for unrestricted ocean disposal while the term "clean" refers to those sediments which are acceptable for ocean disposal.

Capping refers to level bottom capping as is routinely practiced by the Corps' New England Division and New York District. As the name suggests, level-bottom capping projects involve the placement of the contaminated material on the existing flat or gently sloping bottom in a discrete mound. Capping material is then applied over the mound to assure adequate coverage.

3.16.1. - Previous Capping Projects.

A sufficient number of capping projects have been completed under a range of conditions to establish that the concept is technically and operationally feasible. The majority of the reported projects were the level-bottom design in which contaminated fine-grained sediment was excavated by clamshell dredge and placed by conventional bottom-dumping barges or scows. The cap material was typically silt and/or fine sand that was placed over the mounds by either scows or a conventional hopper dredge disposal. None of the reports noted any difficulty in producing well-defined discrete mounds.

In general, descriptions of the projects indicated that the sediment formed a very steep-sided central mound with a radius of 120-150 meters (400-500 feet) and a height of several feet. Following a sharp break in slope, material continued in a deposit up to several inches thick over an annular area extending an additional 120 to 150 meters (400 to 500 feet). In these projects, no attempts were made to cover the mound with a cap of uniform thickness. Coverage was achieved by point placement of relatively large volumes of capping sediment (at least 2 to 3 times the underlying contaminated mound volume). In the few reported cases where the disposal project was not considered entirely successful (e.g., Central Long Island Sound Cap Site No. 1 and No. 2), the difficulties were traced to problems with positioning or control rather than to equipment or design.

Experiences at several heavily monitored level-bottom capping projects indicate that mechanically dredged sediment can be deposited in discrete mounds and successfully capped. Conventional equipment and operational techniques can be used, provided special attention is given to precise positioning and overall control of the operation.

3.16.2. - Sediment Characterization.

Detailed physical characterization of the sediments to be dredged are found in Section 3.3 and Appendix B. The upper layers of sediment in both the turning basin and channel are primarily a silty clay. Lower layers are composed of either silty sands or consolidated silty clays. There are some areas in the project where the material is predominantly a silty sand. Previous dredging experience indicates that clumping would be evident with removal by clamshell dredge. Chemical composition of the bulk sediment and results of elutriate tests, bioassays, and bioaccumulation testing are found in Appendix A of the SEIS.

3.16.3. - Disposal Site Description.

The proposed 1M and B1 ocean disposal sites have been identified as a potential capping sites. Information on the site characteristics, including bathymetry, currents, and geotechnical properties of in situ sediments has been collected. The characteristics of the sites which are pertinent to this capping evaluation are summarized in the following paragraphs.

Site B1 is located further southwest of the mouth of the bay at a haul distance of approximately 56.3 km (30.4 nmi) from the Golden Gate Bridge. The site encompasses an area of approximately 18.5 km^2 (5.4 nmi^2) at a water depth of approximately 84 m (46 fathoms). The bottom is practically flat with slopes of approximately 1v on 100h. The substrate sediments at the site have a median grain size in the range of very fine sands. Local currents at the site are primarily a function of shelf circulation and wave action. The average current velocity at the B1 site is estimated as 16 cm/sec with peak speeds less than 53 cm/sec.

3.16.4. - Proposed Dredging Methods and Sequencing.

The capping alternative proposed involves clamshell dredging, placement of dredged material into barges, and surface release at the disposal site for both contaminated and clean material. Clamshell dredging and barge disposal will maintain cohesion and clumping of the material to the greatest possible extent.

The project will be dredged in two phases. In Phase I, approximately 52,000 cubic meters (68,000 cubic yards) of contaminated material will be removed from the Inner Harbor turning basin down to an elevation of -11.5 meters (-38 feet) and placed at the disposal site in a single mound. This will be followed by dredging of approximately 330,000 cubic meters (432,000 cubic yards) of clean material taken from the Inner Harbor down to an elevation of -11.5 meters (-38 feet) which will be placed as a cap over the contaminated mound.

In Phase II, approximately 157,000 cubic meters (205,000 cubic yards) of contaminated material will be removed from the Inner Harbor turning basin down to an elevation of -12.8 meters (-42 feet) and placed at the disposal site. This will be followed by dredging of approximately 2,240,000 cubic meters (2,900,000 cubic yards) of clean material from the Outer Harbor, which will be placed as a cap over the contaminated mound.

The alternative as proposed is similar to conventional capping operations successfully demonstrated at other locations. Capping is an engineered alternative to conventional open water dumping, and its successful performance depends on proper design and care during construction.

3.16.5. - Disposal Modeling.

An extensive modeling effort has been performed in a previous study, simulating disposal operations at several ocean sites, including the B1 site. This effort involved the use of the Corps dredged material disposal model DIFID, modified by Tetra Tech. Additional algorithms were added to account for resuspension and transport of deposited material and for build-up of mounds. The modeling effort emphasized the bottom area and configuration of mounds as they were developed by a series of future dredging projects over a 20-year period. The Oakland Harbor work along with additional work from other projects was assumed to occur within the first three years of the 20 year period modeled.

Supplemental studies were performed extending the previous results to the present capping evaluation. The modeling results for the capping evaluation indicated that in excess of 90% of the material would be deposited as a mound on the bottom. The mound size is proportional to the volume dredged, therefore the volumes as removed in sequence for the phased capping operation were used to determine an estimated mound configuration using mound side slopes of 1v on 30h. This side slope corresponds to observed mound slopes at other sites involving similar materials and dredging methods. These results indicated that the total radius of the capped mound at site B1 for both phases is approximately 610 m (2,000 ft), and the mound height is approximately 7.5 m (25 ft). The average thickness of the cap with this configuration is in excess of 4.5 m (15 ft).

3.16.6. - Controlled Placement of Material.

The capping alternative now under consideration involves surface dumping of the material at a designated point to build up the contaminated mound and overlying cap. These operations have been successfully performed in water depths less than 30.5 meters (100 feet). However, the water depth at the B1 site is approximately 84 meters (46 fathoms). Capping should be technically feasible at such depths, however the deep water depth will require additional provisions for precise positioning of equipment and monitoring of the operation while in progress.

The behavior of dredged material placed at an open water site by instantaneous release from a barge can be described as 3 or 4 distinct transport phases or stages generally paralleling the physical forces or processes that dominate during each period. A number of factors affect this descent including the mechanical properties of the sediment, and conditions in the water column and at the site bottom. The following are brief descriptions of the nature and magnitudes of the effects produced by the more important of these factors.

Bathymetry. The bathymetry of sloping sites tends to increase the spread of material deposited on the bottom. However, for the B1 site under consideration, the essentially flat bottom slope would have no adverse effect on mound development.

Currents. The principal influence of currents in the receiving water is to displace the point of impact of the descending jet of material with the bottom (by a calculable amount). Even very strong currents observed at some disposal sites did not significantly affect the accuracy of the placement. Somewhat greater dispersion during placement in higher currents is likely and was reflected in the results of the model runs.

Water Depth. Aside from the effect depth has on current speeds, there appears to be little additional short-term influence on the actual disposal process using instantaneous surface dumping. The same general stages of descent have been observed at sites with water depths ranging from approximately 15 to 67 meters (8.2 to 36.6 fathoms). The very cohesive fraction of mechanically dredged material (the clods or clumps) attain their terminal speed quickly after release from a barge and do not accelerate further with depth. The bottom surge does not spread at a faster rate, although because of additional entrainment, the initial thickness of the surge has been shown to be a function of water depth. The total water depth at a site has more influence (usually favorable) in long-term time frames and on stability than on placement processes. Certainly, operational and monitoring problems may be more severe at deeper sites. In addition, even though disposal has taken place and been monitored at deep water sites, experiences with capping are limited to approximately 30.5 meters (16.7 fathoms).

Density stratification in water column. A sufficiently great density gradient in sufficiently deep water can result in arrest of the descending mass of material from a barge. The depth at which that might occur can be calculated. In addition to the relative densities of the water column layers, the depth to the interface of the pycnocline (not the total depth) and the initial volume of the released dredged material are the important terms. Available data on the density structure of the water column at the sites under consideration were factored into the model runs, and results indicated that the descending mass should have enough momentum to descend quickly through the water column to the bottom.

Navigation and positioning. Accurate navigation to the disposal site and precise positioning during material placement are obvious requirements, however, their importance at a distant deep water site cannot be overemphasized. State-of-the-art equipment and techniques should be employed to assure accurate point placement. Taut-moored buoys, mooring barges, various acoustical positioning devices, and computer assisted, real-time helmsman's aids will be considered. In all cases, barges or scows must be required to release the material within a prescribed radius of the designated point of disposal. In general, for the contaminated sediments, rapid release with high insertion speed (from the slowed barge) is desirable. This allows the material to reach terminal speeds quickly, and minimizes contact time with the water column. The accuracy of mound development and positioning and control of dredged material placement will be validated during the initial phases of disposal.

3.16.7. - Capping Material Thickness and Placement.

Capping requirements. One of the principal design decisions in a capping project is the nature and thickness of the capping material placed over the dredged material mound. The capping material provides the isolation necessary to control the movement of contaminants out of the dredged material and into the overlying water column, and to prevent direct contact between the aquatic biota and the contaminated material. The cap will also perform the important physical function of stabilizing the material and protecting it from transport or dispersion away from the site. The design of the cap must, therefore, consider both grain size and thickness.

Extensive laboratory testing has been conducted to determine cap thicknesses necessary for chemical isolation of contaminated materials from the overlying water column. These tests have been conducted for a number of projects involving the potential capping of materials with much higher levels of contamination than the turning basin materials for this project. The maximum capping sediment thickness required for a chemical seal as indicated from all these tests is 0.5 m (1.5 ft). An additional thickness of cap must be determined to prevent exposure of burrowing organisms to the contaminated sediments. Indications are that a burrowing depth of approximately 1 meter (3.5 feet) would be appropriate for the sites under consideration.

As discussed above, the large ratio of clean to contaminated material for this project will result in a cap thickness in excess of 4.5 meters (15 feet). Since this thickness is far greater than that required for isolation, capping effectiveness tests as conducted for previous projects are not considered necessary.

Based on the above considerations, a minimum cap thickness of 2 meters (6.5 feet) should be specified for this project. This will allow for irregularity in thickness, and will be well within the resolution and accuracy of monitoring equipment.

Cap erodibility. Erosion rates are a function of the water depth. Evaluations of erosion rates indicate that Site B1 is essentially non-erosive.

Effect of Dredging Volumes on Capping. The dredging sequence for Phase I of this project results in a ratio of clean to contaminated sediment of over 6 to 1. Capping experience of the New England Division has indicated that typically a 3 to 1 ratio of capping material was needed for effective capping of a discrete mound. This experience was with clamshell and scow disposal of contaminated material and clam and scow or hopper dredge placement of capping material. The overabundance of capping material insures that sufficient cap thickness should be easily obtained with the proposed sequence.

Scheduling of cap placement. Scheduling of placement of the capping material following the completion of the contaminated mound placement should be specified to minimize any exposure of benthic organisms to the contaminated material. Placement of capping material will commence within 15 days following completion of the contaminated mound. The months of January through March hold the highest potential for storm events, resulting in operational difficulties and greater potential for material erosion. Therefore, dredging operations will be scheduled so that contaminated material is capped with a clean sediment volume ratio of at least 3 to 1 prior to this period. Placement of additional cap material can continue during this period.

3.16.8. - Monitoring.

Considering the high proportion of capping material available for the project, precision bathymetry data collected before, during and periodically after construction will be the major focus of the monitoring program. Such data can be used to manage on-going disposal operations to insure mound formation is progressing satisfactorily, and the material has been satisfactorily capped. During-construction surveys will insure that overall slopes for the mound are not excessive. The post-construction surveys will detect any significant erosion of the cap. Estimates of mound consolidation should be factored into the interpretation of the post-construction surveys.

3.16.9. - Summary.

The major considerations for this capping design are as follows:

a. Dredging and disposal will be accomplished in two phases. Each phase will consist of placement of material assumed to be contaminated followed by clean material placement for the cap.

b. A clamshell dredge should be used for the work to insure clumping of the cohesive sediments to the maximum extent possible.

[illegible] The dredged material shall be transported to the disposal [illegible] bottom-dump barges to insure quick release to encourage [illegible] material to the bottom with a minimum spread and

d. The point of release from the disposal barges should be carefully monitored to insure control of material placement and tight mound formation.

e. The characterization of both the material assumed to be contaminated and capping material indicates that significant clumping will occur and a mound will be formed at the disposal site. The nature of the materials indicate that they are compatible for a successful capping operation.

f. The overabundance of capping material for this project insures that sufficient cap thickness should be easily obtained with the proposed sequence.

g. The characteristics for site B1 indicate that the site is technically suitable for the proposed capping operation.

h. Experiences at several heavily monitored level-bottom capping projects indicate that mechanically dredged sediment can be deposited in discrete mounds and successfully capped as proposed for this project. Conventional equipment and operational techniques can be used, provided special attention is given to precise positioning and overall control of the operation.

i. Capping for this site should be considered an engineered alternative. Successful performance depends on proper design, care during construction, and monitoring.

3.17. - Schedule for Construction

Construction of the project will include two dredging contracts. Award of the first dredging contract for the Inner Harbor is expected in May 1988. The first part of this contract will be to remove approximately 52,000 m^3 (68,000 cy) of the suspected contaminated material from the Schnitzer area of the turning basin to a depth of 12 m (38 ft). This material will then be capped by the remaining 336,000 m^3 (440,000 cy) of clean material to provide a 12 m (38 ft) deep channel. Production rate for the Inner Harbor is estimated to be 175,000 m^3 (230,000 cy) per month. The first series of dredging will be completed by June 1988 to provide a channel for the arrival of American President Lines' (APL) larger vessels.

Real estate actions and actions pertaining to the relocation of the Navy's sewer line will be initiated concurrently with the initial dredging contract. Two piers which encroach into the area of the turning basin on the south side of the estuary (Alameda side) are scheduled to be removed by September 1988. Concurrently, a contract will be awarded to lower the Navy [illegible]. Completion of the sewer relocation [illegible] November [illegible].

The second dredging contract will be for the deepening of the Inner and Outer Harbor channels to 12.8 m (42 ft) and will begin in October 1988 upon completion of the removal of the Alameda piers. The construction will proceed as follows: 1) Removal of approximately 150,000 m^3 (200,000 cy) of possibly contaminated material from the turning basin area (Todd Shipyard and Schnitzer Steel areas - See Sec. 4.2. of the SEIS). This material is to be contained by depositing the remaining 4.4 m-m^3 (5.8 mcy) of material over the contaminated material (See Sec. 3.15) With a production rate of 194,000 m^3 (254,000 cy) per month for the Outer Harbor and 176,000 m^3 (230,000 cy) per month for the Inner Harbor. Dredging of the Inner Harbor and Outer Harbor will be done concurrently. The Outer Harbor will be completed by October 1989, and the Inner by January 1990.

The non-Federal dredging of the berths is assumed to be performed under the same contract as the Federal dredging. The construction schedule is presented in Fig. 10.

OAKLAND HARBOR
CONSTRUCTION SCHEDULE

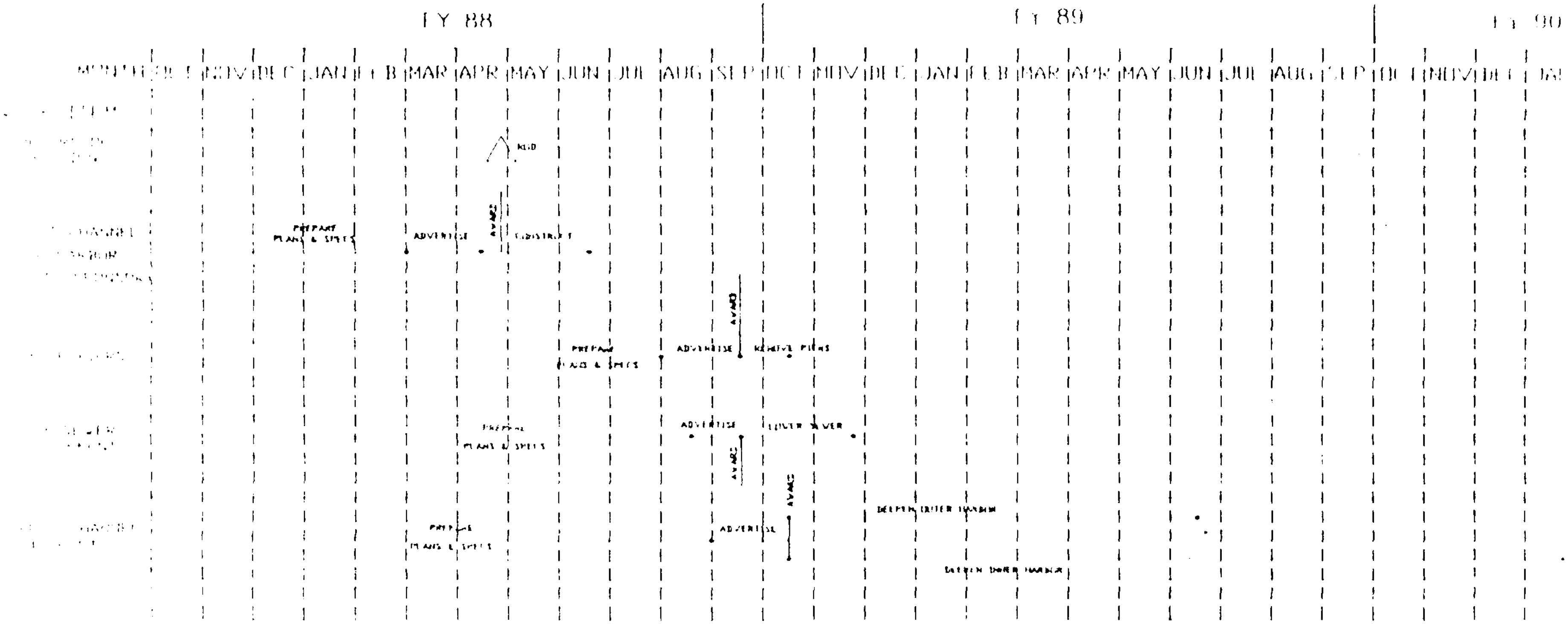


FIG. 10

SECTION FOUR

4. - ENVIRONMENTAL CONCERNS

4.1. - Groundwater

4.1.1. - Introduction

The issue of quality degradation of groundwater within the existing aquifers of the area as a result of channel improvements for Oakland Inner, Outer and Middle Harbors was raised by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). To address this issue, the Corps of Engineers directed a groundwater investigation in the geographic area defined as the Oakland Bayshore Area, which includes Oakland Inner and Outer Harbors, West Oakland and Alameda Island.

Two separate aquifers are identified in the Oakland Bayshore Area: the Merritt/Posey Aquifer consisting of the shallow Merritt Sand and Posey Sand that are considered to represent a single hydrostratigraphic unit based upon reviewed borehole data in this study; and the less formally defined Alameda Aquifer consisting of the underlying Alameda Formation comprised of approximately 243.8 meters (800 feet) of alternating sands, silts and clays. The San Antonio Aquitard, consisting of the San Antonio Formation and a thin, clay-rich portion of marine-estuarine clays of the Alameda Formation, separates these aquifers. No where in the proposed limits of the Oakland Outer Harbor project will dredging encounter the San Antonio Aquitard.

The Merritt/Posey Aquifer is a shallow aquifer that underlies the Oakland and Alameda Island harbor areas. The aquifer consists of the Merritt Sand and the interconnected sand layers and lenses of the underlying Posey Formation. The contact between the Merritt Sand and the Posey Formation is an erosional feature thereby placing the Merritt sand in hydrologic continuity with sands of the Posey Formation. The Merritt Sand outcrops on Alameda Island and under the City of Oakland.

4.1.2. - Aquifer Background

Prior to the placement of man-made fills into the San Francisco Bay in the Oakland area, outcropping Merritt sand formed the shoreline with the saline waters of the San Francisco Bay and San Antonio Creek estuary. (San Antonio estuary was a finger of the Bay that formerly extended inland between Oakland and Alameda.) Due to its geographic position along the edge of the Bay and partially underlying it, the Merritt sand has been exposed to salt water intrusion for the last few thousand years when waters of the Pacific Ocean filled San Francisco Bay to the approximate level it occupies today.

Historic harbor and channel deepening has cut into the Merritt Sand, thus further opening it up for salt water intrusion. The Merritt Sand of the Merritt/Posey Aquifer [illegible]

Oakland Inner Harbor channel prior to 1925 and the deepening of the Outer Harbor to -10.7 meters (35 feet) Mean Lower Low Water (MLLW) during the mid 1940's also cut into the Merritt Sand. The excavation for the Posey tube crossing of the Oakland Inner Harbor during the late 1920's and again for the Webster tube in the early 1960's intersected the Merritt/Posey Aquifer. The Aquifer was penetrated and transected by the excavation for the Bay Area Rapid Transit (BART) system in the late 1960's. The last major deepening of the Inner Harbor Channel occurred during 1974 and 1975 when it was deepened to an authorized depth of -10.7 meters (35 feet) MLLW, plus an allowable overdredge limit of 0.6 meters (2 feet), from the previously authorized project depth of -9.1 meters (30 feet) MLLW. Currently, several berthing areas of major shipping terminals in Oakland Harbor are dredged to depths of -12.2 to -12.8 meters (40 to 42 feet) MLLW in the Merritt/Posey Aquifer.

Borings performed during September 1978 and July 1979 by Woodward Clyde Consultants for field investigation for the Charles P. Howard Terminal, located near the upper terminus of the proposed Inner Harbor project, found the bottom of the Merritt Sand to be as shallow as -12.5 meters (41 feet) MLLW under the terminal. Borings conducted in the upper end of the Inner Harbor Channel by the Corps of Engineers, borings 2D-241 and 2D-240, in January 1982 (see Plate 6) indicated that the Merritt Sand, typically described as a well-sorted, fine to medium grained, brown to gray-brown, medium dense to very dense sand, was absent. Boring 2D-241 was drilled immediately across the channel from the Howard Terminal and 2D-240 was drilled immediately up channel. A boring conducted by Cooper and Clark in September 1982 for field investigation for an Oakland to Alameda utility power cable crossing also indicated that the Merritt Sand was absent. The boring was located in the middle of the Inner Harbor Channel and just up channel from the project limit, but bayward of the Posey-Webster tubes. Borings performed in 1923 and 1926 indicate that the Merritt formation existed in the channel bottom opposite and adjacent to the current Howard Terminal. Borings drilled in 1944 along the edge of the Inner Harbor Channel opposite the current Howard Terminal encountered the Merritt Sand as shallow as -5.5 meters (18 feet) MLLW. Therefore, it is reasonable to assume that dredging since 1926 has removed the Merritt Sand from within the upper limits of the Inner Harbor Channel and has exposed the full thickness of the Merritt Sand (the top just bayward of the Oakland Jetties and the bottom in the vicinity of the Howard Terminal) to salt water intrusion.

The Merritt Sand on the southern side of Alameda Island was in direct contact with the saltwater of the Bay until [illegible] when fill dredged from San Leandro Bay was placed against the shoreline. Inland waterways were provided from the Bay [illegible] shoreline, resulting in continuing [illegible] Sand. The Merritt [illegible] Island Naval Air [illegible]

[illegible]

will result in approximately a 25 percent increase of the exposure of that portion of the aquifer within the project limits (see Appendix C). However, the overall percentage of increase in aquifer exposure will be significantly less. It has, therefore, been determined that the potential for salt water intrusion already exists and that the deepening of either or both the Oakland Outer or Inner Harbors would not increase that potential. The existing salt water intrusion wedge would not be driven further inland than would otherwise occur without the harbor deepening.

4.1.3. - Concerns

A Hydraulic assessment was conducted of the Merritt/Posey Aquifer, based on the issues raised by the RWQCB. The concerns, and a summary of the hydraulic assessment for each, follow.

a. Would an increase in the intrusion of saline water result due to the deepening of the harbor channels?

Increasing Bay water depth along the channels would not result in an increase in the salt water hydraulic head, for purpose of calculations of the position of the salt water/fresh water interface or of other aspects of salt water intrusion.

b. Will there be an increase in the area of exposed aquifers due to berthing area and harbor channel deepening and widening, and turning basin construction?

The Merritt/Posey Aquifer is already exposed below sea level throughout more than half of the area planned for channel improvement, as well as elsewhere in the study area. The project would increase channel floor exposures by 25 percent, however the net increase in total aquifer exposure would be significantly less. The increased aquifer area exposure affects the time interval over which the aquifer response to changes can be expected, but does not induce salt water intrusion. Numeric groundwater modeling of the Oakland Bayshore Area would be necessary to quantify this relatively complex aspect.

c. Will there be an increase in demand for water from the aquifers either by larger pumps, more pumps, increased pumping time or a combination of all three?

There presently exists no data that can be used to quantify the amount of water utilized from the Merritt/Posey Aquifer. In Appendix C, "Ground Water Monitoring Program" by [illegible] [illegible] potentially misleading. Undoubtedly very few of the wells that were drilled into that aquifer and have no production rates recorded were dry holes. It is obvious that no State or local governmental agency has any knowledge of the total demand being placed upon the Merritt-Posey Aquifer, the fluctuations of that demand, and of what effect that demand has upon the equilibrium of the salt water/fresh water interface. This lack of knowledge is further evidenced by the fact that during the drought years of 1976 and 1977 at least 72 percent of the known water wells were drilled into the Merritt/Posey Aquifer, monitoring wells excluded, within the Oakland Harbor area (ACFCWCD's Well Inventory Report and DWR Records). The majority of these wells were drilled on Alameda Island and are recorded as irrigation wells.

While recognizing that the Department of Water Resource (DWR) study of 1981 concluded that the water quality in the vicinity of the Oakland Harbor in the Merritt-Posey Aquifer meets Secondary Drinking Water Standards, the quality of the ground water is not static but changes as the equilibrium of the salt water/fresh water interface is changed by the fluctuation of the demand placed upon the aquifer. As the demand increases, those wells located closest to the shore line have a greater potential for experiencing degradation of water quality than those further inland, and as previously discussed, there is ample opportunity for this degradation to occur should the demand for water from this aquifer increase in the future. It is also interesting to note that in a sewer system evaluation survey report for the City of Alameda, authored by The Eastshore Consultants (January 1986) for the East Bay Municipal Utility District, groundwater infiltration into the sewer system was found to be significant and occurring primarily in areas of sewers built prior to 1950 (a major central portion of Alameda Island) especially the private laterals which they assumed to be generally of poorer condition than the municipal system. Therefore, one can expect that sewer water can also enter the ground or, in this case, the Merritt Sand. Under drought conditions, or increase pumping demands, which will tend to pull down the water table, a greater potential for sewer water to enter the aquifer is created and thus will lead to a degrading of the water quality. Future increases in the utilization of the Merritt-Posey Aquifer can be expected to induce salt water intrusion and water quality degradation even if the current depth of the Oakland Harbor Channel floor were to remain unchanged. Completion of the channel improvements proposed by the Corps of Engineers would [illegible] in [illegible] of the groundwater [illegible] of the Merritt [illegible] Aquifer.

[illegible]

most well of each area. At the Alameda Island Naval Air Station berthing area's inland most monitoring well, slightly to moderately saline water with an average specific conductance of 5,280 micromhos was encountered at -7.6 meters (25 feet) MLLW and moderately saline water at -18.3 meters (60 feet) MLLW having an average specific conductance of 10,228 micromhos. A well screen was placed in the interval between -10.1 and -16.2 meters (33 and 53 feet) MLLW. Initial chloride ion concentration of water sampled from the screened interval in June 1987, was 971 milligrams per liter (mg/l). However, water sampled from the well in September 1987 had a lower chloride ion concentration, 352 mg/l, with a total dissolved solid concentration of 1,580 mg/l, and specific conductance of 4,368 micromhos, clearly exceeding the recommended limit of 250 mg/l chloride ion concentration of the National Secondary Drinking Water Regulations and exceeding its maximum upper limits of 1,000 mg/l for total dissolved solids and 1,600 micromhos for specific conductance. It is doubtful to unlikely that the water from the screened interval is usable for irrigation. The screened interval is very near, or at, the salt water/fresh water interface. The Navy's inland most monitoring well at the Oakland Naval Supply Center encountered moderately saline water having an average specific conductance of 4,967 micromhos at -13.7 meters (45 feet) MLLW. A well screen was placed in the interval between -5.5 and -11.9 meters (18 and 39 feet) MLLW. The chloride ion concentration from the initial sampling of water from the screened interval, taken in June 1987, was 280 mg/l, with a specific conductance of 1,509 micromhos. However, water sampled from that well in September 1987 had a lower cholride ion concentration of 99 mg/l with specific conductance of 954 micromohs and total disolved solids concentrations of 595 mg/l, meeting the National Secondary Drinking Water Regulations. Although the screened interval appears to lie above the salt water/fresh water interface, an increase in chloride ion concentration and in specific conductance of the water in the well will indicate if the salt water/fresh water interface is migrating further inland. The results of the Navy's groundwater monitoring program may be obtained from the Naval Facilities Engineering Command, Western Division, San Bruno, California.

An additional concern expressed by the San Francisco Bay Regional Water Quality Control Board (RWQCB), California State Department of Water Resources (DWR) and the Alameda County Flood Control and Water Conservation District (ACFCWCD) is that the deepening of the Oakland Harbor Channels might promote salt water intrusion into the deeper aquifers of the Alameda formation through unknown windows in the San Antonio Aquitard, or through abandoned wells that were drilled through the Aquitard into the Alameda Aquifer(s). Considering the full extent that historic dredging has exposed the Merritt Sand to salt water intrusion and the large areal extent of the Merritt Sand, as compared to [illegible] in the [illegible] of the pumping demand placed upon the Merritt Posey Aquifer. The ACFCWCD biennially samples two water wells that draw from the Alameda Formation near the Oakland Inner Harbor. According to their test results there appears to be no salt water intrusion at this time, and the ACFCWCD does not, to the Corps of Engineers knowledge, indicate in their Well Inventory Reports any wells drilled into the Alameda Aquifer's that have been abandoned due to salt water intrusion.

Appendix C presents a monitoring program that would allow predictive, numeric groundwater modeling of impacts on the Merritt Posey Aquifer due to future pumping demands in the Oakland Bayshore Area. This extensive and very expensive program is not proposed by the Army Corps of Engineers for implementation with the Oakland Harbor Channel Deepening project because of the extreme cost, limited extent of the aquifer, and limited project related impacts. A monitoring program has been developed through coordination with the S.F. Bay RWQCB and ACFCWCD to mitigate their concerns. This coordinated program consists of drilling a 45.7-meter (150-foot) well that would penetrate into the Alameda Formation and a well cluster comprised of two wells, 15.2-meter (50-foot), and 9.1-meter (30-foot) respectively, into the Merritt Posey Aquifer. The wells are to be located north of the Inner Harbor Turning Basin in Oakland.

Appendix C also discusses potential mitigation measures for salt water intrusion into the Merritt/Posey Aquifer. The mitigation measures discussed fall into the following categories:

a. Controlled aquifer utilization
b. Development of a pumping trough adjacent to the shoreline
c. Direct aquifer recharge
d. Maintenance of a freshwater pressure ridge above sea level
e. Construction of artificial subsurface barriers.

The development of artificial subsurface barriers are not practical since they are not totally efficient and since cost for an area as large as the channel improvement area would be economically unfeasible. In regards to direct aquifer recharge, Appendix C states "Direct aquifer recharge and development of a freshwater pressure ridge are not practical since these alternatives require water which could be utilized in place of groundwater development." It was, in essence, concluded that controlled aquifer development, perhaps in combination with a pumping trough, could be a practical method, but the effectiveness of this alternative could not be determined without more specific hydrologic data and aquifer characterization. Controlled aquifer utilization and development appear to be the most practical method of controlling any potential salt water intrusion into the Alameda Formation through either abandoned wells or hypothetical connection between the two aquifers. [illegible]

4.2. - Sediment Quality

4.2.1. - Data Collection.

Sediment core samples were collected from two reaches within Oakland Outer Harbor and three reaches within Oakland Inner Harbor in December, 1986. Core samples were taken to the project depth plus allowable over-depth. Bulk sediment analyses, elutriate tests and bioassay tests were performed for these samples.

In the chemical analyses of sediment taken from the Outer and Inner Harbors, a higher concentration of trace metals were found than that which occurs at the ocean disposal site. In an urban estuary, an elevated concentration of these metals (including arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) is to be expected. It is also noted that the mere presence of these contaminants does not mean that a biologically significant effect will occur as a result of dredging and disposal of this material.

Elutriate testing, taking into consideration extensive dilution at the dredging and disposal sites, indicated that water quality standards would not be exceeded as a result of the disposal of the material in the ocean. However, chemical testing of the elutriate does not provide information about possible synergistic effects of contaminants. To address these concerns and to assess the potential environmental effects of suspended sediment on the water column, suspended particulate animal bioassays were conducted. Examination revealed that no unacceptable water column impacts would occur as a result of dredging at Oakland Harbor and disposing in the ocean. Although the benthic organisms may not be directly impacted by the sediment quality, they can be suffocated due to the deposit of the material.

4.2.2. - Bioaccumulation.

Bioaccumulation data can be interpreted in relation to human health, but evaluation of ecological impacts of bioaccumulation is much less certain at present. Tentative assessment of the potential for such impacts must consider contamination in tissues of reference animals and other effects of the sediments, such as degree of toxicity. It should be noted that the ecological consequences of the bioaccumulation of contaminants is not well understood and is currently under extensive study by EPA, the Corps, and others in the scientific community.

At present, bioaccumulation data can be interpreted only by comparison to levels in organisms exposed to reference sediment and levels determined to be safe for human consumption (see Table ... Appendix A of the ...). [illegible] in aquatic systems for only a few contaminants, including polychlorinated biphenyls (PCB), DDT, and mercury, and possibly selenium, zinc, kepone, mirex, benzo(a)pyrene, and naphthalenes (Biddinger and Gloss, 1984; Kay, 1984). The above considerations lead to the recommendation that, until tissue concentrations are established for ecological protection, FDA-type levels should be applied to aquatic species that are seldom directly consumed by man (Peddicord et al., 1986).

Statistical differences in test data are only used as a tool to evaluate the variation in the response of test organisms (EPA/USACE, 1977). If the concentration of any contaminant in the tissue of any species exposed to test sediment is equal to or greater than the FDA-type limits (see Table 1), unacceptable benthic impacts are likely to occur when conventional open-water disposal techniques are used. In these cases, restrictions on open-water disposal, such as capping of contaminated material with clean material, may be considered to prevent adverse impacts in the field. If the concentration of any contaminant in the tissue of any organism exposed to test sediment is greater than the concentration in tissues of organisms exposed to reference material but less than FDA-type limits (or if there is no FDA-type limit for that parameter), Peddicord et al. (1986) recommends that the following eight factors be considered in order to determine if restrictions on disposal are required:

a. Number of contaminants of concern bioaccumulated to concentrations exceeding reference levels;

b. Number of phylogenetic groups of species showing bioaccumulation to concentrations exceeding reference levels;

c. Magnitude of contaminant concentrations in tissues of test organisms;

d. Magnitude of bioaccumulation above reference levels;

e. Toxicological importance of [illegible] concentrations exceeding reference levels [illegible]

f. [illegible] test sediment;

g. Magnitude [illegible]

h. [illegible]

[illegible]

[illegible] adjacent to [illegible] Steel and the former [illegible] Shipyard and to evaluate potential for bioaccumulation.

Specified chemical constituents were analyzed to assess the potential for long-term accumulation of [illegible] and toxicity in the food chain. These results were coordinated with [illegible] and indicated that bioaccumulation is not anticipated.

Additional sediment core samples were collected from the Inner Harbor turning basin area in December [illegible] and indicate possible elevated levels of contaminants. See Sec. [illegible] and Appendix A of the SEIS. Further testing of the material from this area is suggested to determine the acceptability for unrestricted aquatic disposal. However, since the timing for construction is critical, the material from this area will be considered as potentially unsuitable for unrestricted open water disposal. [illegible] would be provided as [illegible].

[illegible] - Conclusions.

With the exception of the turning basin area material, [illegible] is suitable [illegible] for unrestricted disposal [illegible] pursuant to the requirements of Section 103 of the Marine Protection, Research and Sanctuaries Act. Material from the [illegible] adjacent to the [illegible] Steel Company and the former [illegible] Shipyard will be isolated from the [illegible]

[illegible]

vicinity of the proposed disposal sites. Use of the sites by [illegible] the endangered whales would occur only during their migration to the north or south. Since the migratory corridor [illegible] the Farallones [illegible] the total significance of the proposed disposal sites is small. Any disposal operation [illegible] the mobile whales. Therefore, use of the [illegible] disposal sites for purposes of material disposal is not expected to result in adverse effects to the species. (See Appendix [illegible])

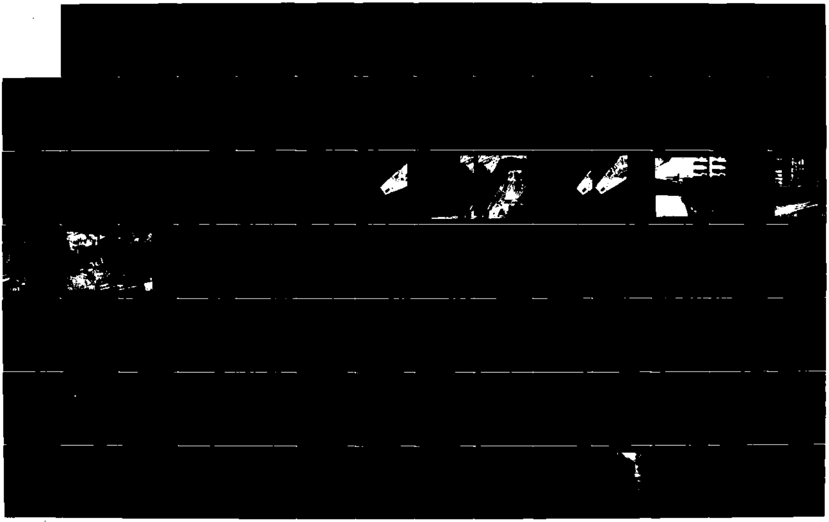
4.4. - Air Quality

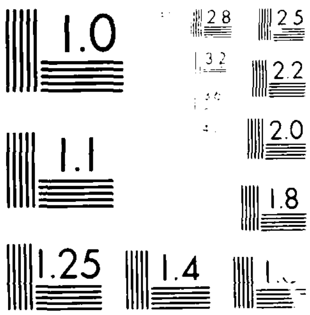
4.4.1. - Introduction

The purpose of the air quality [illegible] as the Clean Air Act provides [illegible] control. [illegible]

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 2/11

UNCLASSIFIED F/G 13/2 NL




1.0
2.8
2.5
3.2
2.2
1.1
2.0
1.8
1.25
1.4

1. Carbon monoxide: An odorless, invisible gas which [illegible] the health of people exposed to high concentrations over [illegible] time. About [illegible] percent of the San Francisco [illegible] pollution results from automobile [illegible].

2. Hydrocarbons: [illegible] containing carbon and hydrogen in various [illegible] especially in fossil fuels. Hydrocarbons [illegible] of sunlight with nitrogen [illegible] in the formation of [illegible] smog. The obvious effects of the oxidants produced by this smog [illegible] visibility reduction, vegetation damage, and eye irritation.

3. Oxides of nitrogen: About [illegible] percent of the air is nitrogen. Whenever anything burns at [illegible] certain amount of the nitrogen in the air [illegible] resulting combinations of nitrogen and [illegible] and nitrogen dioxide (NO_2) [illegible] known as oxides of nitrogen [illegible] reactions that produce smog. [illegible] directly to NO_2. [illegible] are produced by [illegible].

4.1.[illegible] - [illegible]

The potential air quality [illegible]

[illegible]

appropriate since the [illegible] would [illegible] from either the [illegible] or the [illegible] [illegible] would be in proximity to the [illegible] therefore the only [illegible]

The regional impact analysis [illegible] determines the impact on air quality [illegible] downwind from the [illegible] spend much of its time further than [illegible] regional impact would be even less [illegible] impact analysis includes dredge and [illegible]

Regional [illegible]

Project [illegible] [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The [illegible] [illegible] for all [illegible]

[illegible]

[illegible]

4.5. - Final Environmental [illegible]

The final [illegible] 1974. [illegible]

[illegible]

[illegible]

[illegible] Appropriate uses of the shoreline are also discussed in the bay plan. The policy on ports [illegible] calls for [illegible] harbors. The following [illegible] will be satisfied by the selected plan.

[illegible]

[illegible]

[illegible]

The feasibility [illegible] for the [illegible] disposal site. [illegible] disposed of at the [illegible] believe that this [illegible] would [illegible] system. Dredged material [illegible] disposed of in [illegible] from [illegible] in order to [illegible] cumulative impacts of the Oakland [illegible] improvement projects planned for the [illegible] which include [illegible] other disposal and management [illegible].

[illegible]

[illegible] of this regulation.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] from the [illegible] material [illegible] the EPA in [illegible] of the [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] the [illegible] shown [illegible] The [illegible] be performed [illegible]

[illegible]

[illegible]

[illegible]

6.2. - Compari[illegible]

Chan[illegible] in the [illegible]
and [illegible] with the [illegible]

TABLE [illegible]

[illegible]
(x$1,[illegible])

Cost Account No.	Description	Authorized Program [illegible]	[illegible]	[illegible]
	Proj[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Tot[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-
[illegible]	[illegible]	[illegible]	[illegible]	-
Tot[illegible]		[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

1) Mobilization and demobilization costs were considerably higher in the [illegible] due to the [illegible] of [illegible]

2) [illegible]

of the [illegible]

3) Navigation [illegible] by the Coast Guard, [illegible] part of the Coast Guard's maintenance program.

4) Rather [illegible] from the [illegible]

5) [illegible]

TABLE [illegible]

OAKLAND INNER HARBOR - COMPARISON OF COSTS
($1,000)

Cost Account No.	Description	Latest Project Cost [illegible]	[illegible]	[illegible] Pr[illegible]
	Project Costs			
09	Channel[2]	19,010	22,7[illegible]	27,2[illegible]
30	E & D	1,03[illegible]	[illegible]	1,5[illegible]
31	S & A	40[illegible]	[illegible]	1,[illegible]
0[illegible]	Dredging Berths	[illegible]	[illegible]	[illegible]
	Total [illegible]	21,[illegible]	[illegible]	[illegible]
	Navigation [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1[illegible]	[illegible]	[illegible]	[illegible]	-
	TOTAL [illegible]	[illegible]	[illegible]	[illegible]

[illegible]

4.2.[illegible]

[illegible]

6.2.4. - Project Cost - Inner Harbor.

The total project cost for the recommended plan is $[illegible], which includes $[illegible] in associated costs of dredging the berths (April 1987 price level), an increase from the total project cost of $27,500,000 (October 1984 price level) presented in the Feasibility Report and from $31,235,000 in the approved [illegible]. The change is due to the following:

1) Increase in project dredging costs due to selection of the B1 site, which was only partially offset by a decrease in project dredging costs due to the change in primary dredging method from a hydraulic cutterhead operation to a hopper operation, and reduction in the Federal dredging quantity.

2) Decrease in the costs for dredging the berths primarily due to a reduction in the [illegible] costs. [illegible] assur[illegible].

3) Addition [illegible] engineering and design costs [illegible] study.

4) [illegible]

	OUTER HARBOR	INNER HARBOR
FY 1988	$2,015,000	* $6,452,000
FY 1989	$17,860,000	$18,910,000
FY 1990		$8,763,000

* Includes Pre-Construction Engineering and Design costs of $2,000,000.

Interest during construction (IDC) was calculated monthly using the present discount rate of 8-5/8%. IDC costs were calculated beginning with the first quarter of FY 1988 (IDC on prior General Design Memorandum costs was brought up to FY 1988 conditions using the 8-5/8% rate). Because dredging to -38 feet in the Inner Harbor would begin accruing benefits in the fourth quarter of FY 1988, IDC on that work as well as the GDM was not calculated beyond that point. Interest during construction is displayed by quarter that the construction expenditures accrue below:

	Outer Harbor	Inner Harbor
First Quarter	$197,000	* $130,000
Second Quarter	369,000	* 13,000
Third Quarter	221,000	20,000
Fourth Quarter	125,000	246,000
Fifth Quarter	31,000	700,000
Sixth Quarter		428,000
Seventh Quarter		325,000
Eigth Quarter		225,000
Ninth Quarter		127,000
Tenth Quarter		32,000
TOTAL:	$943,000	$2,246,000

* Interest on Pre-Construction Engineering and Design Costs.

6.4. - Operations and Maintenance

6.4.1. - Federal.

Historical maintenance dredging records for the period 1976 through 1986 indicate that Oakland Outer Harbor has had an average of 119,000 cubic meters (155,000 cubic yards) of material dredged annually. In the same period, Inner Harbor dredged an average of 153,000 cubic meters (200,000 cubic yards) annually. The increased annual maintenance dredging quantities will be 72,000 cm (94,000 cy) and 107,000 cm (140,000 cy), for Outer and Inner Harbors, respectively, based on the equation:

$$Z_2 = Z_1 \frac{(d_2)^2}{(d_1)^2} \times \frac{\lambda_2}{\lambda_1}$$

where Z = annual dredging quantity, d = depth, λ = channel bottom surface area and the subscripts 1 and 2 apply to the existing and proposed conditions, respectively.

Maintenance dredging is presently performed on an annual cycle by Government hopper dredge, with disposal at the authorized Alcatraz site. Current hopper dredging costs, including engineering and design, and supervision and administration, are approximately $2.21 per cubic yard for Outer and Inner Harbors, based on April 1987 price levels. Future maintenance is assumed to be performed on an annual cycle. A clamshell dredge will maintain those areas which are inaccessible to the hopper dredge, such as the turning basins and maneuvering areas in the Inner Harbor. The increased annual maintenance costs attributable to this project, assuming availability of dredges, and disposal at Alcatraz, are $289,000 and $464,000 for the Outer and Inner Harbors, respectively.

6.4.2. - Non-Federal.

The berthing areas located adjacent to the Oakland Harbor Channels are currently maintained by local interests to depths compatible with the 35 feet below MLLW of the existing Federal Channel. Berthing depths deepened for compatibility with the -42 foot project depth of the improved Federal channel will not involve appreciable increases in non-Federal maintenance dredging.

6.5. - Average Annual Benefits

6.5.1. - Project Benefits

If the channel is deepened, larger vessels, which have lower operating costs per ton of cargo, can be expected to use the channel, and tidal delays would be reduced resulting in transportation savings benefits. These benefits have been updated from prior studies to December 1986 conditions based upon a detailed study of vessel operations at Oakland Harbor during the period of January through June 1982. The study provided more detailed data related to fleet size, underkeel clearances, risks, exchange factors and light loading that were incorporated into a computer model for purposes of updating project benefits for this report.

6.5.2. - Oakland Outer Harbor.

Benefits to be derived from the implementation of the recommended plan for Oakland Outer Harbor consist of transportation savings on cargo passing through the Outer Harbor. The updated (1986) Oakland Outer Harbor project benefits for dredging and maintenance to a depth of 42 feet below MLLW reflect current prices and a Federal discount rate of 8-5/8 percent. The benefits attributable to the Outer Harbor construction are $10,[illegible] annually.

6.5.3. - Oakland Inner Harbor.

Benefits to be derived from the [illegible] consist of transportation savings on cargo passing through the Oakland Inner [illegible]

Harbor. The benefits presented here reflect current (1986) prices and a discount rate of 8-5/8 percent. The value of project benefits for the Oakland Inner Harbor, dredged and maintained to a depth of 42 feet below MLLW, amount to $12,900,000 annually.

6.6. - Benefit/Cost Ratio

The ratio of benefits to costs for the Oakland Harbor project is shown in Table IX.

TABLE VI

OAKLAND HARBOR
ESTIMATED PROJECT FIRST COST
(April 1987 Price Levels)

Cost Account No.	Description	Quantity	Unit	Unit Price	Amount
	Clamshell direct to Site B1				
09	Mobilization and Demobilization	1	job	L.S.	$370,000
	OAKLAND OUTER HARBOR				
	Standard Dredging -11.3 to -12.8 meters (-37 to -42 feet)	2,042,165 (1,561,000	c.y. c.m.)	$6.30	12,866,000
	75% of Overdepth - 0.6 meters (2 feet)	702,770 (537,338	c.y. c.m.)	$6.30	4,427,000
	SUBTOTAL - OUTER HARBOR				17,293,000
	OAKLAND INNER HARBOR				
	Standard Dredging -11.3 to 12.8 meters (-37 to -42 feet)	2,798,583 (2,139,797	c.y. c.m.)	$6.55	18,331,000
	75% of Overdepth - 0.6 meters (2 feet)	830,485 (634,989	c.y. c.m.)	$6.55	5,440,000
	SUBTOTAL - INNER HARBOR				23,771,000
	SUBTOTAL				41,434,000
	CONTINGENCIES (±15%)				5,655,000
	SUBTOTAL				47,089,000
30	Preconstruction Engineering and Design (PED)				863,000
30	Engineering and Design (±4%)				1,713,000
31	Supervision and Administration (±6%)				2,570,000
	TOTAL NAVIGATION COST				$52,235,000
01	Lands, Easements and Rights-of-way				290,000
02.3	Navy Sewer Relocation				1,687,000
09	Navigation Aids				50,000
	TOTAL FIRST COST				$54,000,000

TABLE VII

OAKLAND HARBOR
ASSOCIATED COSTS (DREDGING OF BERTHS)
(April 1987 Price Levels)

Cost Account No.	Description	Quantity	Unit	Price	Unit Amount
	Clamshell direct to Site B1				
09	Mobilization and Demobilization	1	job	L.S.	$35,000
	OAKLAND OUTER HARBOR				
	Standard Dredging -11.3 to -12.8 meters (-37 to -42 feet)	346,000 (264,552	c.y. c.m.)	$6.30	2,180,000
	75% of Overdepth - 0.6 meters (2 feet)	109,000 (83,341	c.y. c.m.)	$6.30	687,000
	SUBTOTAL - OUTER HARBOR				2,867,000
	OAKLAND INNER HARBOR				
	Standard Dredging -11.3 to 12.8 meters (-37 to -42 feet)	77,000 (58,874	c.y. c.m.)	$6.55	504,000
	75% of Overdepth - 0.6 meters (2 feet)	31,000 (23,703	c.y. c.m.)	$6.55	203,000
	SUBTOTAL - INNER HARBOR				707,000
	SUBTOTAL				3,609,000
	CONTINGENCIES (±15%)				541,000
	SUBTOTAL				4,150,000
30	Engineering and Design (±3%)				124,000
31	Supervision and Administration (±5%)				207,000
	TOTAL ASSOCIATED COSTS				$4,481,000

TABLE VIII

ESTIMATE OF FIRST COST FOR RELOCATION
OF THE NAVY SANITARY SEWER
OAKLAND INNER HARBOR
(April 1987 Price Level)

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
U.S. NAVY 16" DIAMETER SEWER MAIN RELOCATION				
Mobilization & Demobilization	1	job		$142,600
Dredge Pipe Trench (Clamshell) To Ocean Site B1	32,700 (25,000	c.y. c.m.)	$11.74	384,000
Dredge Sand Borrow (Clamshell) and Backfill Primary Trench	6,000 (4,588	c.y. c.m.)	8.53	51,000
Remove and Replace Riprap Channel Slopes	884 (766	tons tons metric)	31.25	28,000
Furnish and install 40-cen (16-inch) Diameter Cast Iron Flexible Joint Pipe & Fittings	870 (265	l.f. meter)	518.00	452,000
Remove and Dispose of Existing 40-cen (16-inch) Diameter C.I. Pipe	660 (201	l.f. meter)	195.00	129,000
Install (40-cen) 16-inch Diameter Pipe Valves	4	ea.	11,000.00	44,000
SUBTOTAL				$1,230,600
CONTINGENCIES (±30%)				325,000
SUBTOTAL				1,548,000
Engineering and Design (±5%)				68,900
Supervision and Administration (±7%)				96,400
TOTAL - Sewer Line Relocation				$1,542,500
Up-grade to 45.7-cen (18-inch) line				1,687,000

TABLE IX

ANNUAL BENEFIT TO COST COMPARISON
(x$1,000)

DESCRIPTION		COST
Project First Cost		$54,000
Associated Costs		4,481
Interest During Construction		3,189
TOTAL INVESTMENT COST		$61,670
Capital Recovery Factor (CRF) 8-5/8% for 50 years	0.08765	
Annualized First Cost		5,405
Annual Maintenance		753
AVERAGE ANNUAL COST		6,158
AVERAGE ANNUAL BENEFITS *		26,800
NET BENEFITS		20,642
BENEFIT TO COST RATIO (B/C)	4.4	

* No associated benefits are claimed

SECTION SEVEN

7. - COST ALLOCATION

7.1. - Allocation by Purpose

The costs of the recommended plan for Oakland Harbor have been allocated entirely to commercial deep-draft navigation. The recommended project costs include dredging of the Federal navigation channels, dredging of the turning basin, installation of aids to navigation, dredging of the non-Federal berthing areas (an associated cost), and modifications to the Navy sanitary sewer line which crosses the Estuary.

7.2. - Cost Apportionment

Apportionment of the project costs between Federal and non-Federal is as specified in the Water Resources Development Act of 1986, 99th Congress, 2nd Session, PL99-662, the authorization for the project construction. The cost sharing, given in detail in the Local Cooperation Agreement (See Section 3.00 and Appendix A), states that the Local Sponsor (the Port of Oakland) is to pay for 10% of the cost of dredging to 6.1 meters (20 feet), and 25% of the cost of dredging from 6.1 meters to 13.7 meters (20 feet to 45 feet), with this proportion (approximately 24.8% to be applied towards dredging of the 0.6 meters (2 feet) of overdepth, mobilization and demobilization, engineering and design, and supervision and administration. This amount will be placed in an escrow account the beginning of each fiscal year, prior to proceeding with work. In addition, the Local Sponsor is to pay 10% of the project first cost over a period of 30 years. This 10% is partially offset by any costs of lands, easements and rights-of- way. The Local Sponsor is to pay for all dredging of berths and relocations of utilities, with the exception of the Navy sewer line which is a project cost. The apportionment is shown in Table X.

TABLE X
COST APPORTIONMENT
(April 1987 Price Levels)
Clamshell to Ocean Site B1

FEDERAL COSTS	OUTER HARBOR	INNER HARBOR	TOTAL
09 Mob and Demob	$132,000	$146,000	$278,000
Dredging to 20'	$66,000	$140,000	$206,000
Dredging 20' to 42'	$9,587,000	$13,617,000	$23,204,000
Overdepth (2')	$3,322,000	$4,082,000	$7,404,000
Contingencies	$1,789,000	$2,455,000	$4,244,000
30 E&D	$785,000	$1,148,000	$1,933,000
31 S&A	$813,000	$1,116,000	$1,929,000
09 Navigation Aids		$60,000	$60,000
02.3 Navy Sewer Reloc.		$1,266,000	$1,266,000
TOTAL FEDERAL FIRST COST	$16,500,000	$24,000,000	$40,500,000
NON-FEDERAL COSTS			
09 Mob and Demob	$44,000	$48,000	$92,000
Dredging to 20'	$17,000	$35,000	$52,000
Dredging 20' to 42'	$3,196,000	$4,539,000	$7,735,000
Overdepth (2')	$1,105,000	$1,358,000	$2,463,000
Contingencies	$595,000	$816,000	$1,411,000
30 E&D	$261,000	$382,000	$643,000
31 S&A	$270,000	$371,000	$641,000
01 Lands, Easements and Rights-of-way		$290,000	$290,000
02.3 Navy Sewer Reloc.		$421,000	$421,000
TOTAL NON-FED. FIRST COST	$5,500,000	$8,000,000	$13,500,000
TOTAL PROJECT FIRST COST	$22,000,000	$32,000,000	$54,000,000

SECTION EIGHT

8. - LOCAL COOPERATION

8.1. - Coordination with Local Interests

The Department of the Army has entered into a local cooperation agreement with the Port of Oakland for the construction and maintenance of the Oakland Harbor Deep Water Ship Channels. The Local Cooperation Agreement is presented in total in Appendix D.

8.2. - Local Cooperation Agreement

The obligations of the local sponsor are specified in Article II of the Local Cooperation Agreement between the Department of the Army and the Port of Oakland for Construction and Maintenance of Navigation Improvements at Oakland Outer and Inner Harbors, which reads in part as follows:

Article II - OBLIGATIONS OF PARTIES

a. The Local Sponsor shall provide and maintain, at its own expense, all project facilities other than those for general navigation, including dredged depths in berthing areas and local access channels serving the general navigation features commensurate with those in related general navigation features.

b. The Local Sponsor shall provide to the Government all lands, easements, and rights-of-way, including dredged material disposal areas, and perform all relocations or alterations of facilities other than utilities governed by paragraph c. below (except relocations or alterations of highway and railway bridges), determined by the Government to be necessary for construction, operation, or maintenance of the project.

c. The Local Sponsor shall perform or assure performance of all utility relocations, including the Navy sanitary sewer, or alterations determined by the Government to be necessary for construction, operation, or maintenance of the project.

d. The Local Sponsor shall provide, operate and maintain without cost to the Government adequate public terminals and transfer facilities open to all on equal terms.

e. To the extent it is legally empowered to do so, the Local Sponsor shall prohibit erection of any structure within [illegible] feet of the project channel lines.

f. The Local Sponsor shall provide, during the period of construction, a cash contribution equal to the following percentages of the total cost of construction of the general navigation facilities assigned to commercial navigation:

10 percent of the costs attributable to the portion of the project which has a depth not in excess of [illegible] feet:

25 percent of the costs attributable to the portion of the project which has a depth in excess of 20 feet but not in excess of 45 feet:

g. The Local Sponsor shall repay with interest, over a period not to exceed 30 years following completion of the general navigation features of the project or separable element thereof, an additional 0 to 10 percent of the total cost of construction of general navigation facilities assigned to commercial navigation, depending on the value, as calculated under Article IV hereof, of items prvoided pursuant to paragraph b. of this Article. If the credit allowed for such items is less than 10 percent of the total cost of construction of general navigation features, the Local Sponsor shall repay a percentage of such local cost equal to the difference between 10 percent of the total cost and the percentage of the total cost represented by the value of such items. If the credit allowed is equal to or greater than 10 percent of said total cost, the Local Sponsor shall not be required to repay any additional percentage of the total cost.

h. The Government, subject to and using funds provided by the Local Sponsor and appropriated by Congress, shall expeditiously construct the general navigation features of the project (including relocations or alterations of highway and railway bridges), applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The Local Sponsor shall be afforded the opportunity to review and comment on all relevant plans and specifications prior to the issuance of invitations for bids. The Local Sponsor also shall be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor to the maximum extent feasible. The Local Sponsor will be supplied with a copy of all modifications and change orders. The Government will consider the views of the sponsor, but award of the contracts and performance of the work thereunder shall be exclusively within the control of the Government.

i. The Government shall operate and maintain the general navigation features of the project.

j. The Government shall acquire such interests as are necessary to construct, operate and maintain those portions of the Project lying within the City of Alameda. The Government will coordinate the selection of the appraiser with the Local Sponsor and copies of the approved appraisal reports will be provided the Local Sponsor.

ARTICLE III - LANDS, FACILITIES, AND RELOCATION ASSISTANCE

a. Prior to the advertisement of any construction contract, the Local Sponsor shall furnish to the Government all lands, easements and rights-of-way, including suitable borrow and dredged material disposal areas, as may be determined by the Government to be necessary for construction, operation, and maintenance of the general navigation features, and shall furnish to the Government evidence supporting the Local Sponsor's legal authority to grant rights-of-entry to such lands.

b. The Local Sponsor shall provide or pay to the Government the full cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, determined by the Government to be necessary for construction, operation, or maintenance of the general navigation features.

c. The Local Sponsor shall reimburse the Government for all costs associated with the Government's acquisition of such interests as are necessary to construct, operate and maintain those portions of the Project lying within the City of Alameda.

d. Upon notification from the Government, and subject to the Government's acquisition of interests in the City of Alameda and the Government's furnishing to the Local Sponsor rights-of-entry pursuant to said interests, the Local Sponsor shall accomplish all necessary alterations and relocations of buildings, highways, railroads, storm drains, and other facilities, structures, and improvements.

e. Upon notification from the Government, the Local Sponsor shall perform or assure performance of all necessary alterations and relocations of pipelines, cables, and other utilities, including the Navy sanitary sewer. Nothing herein shall be deemed to affect the ability of the Local Sponsor to seek compensation from other non-Federal entities for costs it incurs under this paragraph.

f. The Local Sponsor shall comply with the applicable provisions of the Uniform Relocations Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, Approved January 2, 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

NOTE: Article II, Paragraph c. indicates that relocation of the Navy sanitary sewer is a local responsibility. It has since been determined that this is a project cost and cost shared similarly (75% Federal and 25% non-Federal).

SECTION NINE

9. - CONCLUSIONS AND RECOMMENDATIONS

9.1. - Conclusions.

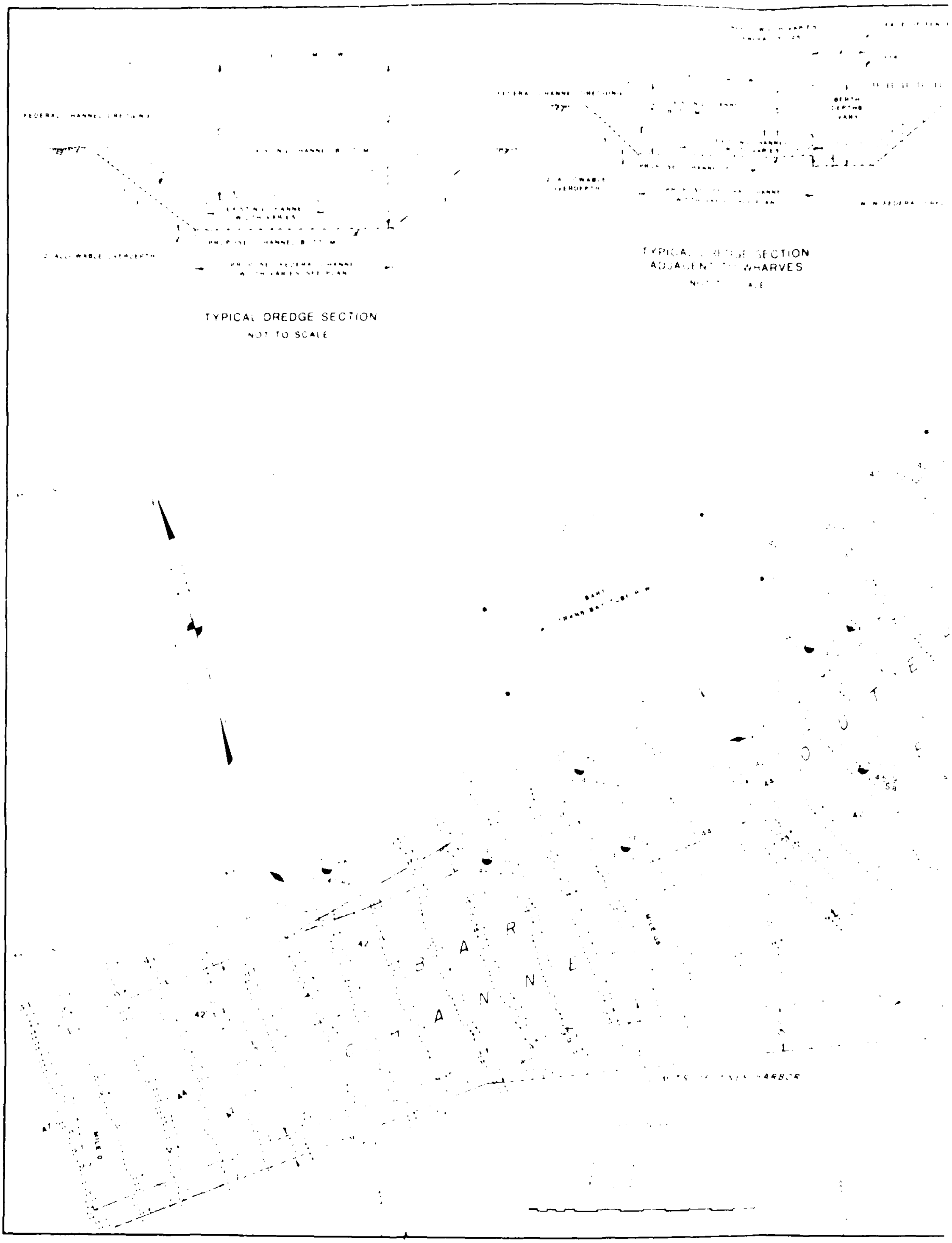
The District Engineer concludes that the widening and deepening of the Oakland Outer and Inner Harbor navigation channels as described herein is in conformance with the expressed concerns and needs of the local interests and is justified on a basis of tangible project benefits, in the form of monetary transportation savings in excess of project costs. The District Engineer concludes that the assurances of financial cooperation provided by the local interests are satisfactory and that the local interests maintain the capability to furnish the required cooperation. Furthermore, the District Engineer concludes that the departures from the authorized plan of improvement, which are presented in this General Design Memorandum, are minor modifications necessary to realize the intent of the project proposed for construction.

9.2. - Recommendations.

Recommend the approval of this GDM as the basis for the preparation of contract plans and specifications.

Galen H Yanagihara

GALEN H. YANAGIHARA
COL, CE
Commanding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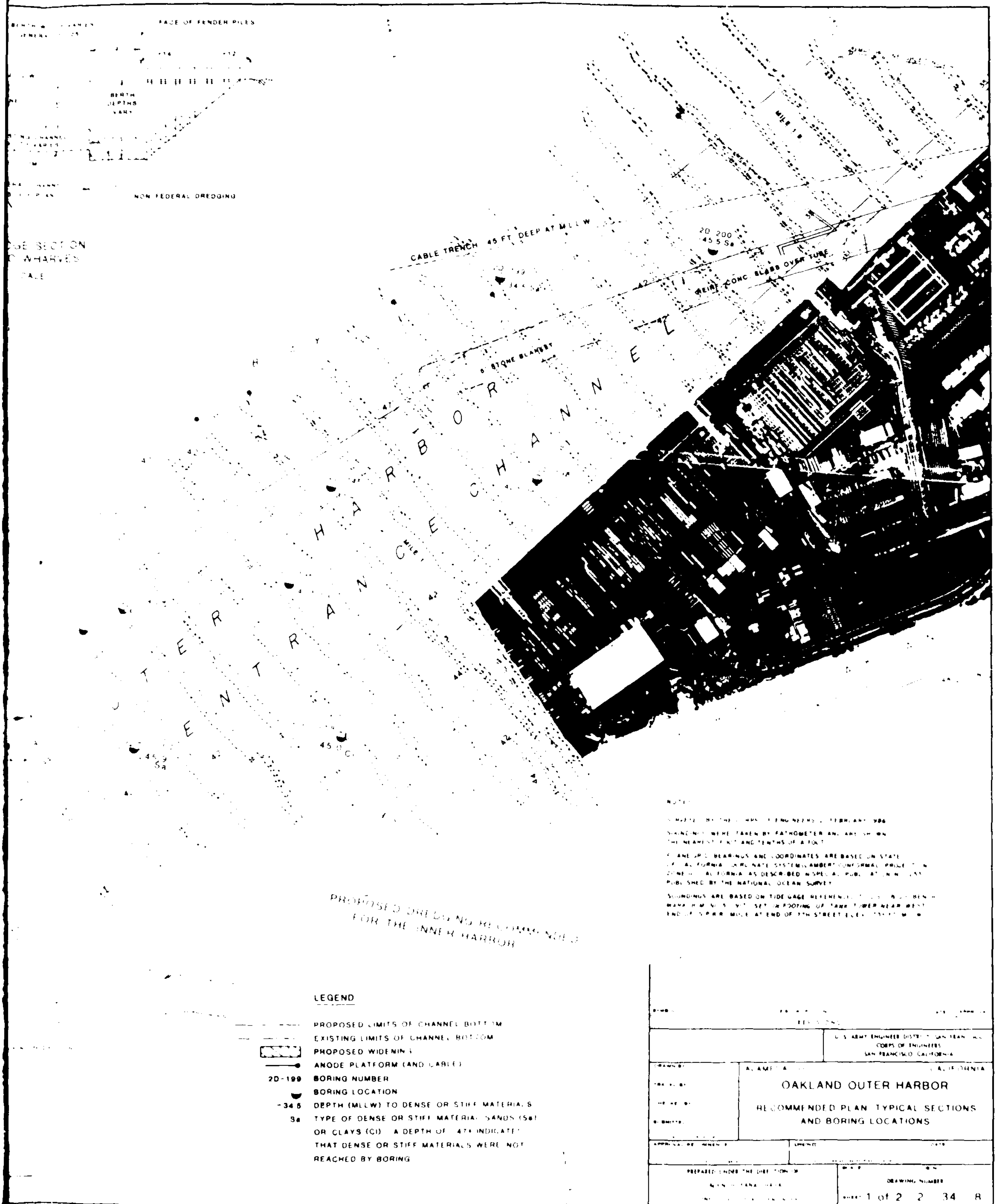
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ENTRANCE CHANNEL
PROPOSED DREDGING RECOMMENDED FOR THE INNER HARBOR
LEGEND
PROPOSED LIMITS OF CHANNEL BOTTOM
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PROPOSED WIDENING
ANODE PLATFORM (AND CABLE)
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U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
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ALAMEDA CALIFORNIA
OAKLAND OUTER HARBOR
RECOMMENDED PLAN TYPICAL SECTIONS AND BORING LOCATIONS
PREPARED UNDER THE DIRECTION OF
DRAWING NUMBER
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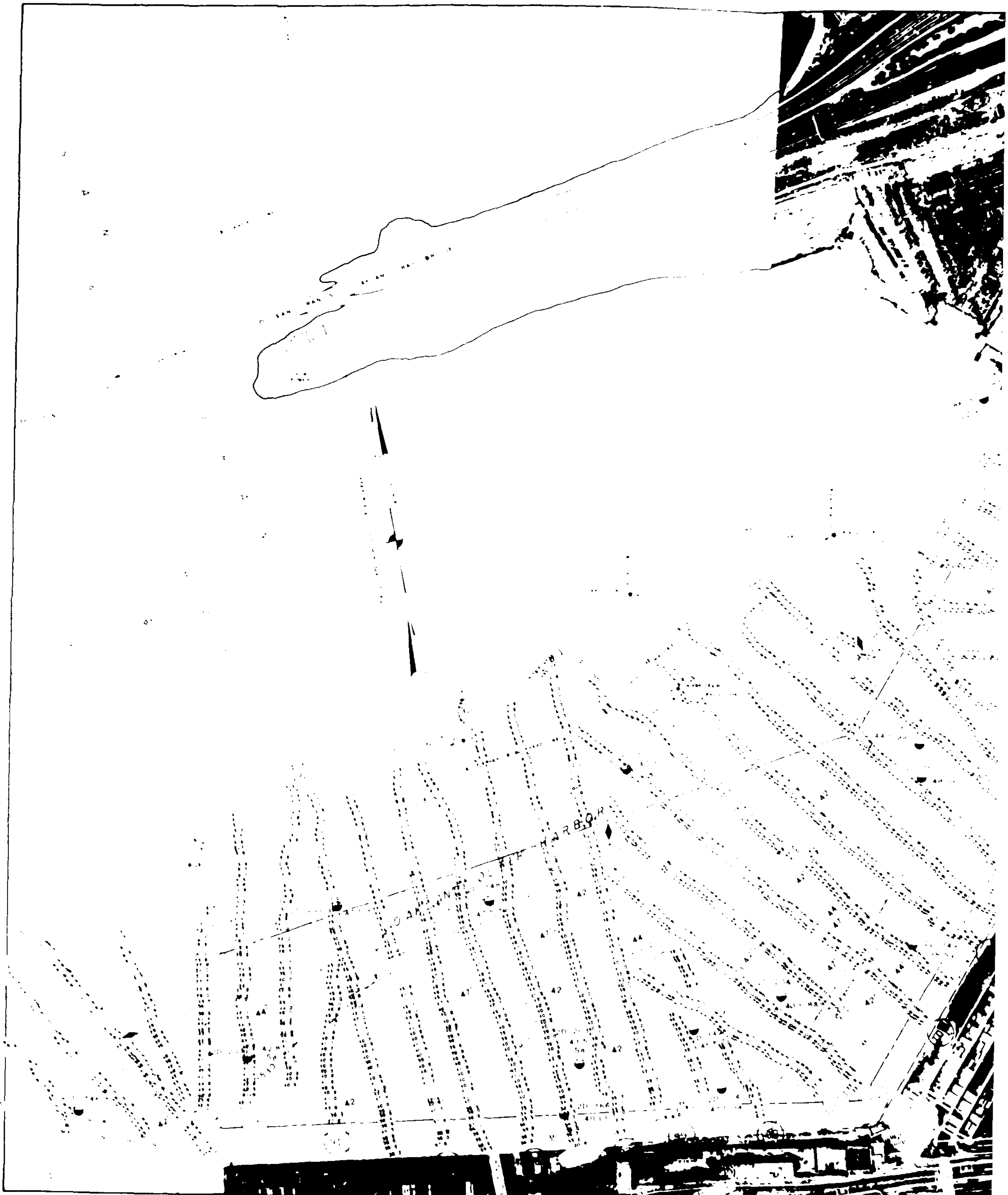
PLATE




REVISIONS
U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA
OAKLAND OUTER HARBOR
RECOMMENDED PLAN
PREPARED UNDER THE DIRECTION OF
DRAWING NUMBER
2 of 2

PLATE 2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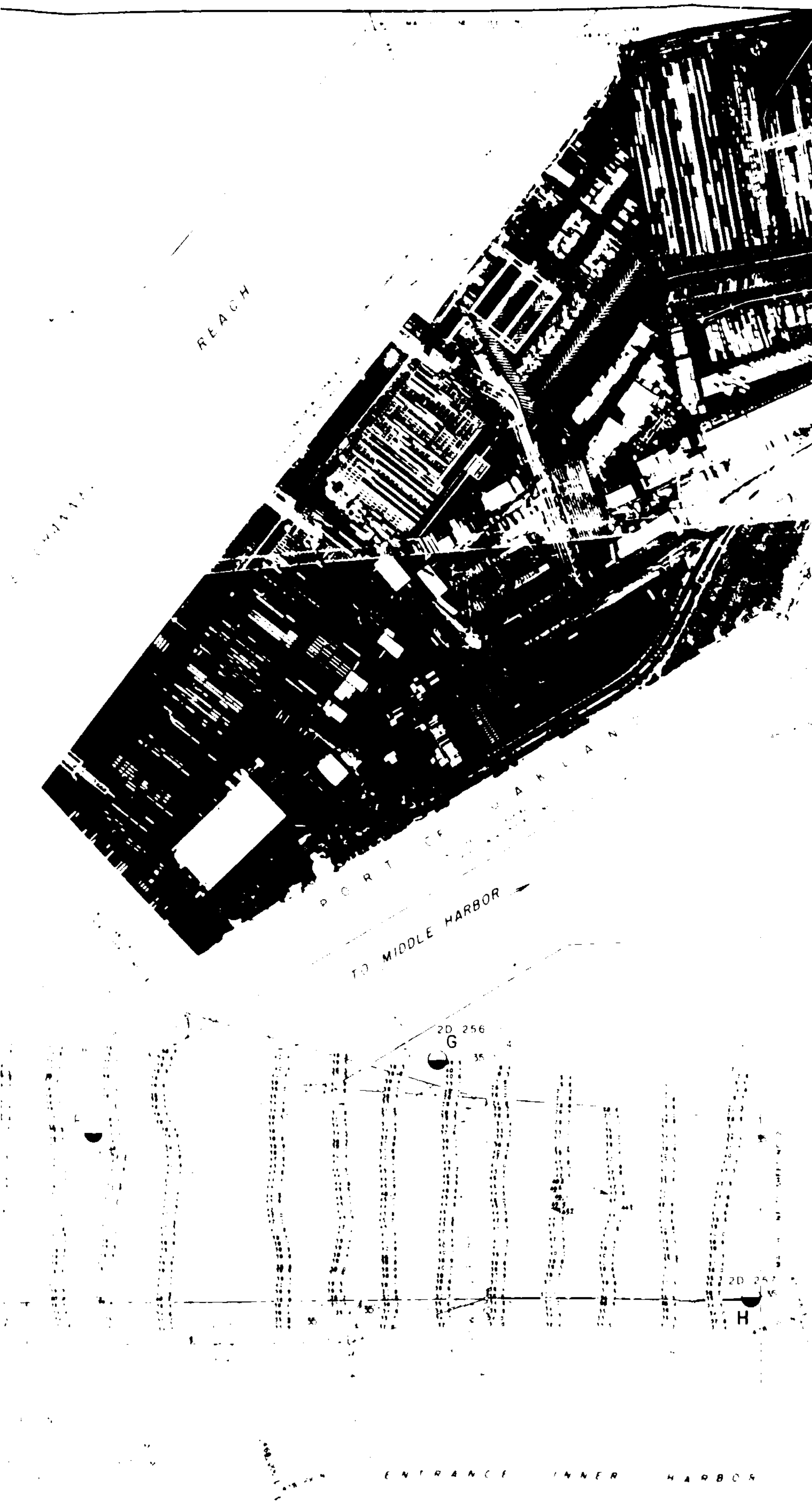


SYMBOL	DESCRIPTION	DATE	APPROVAL

REVISIONS

U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO CALIFORNIA

DRAWN BY
TRACED BY
CHECKED BY
SUBMITTED

ALAMEDA COUNTY CALIFORNIA

OAKLAND INNER HARBOR

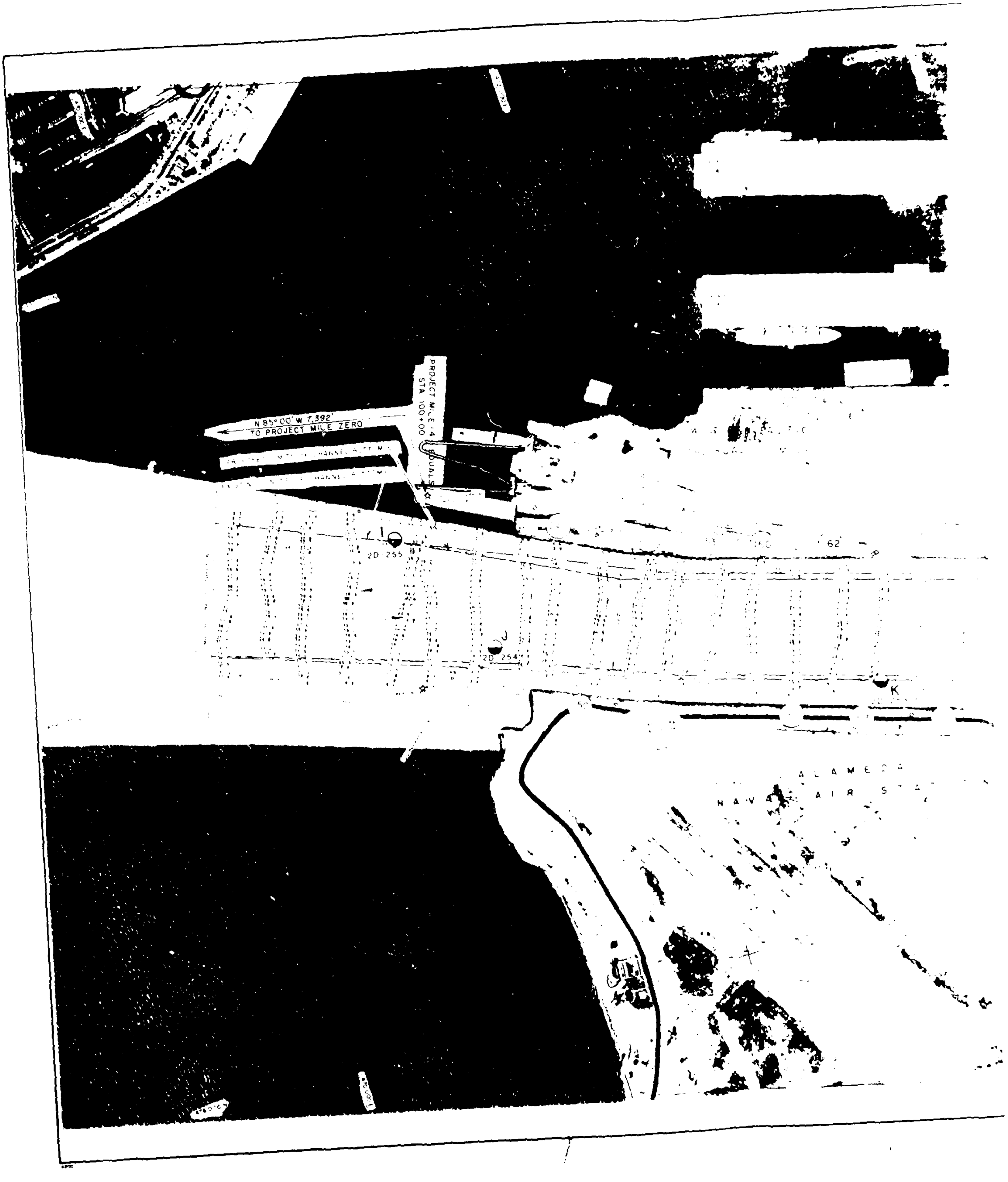
RECOMMENDED PLAN

APPROVAL RECOMMENDED
APPROVED
DATE

PREPARED UNDER THE DIRECTION OF
GALEN H. YANAGIHARA
COLONEL C.E. DISTRICT ENGINEER

SCALE 1" = 200'
DRAWING NUMBER
SHEET 1 of 4 2 2 335

PLATE 3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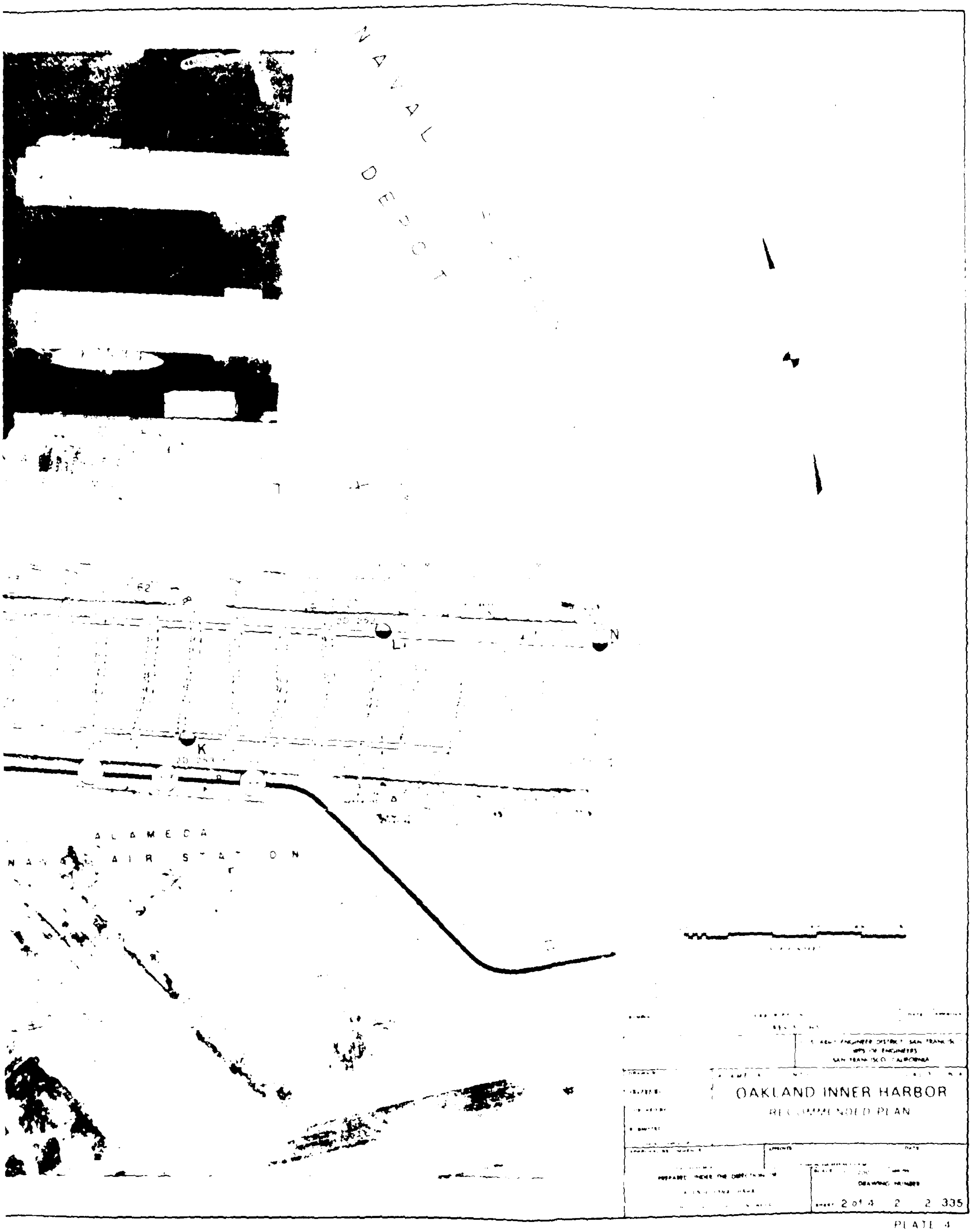
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OAKLAND INNER HARBOR
RECOMMENDED PLAN
DRAWING NUMBER
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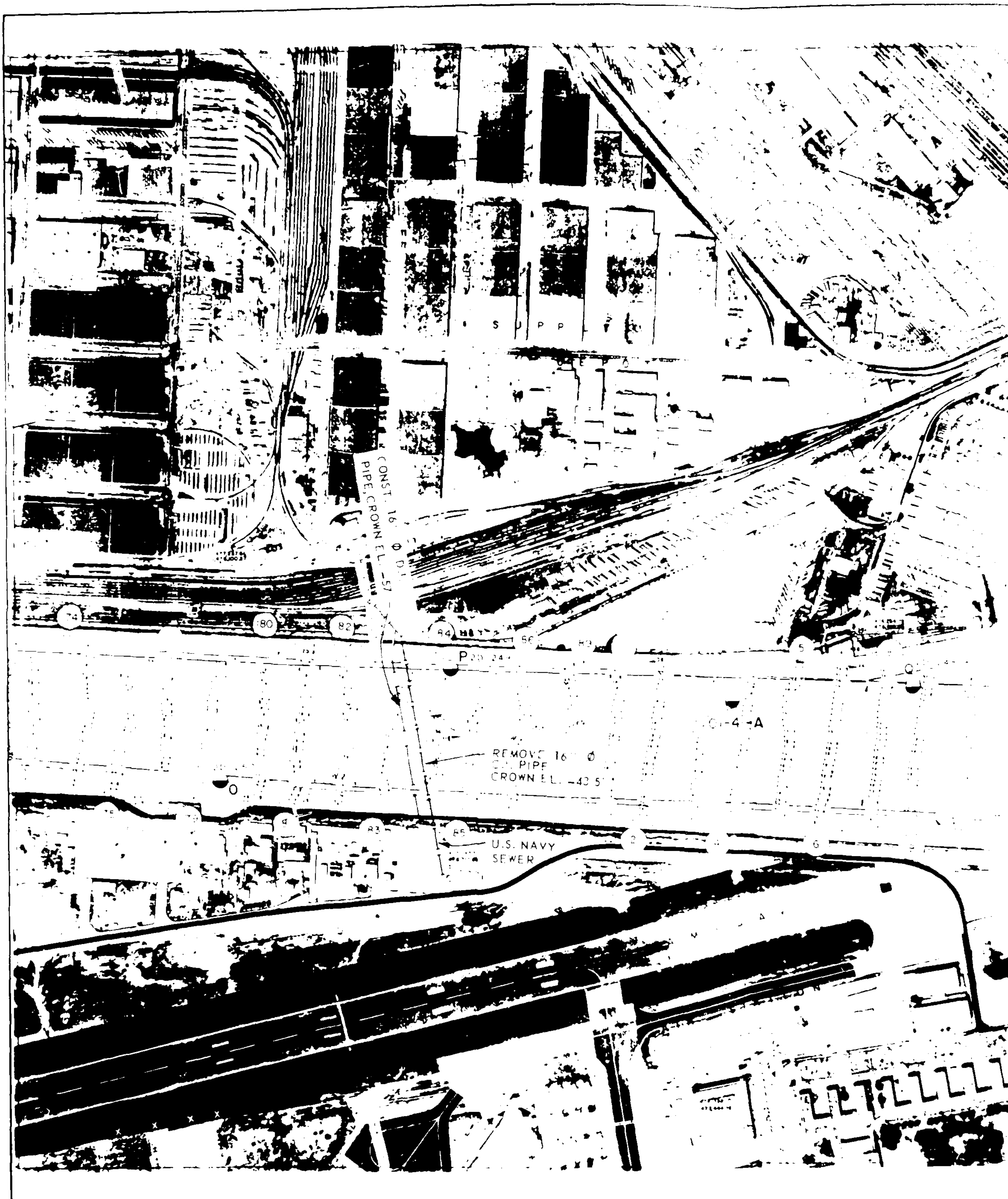
PLATE 4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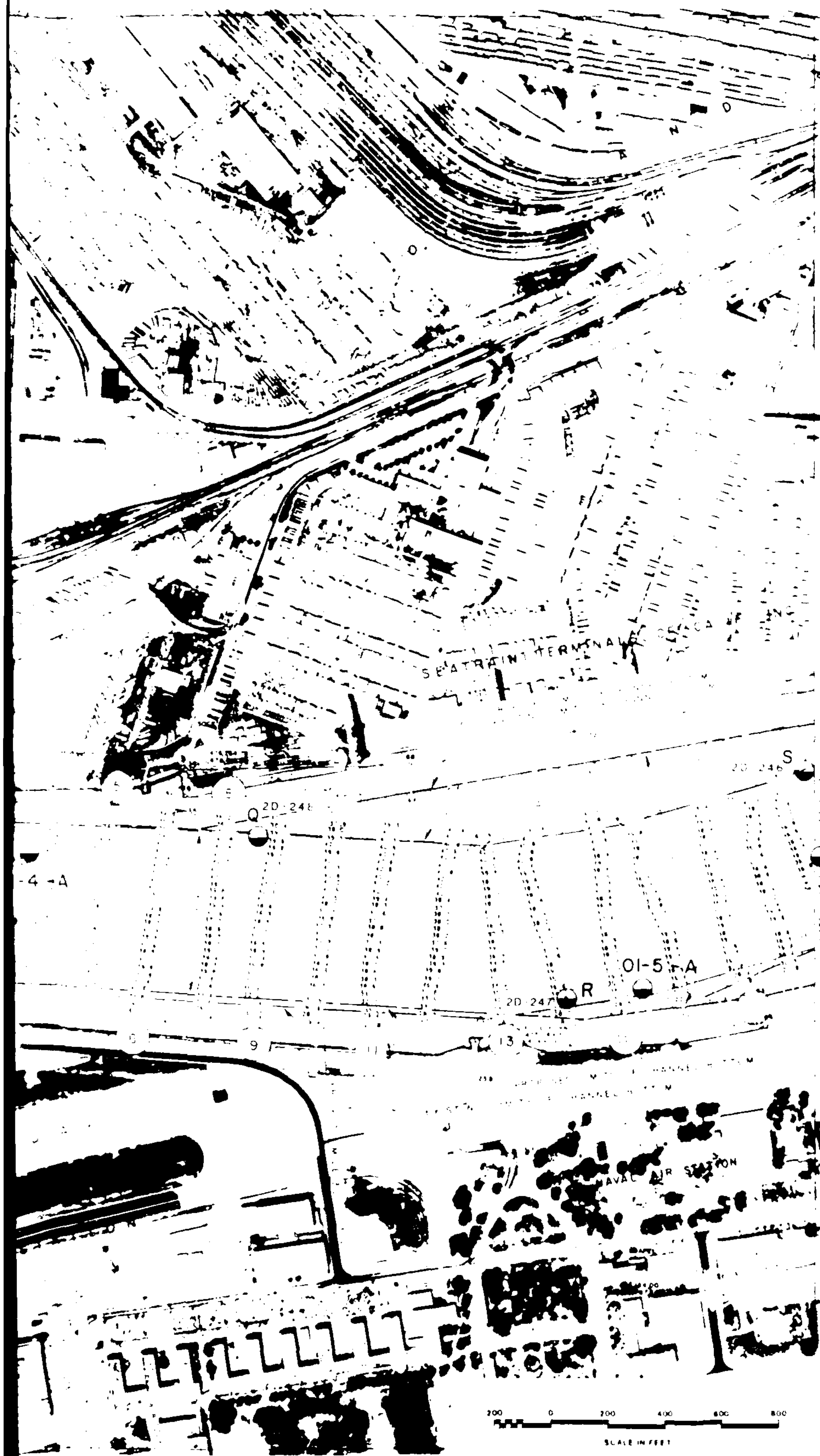

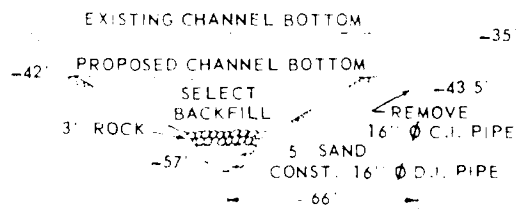

TYPICAL CROSS-SECTION
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U. S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

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SUBMITTED

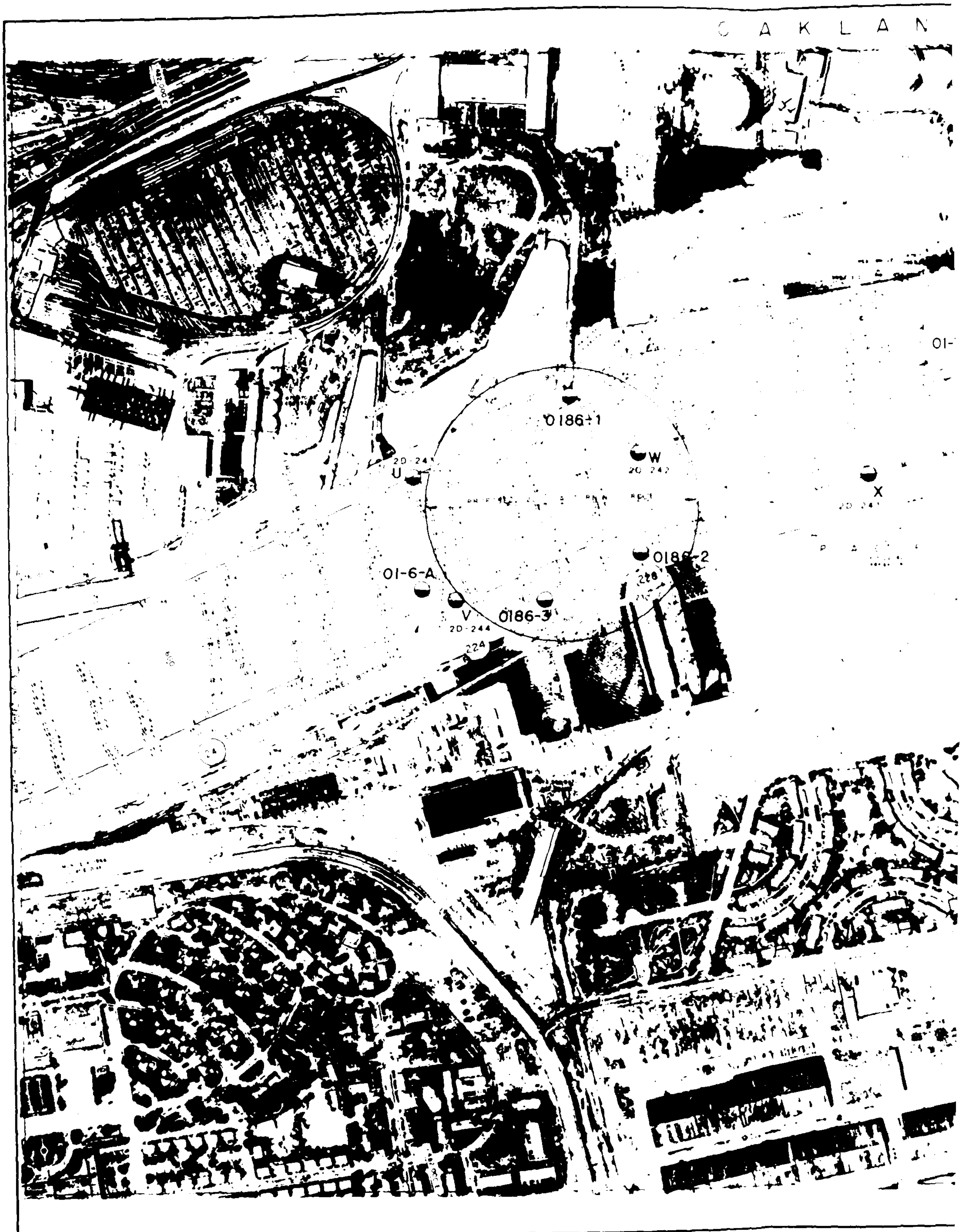
ALAMEDA COUNTY — CALIFORNIA

OAKLAND INNER HARBOR
RECOMMENDED PLAN

APPROVAL RECOMMENDED — APPROVED — DATE

PREPARED UNDER THE DIRECTION OF
GALEN H. YANAGIHARA
COLONEL, C.E., DISTRICT ENGINEER

SCALE 1" = 200'
DRAWING NUMBER
SHEET 3 of 4 — 2 2 335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SHEET INDEX

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SYMBOL | DESCRIPTION | DATE | APPROVAL

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U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

DRAWN BY
TRACED BY
CHECKED BY
SUBMITTED

ALAMEDA COUNTY CALIFORNIA

OAKLAND INNER HARBOR

RECOMMENDED PLAN

APPROVAL RECOMMENDED | APPROVED | DATE

PREPARED UNDER THE DIRECTION OF
GALEN H. YANAGIHARA
COLONEL, CE, DISTRICT ENGINEER

SCALE 1" = 200'
DRAWING NUMBER
SHEET 4 of 4 2 2 335

PLATE 6

FINAL SUPPLEMENT I
TO THE
FINAL ENVIRONMENTAL IMPACT STATEMENTS

OAKLAND OUTER AND OAKLAND
INNER HARBORS DEEP-DRAFT NAVIGATION
IMPROVEMENTS

ALAMEDA COUNTY, CALIFORNIA

FINAL SUPPLEMENT I TO THE FINAL ENVIRONMENTAL IMPACT STATEMENTS

OAKLAND OUTER AND OAKLAND INNER HARBORS DEEP-DRAFT NAVIGATION IMPROVEMENTS

ALAMEDA COUNTY, CALIFORNIA

United States Army Corps of Engineers
San Francisco District

211 Main Street
San Francisco, California 94105

March 1988

FINAL SUPPLEMENT NUMBER 1 TO
THE ENVIRONMENTAL IMPACT STATEMENTS
OAKLAND OUTER AND OAKLAND INNER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA

The responsible lead agency is the U.S. Army Corps of Engineers, San Francisco District. The responsible cooperating agency is the Port of Oakland.

Abstract: The San Francisco District has been authorized by the Water Resources Development Act of 1986, 99th Congress, 2nd Session, P. L. 99-662 to deepen the navigation channels in the Oakland Outer and Oakland Inner Harbors. Environmental impacts of the projects were evaluated in the Final Environmental Impact Statements filed with the Environmental Protection Agency in 1981 and 1985. This Supplement to the FEIS's has been prepared to address the changes related to disposal and disposal site. The Alcatraz site was originally selected for disposal of dredged material from the Oakland projects; however, dredged sediment deposited there has been accumulating. Results of recent disposal studies at the Alcatraz site indicate that accumulation will continue even with material disposed in slurried form, and that the site would be filled to near capacity with the addition of material from the Oakland Channels. Maintenance of access to terminal facilities and marinas, and provision of adequate berthing depths for both deep-draft vessels and small craft is essential to the economy of the Bay Area. Potential loss of capacity at the Alcatraz site would jeopardize maintenance dredging, thereby affecting maritime interests throughout the Bay.

Other in-Bay, and upland sites have been examined and found limited in availability or unacceptable for receiving material from the Oakland projects; therefore, several ocean disposal sites have been evaluated and ocean disposal B1 site (located approximately 30 nautical miles from the Golden Gate Bridge) has been selected for dredged material disposal. Three disposal alternatives for the Oakland project have been examined. Direct ocean disposal at B1 is selected because the disposal site has the least value to the local fishing industry. The selected alternative ensures that the Alcatraz site remains available for on-going disposal activities.

SEND YOUR COMMENTS TO
THE DISTRICT ENGINEER
BY: 25 APRIL 1988

If you would like further information on this SEIS, please contact:
Patricia Duff or Brian Walls
U.S. Army Corps of Engineers,
San Francisco District,
211 Main Street, San Francisco
California 94105
(415) 974-0441 or (415) 974-0444

SUMMARY

FINAL SUPPLEMENT I TO
THE FINAL ENVIRONMENTAL IMPACT STATEMENTS

OAKLAND OUTER AND OAKLAND INNER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA

( ) ADMINISTRATIVE DRAFT SUPPLEMENT (X) FINAL SUPPLEMENT

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1. Name of Action: (x) Administrative ( ) Legislative

2. Description of Actions:

a. Channel Dredging - The recommended plan for deep-draft navigation improvements to the Oakland harbors would deepen the Outer and Inner Harbor channels from an authorized -11 meters (m) (-35 feet [ft]) MLLW to -13 m (-42 ft) MLLW. Approximately 12.8 kilometers (km) (3.4 miles [mi]) of the Outer Harbor would be deepened and the turning basin would be relocated, deepened and enlarged. Approximately 6 km (4 mi) of the Inner Harbor channel would be deepened between the Entrance Channel reach and the Clay Street Pier. The channel would be widened at the Inner harbor entrance, at project kilometer 5 (project mile 3) and at the upper end of the project. A turning basin would also be provided.

b. Disposal of Materials - As originally planned, dredged material from the project was to be disposed at the Alcatraz disposal site. Material was to be disposed in slurried form in order to promote dispersion and movement of sediment through the Golden Gate and out of the bay system. Material from continued disposal of dredged material has accumulated at Alcatraz more rapidly than it has dispersed even though a requirement for disposal of slurried material is in place. Disposal of approximately 5.4 million cubic meters (m^3) (7.0 million cubic yards [yd^3]) of slurried material from the Oakland channels at the Alcatraz disposal site its capacity would be reduced significantly unless material were removed from the Alcatraz site to minimize the impact of potential accumulation. In order to maintain a viable in-Bay disposal site for Corps maintenance dredging and regulatory projects, additional disposal sites and disposal alternatives for the Oakland project have been evaluated. The selected disposal alternative includes ocean disposal of hte material while conserving continued use of the Alcatraz site.

c. Environmental impacts of the authorized navigation improvements were assessed in the FEIS, Oakland Outer Harbor Deep-Draft Navigation Improvements and Final Feasibility Study and Environmental Impact Statement, Oakland Inner Harbor Deep-Draft Navigation Improvements. This Supplemental Environmental Impact Statement (SEIS) evaluates alternative disposal sites and options not covered in prior environmental documents.

d. Alternatives Considered - Several ocean disposal sites have been assessed for use under Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) in the SEIS. The ocean disposal site (Site 1M) was selected to "minimize the interference of disposal activities with other activities in the marine environment particularly avoiding areas of existing fisheries or shellfisheries and regions of heavy commercial or recreational navigation" (EPA, Ocean Dumping Regulations, 40 CFR 228.5). Following initial screening of candidate ocean disposal sites, four disposal alternatives for the authorized project including "No Action", were evaluated. The other three alternatives are:

1) Unrestricted Disposal at Alcatraz - The estimated 5.4 million m^3 (7.0 million yd^3) of material from the Oakland Channels would be disposed and allowed to accumulate, filling the site bottom with depths decreasing to -20 feet, mean lower low water;

2) Alcatraz Disposal with Pre-dredging Material to an Offshore Ocean Site - Approximately 5.0 million m^3 from Oakland Harbor (6.5 million yd^3) would be disposed at the Alcatraz site. Approximately 0.3 million m^3 (0.5 million yd^3) of material from the turning basin in the Oakland Inner Harbor would be dredged and either (a) taken upland, or (b) disposed at an ocean site. Because of the lack of additional information necessary for ocean disposal, the predredging of the accumulated material from the Alcatraz site will be delayed until adequate information is developed related to material disposal and an appropriate ocean site is approved. Approximately 2.1 million m^3 (2.7 million yd^3) would be dredged from the Alcatraz disposal site and transported to an ocean disposal site for disposal. Site 1M is the preferred ocean site. In addition, an amount of uncontaminated material (to be determined) would also be needed for disposal at the ocean site to cover potentially contaminated material;

3) Direct Ocean Disposal

a) Site 1M - All material from the Oakland Harbor deepening would be dredged by clamshell and taken directly to the ocean disposal site by barge. This alternative would require dredging of the turning basin first, and the remainder of the project would be disposed on top of the material from the turning basin.

b) Site B1 - Similar to the Direct to Site 1M alternative, all material from the Oakland Harbor deepening would be dredged by clamshell and taken directly to the ocean disposal site by barge. The same sequence of dredging as would be followed as the Direct to Site 1M alternative; that is, the turning basin first, then the remainder of the project to be disposed on top of the material from the turning basin.

3. Major Conclusions and Findings:

a. NED Plan Rationale - The disposal alternative which would be implementable and would allow the greatest net economic benefit would be "Direct Ocean Disposal to Site B1"; this option represents the least cost, environmentally acceptable alternative that can be implemented. Although the capping operation is necessary to satisfy the criteria for ocean disposal, the design and implementation are simplified by the relatively small amount of potentially contaminated material compared to uncontaminated material to be disposed. With the NED plan, approximately 5.4 million m^3 (7 million yd^3) of sediment would be dredged from the Oakland Harbor project site and be transported by barge to the ocean disposal site located approximately 42 km (26 nautical miles haul distance) from the Golden Gate Bridge. This plan would not affect continued use of the Alcatraz disposal site. This plan would result in environmental impacts at the ocean disposal site, but represents the least cost, implementable plan.

b. Selected Plan - The selected plan is the "Direct to an Ocean Disposal Site B1". This plan will require a specific dredging sequence as a result of water quality test data from the Oakland Inner Harbor turning basin indicating a potential for significant adverse effect in the marine environment. This potential for adverse effect will be minimized by the following management operation. Since additional testing would be needed before disposal to determine the extent of the potential contamination, a conservative dredging and disposal program has been developed. In two phases, the material, approximately 206,000 m^3 (270,000 yd^3) from the turning basin, will be dredged and taken to the ocean disposal site. Then, the remainder of the project will be dredged and taken to the ocean site with the objective of covering the potentially contaminated material. Lastly, the monitoring program involving bathymetry, REMOTS photography, sediment grab sampling, etc., will be implemented to measure the success of the covering.

1) Short-term Environmental Effects - Turbidity would increase in the vicinity of the work site as the Oakland channels are dredged. Turbid conditions would result as material is released at the ocean disposal site. Although the bulk of the material will fall to the bottom at the site, some of the material will disperse in the water column. Accumulation of sediment would occur in the vicinity of the ocean site. Benthic organisms would be disturbed at the dredge and disposal sites. Based on available data, material from the Oakland Harbors has been found to be acceptable for aquatic disposal in accordance with statutory requirements with the exception of the sediments from the Oakland Inner Harbor turning basin. Placement of the sediments from the turning basin will be handled in an environmentally sound manner at the designated ocean site.

2) Long-term Environmental Effects, Project Area - Some benthic organisms would be eliminated during dredging and would be buried during disposal. Substrate at the designated ocean disposal site would change as Bay sediments mound on the ocean bottom. Since the evaluation of dredged material disposal in marine environments has continually evolved since 1972, there is no definitive determination of long-term effects. However, the existing analysis of potential for adverse environmental effects from the selected disposal plan has not revealed the likelihood of significant effects occurring.

3) Long-term Environmental Effects, Regional - No regional long-term adverse environmental effects are anticipated. Socio-economic effects of the project would be beneficial. However, great concern has been expressed on the potential economic losses that may be incurred by fishing interests in ocean waters from disposal at Site 1M. Disposal will only have short-term impacts on commercial and sport fishing enterprises. Since bottom habitat will be modified, fish species that would normally be found in the area of the disposal site will change. Fish populations and distributions vary widely throughout the continental shelf in the region offshore of San Francisco under natural conditions. Potential economic losses as a result of such a change from disposal of dredged material are not quantifiable without a database of several years for the fish species of interest to identify overall trends in the variations that fish populations, distributions and exploitation thereof experience.

c. Other Major Conclusions and Findings of the District Engineer - Environmental coordination completed includes the following actions:

1) A Section 404(b)(1) evaluation was submitted to the RWQCB requesting certification for disposal at the Alcatraz disposal site, but was suspended pending concurrence on ocean disposal from EPA. Certification pursuant to Section 404 of the Clean water Act is not required for ocean disposal;

2) A consistency determination for in-Bay dredging has been initiated with the Bay Conservation and Development Commission in compliance with the Coastal Zone Management Act (16 USC 1451);

3) A supplemental Coordination Act report has been requested from the Fish and Wildlife Service (FWS) in compliance with the Fish and Wildlife Coordination Act (16 USC 661); the National Marine Fisheries Service (NMFS) Endangered Species Office, FWS, has been consulted in compliance with the Endangered Species Act (16 USC 1531-1543);

4) Criteria used to select the appropriate ocean disposal site are those required by the Marine Protection, Research and Sanctuaries Act (33 USC 1445); use of an ocean disposal site has been formally coordinated with the Environmental Protection Agency (EPA) under Section 103 site identification procedures of the Act.

4. Areas of Controversy:

a. Issues of major disagreement among public interests - FWS, NMFS, the California Department of Fish and Game (CDFG), and numerous fishing interests have expressed concerns related to the impacts of disposing dredged material in the ocean, and have, for the most part, recommended that a more distant and deeper water site than Site 1M be used. It is the position of these agencies and groups that this activity could contribute to detrimental effects on fish populations by increasing turbidity, eliminating habitat, releasing contaminants associated with the dredged sediments, and by conflicting with the commercial and sport fishing enterprises.

Increased turbidity resulting from disposal of consolidated dredged material is of short duration. Turbidity is also generally localized in the immediate vicinity of the disposal site as material falls through the water column. Habitat losses that may occur from deposition of consolidated fine-grained sediments are unavoidable. However, the newly deposited substrate would provide habitat for a different array of opportunistic species. This may increase the species diversity at the disposal site. The issue of increased availability of contaminants associated with sediments into the water column and to marine organisms is evaluated by statutory testing requirements developed by the EPA and the Corps, which have implemented water quality testing procedures for disposal of dredged material in ocean waters. To assure that dredged sediment from the project site would not unacceptably degrade water quality in the marine environment, water/sediment tests including bioassay and bioaccumulation tests have been conducted. The results of these tests indicate that contamination levels of the material from the Oakland project with the exception of material from the turning basin are low and would not significantly affect water quality conditions in the Bay or ocean environments. The turning basin sediments are presently being handled as having the potential for significant adverse impact on the marine environment. This potential would be minimized by the capping operation. The potential risks are described in detail in the section on environmental effects in this Final SEIS. Fishing will be affected in the vicinity of Site B1 during the disposal activity, but the effect would be tolerable for the duration of construction of the Oakland project. It is expected that bottom fishing at the site would be eliminated, although some bottom fish may later occupy the site. Fishing for pelagic species could resume after the disposal has occurred. Due to the areal distribution of fish throughout the continental shelf and the extent of fishing throughout the region, the impact on fishing at the disposal site is considered small. FWS has indicated that it is not prepared to furnish its Coordination Act report for input to the authorized project and has formally stated their concurrence with the use of site B1. Detailed discussion of FWS's views expressed in coordination is found in Appendix D.

b. Resolution of controversies - The controversy involves delineating significant interaction between natural physical processes, typically dynamic marine resources (related to population and distribution changes), and disposal of dredged material which may influence both natural processes and marine resources. Based on studies conducted by USACE, both locally and nationally, increased turbidity resulting from disposal of dredged material at open water sites is of short duration. Turbidity is also generally localized in the immediate vicinity of the dredging or disposal site. The ocean environment at Site B1 is capable of accepting dredged material from its adjacent Bay environment. While public and agency response is firm in their belief that potential impacts would be lessened by using a more distant and deeper site, the collective favor has been expressed for Site B1.

5. Unresolved Issues:

Commercial and sport fishing interests of San Francisco Bay have expressed great concern related to the practice of dredged material disposal in San Francisco Bay. Comments received on the authorized Oakland Harbor project are related to the use of the Alcatraz disposal site as was authorized and as initially preferred by USACE in the Draft SEIS. Presently, the major unresolved issue remains the availability of an appropriate ocean disposal site for the 5.4 million m^3 (7.0 million yd^3) of material from Oakland Harbor. USACE maintains that Site B1 is the appropriate site to accomplish the necessary handling of potentially contaminated material in the most efficient and effective manner possible.

inconsistencies between the selected disposal alternative and the laws, policies and plans are discussed, and the extent to which the proposed action shall reconcile such inconsistencies is also described. The authorized project complies with all environmental laws and regulations:

a. Clean Air Act. The objective of the Clean Air Act (42 U.S.C. 1857 et seq) is to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population. The act requires Federal agencies to perform an Air Quality Analysis for projects located within Air Quality Maintenance Areas to determine the effect of the proposed action upon the local Air Quality Maintenance Plan. The Corps will require that the dredging contractor secure all necessary permits from the Bay Area Air Quality Maintenance District before construction.

b. National Environmental Protection Act (NEPA). NEPA (42 U.S.C. 4321-4327) established a national environmental policy to be considered in all Federal actions. NEPA directs all Federal agencies to include in every recommendation, report, proposal for legislation or other major Federal actions significantly affecting the quality of the human environment, a detailed environmental impact statement. This SEIS fulfills the requirements of NEPA.

c. Clean Water Act, Section 404. The objective of the Clean Water Act (33 U.S.C. 1344) is to restore and maintain the chemical, physical and biological integrity of the Nation's waters. Section 404(b) of the Clean Water Act as amended in 1977, requires that the Corps evaluate the impacts of the discharge of dredging or fill material into waters of the United States in order to make specified determinations and findings. A State Water Quality Certificate must be obtained for the discharge unless an exception is approved by Congress. An evaluation as specified in Section 404(b) was furnished to Congress in the Final EIS, November 1984, for the Oakland Inner Harbor project for the disposal at the Alcatraz disposal site. The evaluation indicated that additional testing would be performed prior to construction. Since the selected plan presently involves ocean disposal, State certification pursant to Section 404 is not necessary. However, additional testing data has been included in this report (see Appendix A) for detailed information. Although State Certificate was requested for proposed Alcatraz disposal, no action is needed for the selected ocean disposal alternative to comply with the above requirements.

d. Fish and Wildlife Coordination Act (FWCA). The FWCA (16 U.S.C. 661 et seq) requires that an action agency consult with the FWS, the NMFS and state fish and wildlife agencies to determine the effects a project may have on fish and wildlife resources. The Fish and Wildlife Coordination Act Reports for disposal of dredged material at the Alcatraz site were provided on 1 September 1976 for Oakland Outer Harbor and on 18 April 1984 Oakland Inner Harbor.

Coordination on the proposed ocean disposal has been initiated formally, but the FWS has declined to provide its views and recommendations in an official report based on the need for undefined studies. Their earlier views have been provided in Planning Aid Letters which are included with this document (See Appendix B). Issues raised in the FWS letter, dated 15 January 1988, are addressed within this document. FWS has also indicated in its 24 February 1988 letter that if Site 1M is pursued, it would initiate a referral to the Council on Environmental Quality. NMFS has also provided its views and comments by letter, dated 28 October 1987.

e. Endangered Species Act, Section 7. Section 7(a) of the Act (16 U.S.C. 1531 et seq), requires that federal agencies insure that their actions do not jeopardize the continued existence of endangered or threatened species or destroy or adversely modify the critical habitat that supports such species. Review of the FWS Listing and the State of California endangered species publications in relation to the tentatively-selected plan indicates no effect upon rare or endangered species or critical habitats. The NMFS has confirmed this finding by its letter of 18 March 1987 (See Appendix D).

f. National Historic Preservation Act (NHPA). The NHPA (16 U.S.C. 470) requires that Federal agencies take into account the effect of their undertakings upon National Register properties. There are no historic properties listed on the National Register of Historic Places within the project area. To assess the potential for presence of shipwrecks, a record search was conducted and consultation with the California Archaeological Inventory, State Historic Preservation Office, Bureau of Land Management, National Park Service and Minerals Management Service was conducted. It has been determined that the ocean disposal site area is unlikely to contain submerged maritime resources.

g. Executive Order 11593, May 1971, Preservation and Enhancement of Cultural Resources. This executive order directs Federal agencies to assume its leadership in preserving and enhancing the Nation's cultural heritage. The California Inventory of Historic Resources has been consulted and it has been determined that no State Historic Landmarks or State Points of Interest are located in the project area.

h. Coastal Zone Management Act, Section 307. This act directs all Federal agencies engaged in programs affecting the coastal zones to cooperate and participate with state and local governments and regional management program for the area affected by the proposed project is contained in San Francisco Bay Plan, and the McAteer Act. In accordance with 15 CFR Part 930, it has been determined that the proposed action is consistent to the maximum extent practicable with the approved coastal management program (see San Francisco Bay Plan and Appendix C).

i. Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1401). The Act states the National policy to regulate dumping of all types of materials into ocean waters and to prevent or limit the dumping of any material that would adversely affect human welfare or amenities, the marine environment, ecological systems, or economic potentialities. Section 103 of the Act gives the Secretary of the Army authority to issue permits for the purpose of ocean discharge of dredged material applying the same criteria which apply to EPA permits allowing ocean dumping of other material. Section 103 also requires that dumping of dredged material be evaluated to determine the potential environmental impact of such activities. A Section 103 action is necessary to use the selected Site 1M for the Oakland project.

j. Marine Mammal Protection Act (16 U.S.C. 1361). This Act is designed to protect all species of marine mammals. The primary management features of the Act include: (1) a moratorium on the "taking" of marine mammals, (2) the development of a management approach designed to achieve an "optimum sustainable population" for all species or population stocks of marine mammals, and (3) additional protections for those populations determined to be "depleted" (Refer also to the Endangered Species Act).

k. San Francisco Bay Plan (Bay Conservation and Development Commission). The Bay Plan provides a comprehensive and enforceable basis for protecting the Bay as a natural resource benefiting both present and future generations, and developing the Bay and its shoreline to the highest potential with a minimum of Bay filling. This authorized channel deepening for the Oakland Inner and Outer Harbors is considered consistent with the policies described in the consistency determination (see Appendix C).

l. State Water Quality Control Policy for Enclosed Bays and Estuaries. Requirements of this policy applicable to dredging and disposal operations include: compliance of dredged material with Federal criteria for determining acceptability for disposal into bay waters and certification of compliance by the Regional Water Quality Control Board. Refer to paragraph c., Clean Water Act, Section 404.

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ALAMEDA COUNTY, CALIFORNIA

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SECTION 1.0 NEED FOR AND OBJECTIVES OF ACTION

1.1. AUTHORIZATION

The United States Army, Corps of Engineers (USACE) conducted the feasibility study of the Oakland Outer Harbor Channel in response to a resolution adopted June 14, 1972 by the Committee of Public Works of the United States House of Representatives. The resolution requested review of prior reports and recommendations for developing the channel to serve deep-draft shipping needs. The Oakland Inner Harbor study resulted from a House of Representatives resolution of May 10, 1977 to develop recommendations for improving the Inner Harbor including consideration of increasing the channel depth.

The initial study for Oakland Outer Harbor, including a Final Environmental Impact Statement (FEIS), was transmitted to Congress on February 1, 1985. The initial study for Oakland Inner Harbor and FEIS was transmitted to Congress on January 26, 1987. Environmental Impacts of the Outer Harbor project were assessed in the <u>Final Environmental Statement, Oakland Outer Harbor Deep-Draft Navigation Improvements, Alameda County, California</u> which was filed with the Environmental Protection Agency (EPA) on February 20, 1981. The environmental impacts of the Inner Harbor project were assessed in the <u>Final Feasibility Study and Environmental Impact Statement, Oakland Inner Harbor Deep-Draft Navigation Improvements</u> which was filed with the EPA on April 18, 1985. Both projects were authorized for construction by the Water Resources and Development Act of 1986 (Public Law 99-662).

1.2. PLANNING OBJECTIVES.

The USACE's planning objective for the authorized project is to provide deep-draft navigation improvements in the Oakland Harbors which would contribute to national economic development (NED). The USACE's planning process requires that the objective be consistent with protecting the environment, pursuant to environmental statutes, relevant executive orders, and other Federal planning requirements. Oakland Harbor is located on the east side of San Francisco Bay in Alameda County, California (Figure 1.1). Along the Port of Oakland's 19 miles of waterfront are 535 acres of marine terminal facilities which handle a broad spectrum of import and export cargo. The Port of Oakland consists of an Outer Harbor, a Middle Harbor, and an Inner Harbor. The entrance channel to all three is known as the Bar Channel. The federal channels maintained by the Corps of Engineers provide access to berthing areas which serve container, conventional, and roll-on/roll-off vessels (Figure 1.2). The Oakland Harbor channels were determined to be no longer adequate to efficiently and cost-effectively accommodate modern deep-draft vessels. The specific planning objectives for the Oakland Harbor deepening are to reduce tidal delays associated with containership passages, to increase economies of scale for waterborne commerce, and to increase navigational safety. The authorized project deepening will improve

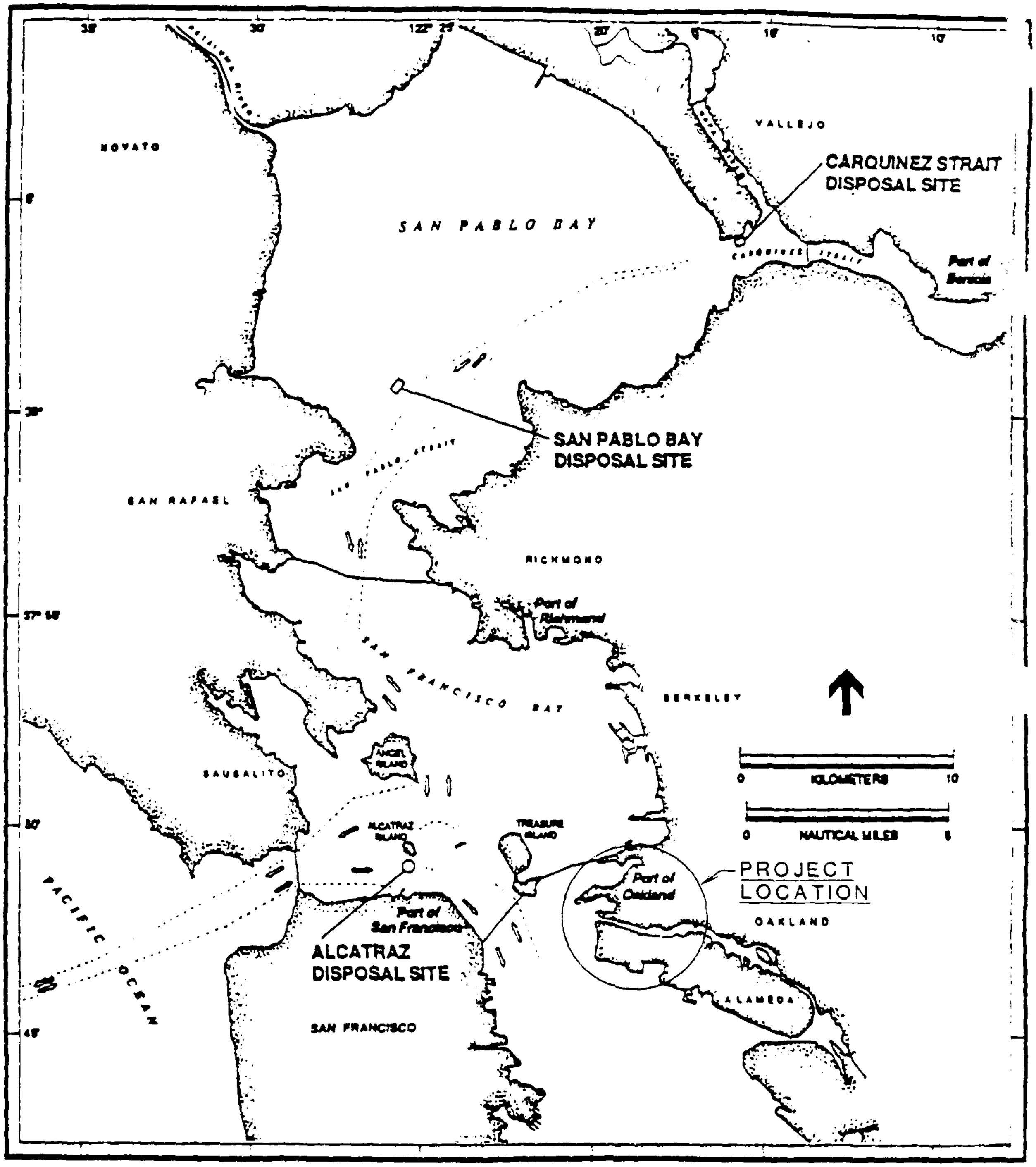
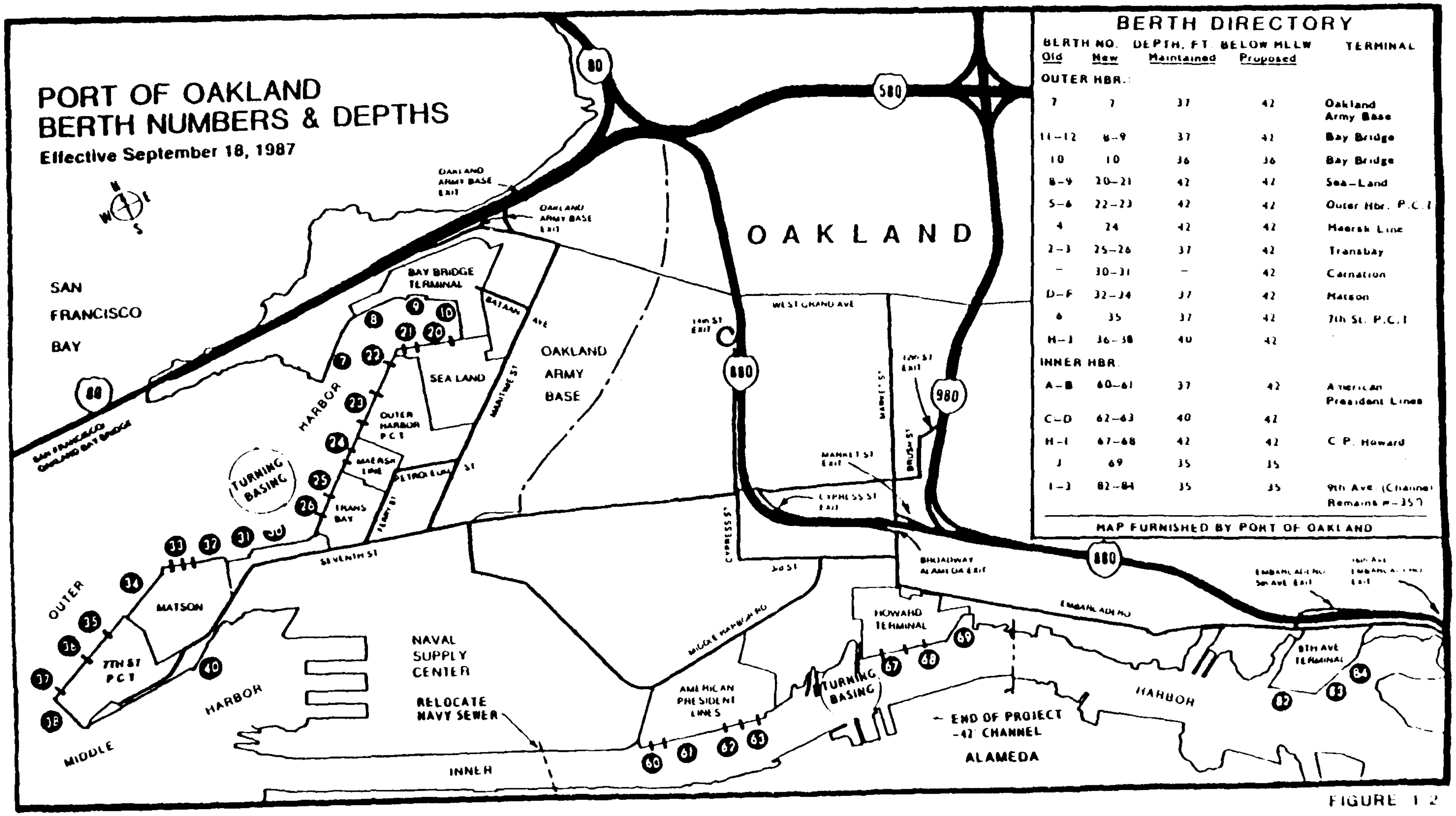


Figure 1.1 OAKLAND HARBORS PROJECT LOCATION MAP
San Francisco Bay and Alcatraz Disposal Site



BERTH DIRECTORY

BERTH NO. Old	BERTH NO. New	DEPTH, FT. BELOW MLLW Maintained	DEPTH, FT. BELOW MLLW Proposed	TERMINAL
OUTER HBR.:				
7	7	37	42	Oakland Army Base
11–12	8–9	37	42	Bay Bridge
10	10	36	36	Bay Bridge
8–9	20–21	42	42	Sea–Land
5–6	22–23	42	42	Outer Hbr. P.C.T
4	24	42	42	Maersk Line
2–3	25–26	37	42	Transbay
–	30–31	–	42	Carnation
D–F	32–34	37	42	Matson
6	35	37	42	7th St. P.C.T
H–J	36–38	40	42	
INNER HBR.				
A–B	60–61	37	42	American President Lines
C–D	62–63	40	42	
H–I	67–68	42	42	C. P. Howard
J	69	35	35	
1–3	82–84	35	35	9th Ave. (Channel Remains @–35')

FIGURE 1-2

navigational safety and efficiency of vessel movement in the harbors. The authorized project would reduce the potential for vessel collisions and groundings, and would lessen the need for tidal delays by deepening and widening the channel.

1.3. NEED FOR SUPPLEMENT

The environmental effects of authorized channel improvement plans were thoroughly assessed in the Final Environmental Impact Statements (FEIS). Changing conditions at the authorized Alcatraz disposal site have required consideration of an ocean disposal site. This Supplemental Environmental Impact Statement (SEIS) has been prepared because unrestricted use of the Alcatraz site, as authorized for this project, would significantly reduce its capacity and jeopardize maintenance and small projects within the Bay. This SEIS evaluates additional options for dredged material disposal.

1.4. PUBLIC CONCERNS

Public comment was solicited through publication in the Federal Register of two Notices of Intent (NOI) to prepare a SEIS. The NOI for Oakland Outer Harbor was published January 13, 1987; the NOI for Oakland Inner Harbor was published April 23, 1987. The projects have since been combined. Public input was also provided during the review of the Draft SEIS during September 25, 1987 through December 7, 1987.

Letters received during the review period from federal, state and local entities, environmental groups and individuals are contained in Appendix E of the final SEIS along with the Corps' responses. The concerns expressed were primarily for perceived water quality and turbidity impacts relating to the disposal of dredged sediment at the Alcatraz disposal site, the cumulative impacts of Alcatraz disposal, and the need for monitoring and mitigation. Potential biological impacts, particularly those affecting commercial and sport fisheries were of particular interest. Additionally, the position, location and depth of the selected ocean disposal site were questioned and the need for additional studies of the marine environment was recommended. A summary discussion of these concerns and the Corps' prior studies is included in Section 6.3 of this final SEIS. Groundwater concerns are addressed in Section 4.1 of the General Design Memorandum (GDM). A groundwater monitoring program has been developed and approved by the Regional Water quality Control Board which is also included in paragraph 4.1 of the GDM.

SECTION 2.0 ALTERNATIVES

2.1 INTRODUCTION

Ship simulation studies on the Oakland Approach, Outer, Middle and Inner Harbors have resulted in channel design changes since preparation of the FEIS. These modifications to the channel design are minor. Because impacts of deepening and widening the channel were adequately addressed in the FEIS documents, this SEIS is limited to an evaluation of additional disposal alternatives only. The simulation studies were conducted for the purpose of reducing the volume of dredged material to be disposed, reducing project costs, and determining the best design for vessel traffic and safety. With the modification in channel design the total quantity of sediment to be dredged is 5.4 million cubic meters (m^3) [7.0 million cubic yards (yd^3)]. This quantity is approximately 3.7 million m^3 (4.8 million yd^3) less than the total of the sediment quantities estimated in the FEIS's.

Sediment retention at the selected Alcatraz disposal site has resulted in the need to address other disposal options for the Oakland Harbor project. As stated in the FEIS most of the dredged material from the Oakland Harbor Project was to be disposed at the Alcatraz site; however, a large mound was detected there in 1982 which has not significantly eroded. Though ebb-tide only disposal was considered for the Oakland Outer Harbor, subsequent evaluation of this alternative determined that it was not operationally practicable or cost-efficient. Material dredged from the Inner Harbor was to be disposed at the Alcatraz site in slurried form in order to promote the dispersal and movement of sediment out of the Bay system. Based on monitoring studies of slurried disposal conducted for Phase II of the John F. Baldwin project, slurrying does enhance dispersion; while dispersion is optimized, deposition and accumulation are not completely eliminated. The absence of measurable erosion from the Alcatraz mound since its discovery in 1982 plus the cumulative impacts of the Oakland Harbor projects, and other major harbor improvement projects in the Bay Area requiring dredged material disposal within the next five years, require re-examination of other disposal sites and management options.

2.2 OAKLAND OUTER HARBOR

The existing channel in the Outer Harbor ranges between -10.0 and -14.3 meters [m] (-33 and -47 feet [ft]) MLLW and varies in width from 180 m (600 ft) to 290 m (950 ft); it contains a turning basing 290 m (950 ft) in diameter. At the authorized depth of 10.7 m (35 ft), the channel would no longer be adequate to safely and efficiently accommodate third generation, deep-draft containerships.

The authorized project (Figure 2.1) would deepen the entire one-way channel from the current depths to a newly authorized depth of -12.8 m (-42 ft) MLLW, widen the bar channel from 240 m (800 ft) to 270 m (900 ft), widen the entrance channel 60 m (200 ft) at its western end

(240 m [800 ft] to 300 m [1000 ft]) tapering 700 m (2,300 ft) eastward to its existing width of 180 m (600 ft), and would relocate the turning basin 910 m (3,000 ft) westward and increase its diameter from 290 m (950 ft) to 430 m (1,425 ft). These dimensions represent modifications to the project and result in a decreased dredging quantity. The 5.4 million m^3 (7.0 million yd^3) estimated in the FEIS is now estimated at 2.4 million m^3 (3.1 million yd^3), mostly due to design changes. Annual maintenance dredging requirements would be increased by 67,300 m^3 (88,000 yd^3) for a total annual maintenance dredging quantity of 164,000 m^3 (215,000 yd^3). In the FEIS, the annual increase was estimated at 194,000 m^3 (254,000 yd^3). With the originally planned Oakland Outer Harbor project, approximately 15 percent of the material was to be disposed at the 100-fathom ocean disposal site; the remaining material was to be disposed at the Alcatraz disposal site (See Appendix A).

The terms of the Local Cooperation Agreement between the Port of Oakland and the Corps require that the Port assume the cost of dredging and maintaining the associated berths to a depth commensurate with the -42 foot Federal channel. The berths are currently maintained by the Port under Corps permit No. 142728E35 at depths ranging between -35 feet and -42 feet. The Corps permit will need to be modified to reflect the change in maintainence depth for some of the channels. The following berths are likely to be deepened in association with the Federal channel:

Terminal	Berth No. Old	- New	Location	Maintained Depth
Bay Bridge	11	9	Oakland Army Base	-37′
	12	8	" " "	-37′
	13	7	" " "	-37′
Transbay	3	25	" " "	-37′
Matson	D	32	Seventh Street Terminal	-37′
	E	33	" " "	-37′
	F	34	" " "	-37′
7th St.	G	35	" " "	-37′
	H	36	" " "	-40′
	I	37	" " "	-40′

These berths may be deepened to -42 feet by permit actions separate from the Federal project:

Terminal	Berth No. Old	- New	Location	Maintained Depth
Transbay	2	26	Outer Harbor Terminal	-37′
Carnation	-	30	" " "	--
	-	31	" " "	--

These Berths are already maintained to -42 feet under the Corps permit:

Terminal	Berth No. Old	- New	Location	Maintained Depth
Maersk	4	24	Outer Harbor Terminal	-42'
Outer Hbr	5	23	" " "	-42'
P.C.T.	6	22	" " "	-42'
Sealand	8	20	" " "	-42'
	9	21	" " "	-42'

These berths are outside the project area. Dredging to the -42 foot depth may require a Corps of Engineers permit if the Port decides to deepen these berths at a later time:

Terminal	Berth No. Old	- New	Location	Maintained Depth
Bay Br.	10	10	Outer Harbor Terminal	-36'
7th St.	J	38	Seventh Street Terminal	-40
Berth 40	O	40	Seventh Street Terminal	-37' not in use
Howard	J	69	C.P. Howard Container	-35'
Ninth Ave	1	84	Ninth Avenue Terminal	-35'
	2	83	" " "	-35'
	3	82	" " "	-35'

The estimated volume of material that would have to be dredged from the Outer Harbor if all berths were deepened is 348,000 m^3 (455,000 yd^3).

2.3 OAKLAND INNER HARBOR

The Oakland Inner Harbor channel is 8.5 miles (13.7 kilometers) long. It includes an Entrance Reach, an Inner Harbor Reach, the Brooklyn Basin Reach, Park Street Reach, and a Tidal Canal that connects with San Leandro Bay. Channel width varies in different sections of the Inner Harbor between 84 m (275) and 240 m (800 ft). Channel depths in the Inner Harbor project area range between -9.1 m (-30 ft) and -12.8 m (-42 ft) MLLW.

Plans for improving the Oakland Inner Harbor (Figure 2.1) include widening the Entrance Channel to 360 m (1,175 ft); and at project kilometer 4.8 (mile 3.0), widening the Channel to 270 m (900 ft); constructing a 370 m (1,200 ft) diameter turning basin at project 5.9 km (3.7 mile); and deepening the channel to the newly authorized -13 m (-42 ft) MLLW beginning at the entrance and terminating at project 7.2 km (4.5 mile) south of Broadway Street. Construction is scheduled for April 1988. It is estimated that approximately 2.8 million m^3 (3.7 million yd^3) of material would be dredged from the channel during construction. The channel improvements would add 54,000 m^3 (70,000 yd^3) of material to the annual maintenance quantities of 153,000 m^3 (200,000 yd^3) for a total of 207,000 m^3 (270,000 yd^3) of dredged material.

The following berths are likely to be deepened in association with the Federal channel. The estimated volume of material that would have to be dredged from the Inner Harbor if these berths were deepened is 92,000 m^3 (108,000 yd^3):

Terminal	Berth No. Old	Berth No. New	Location	Maintained Depth
American	A	60	Middle Harbor Terminal	-37'
President	B	61	" " "	-37'
Lines	C	62	" " "	-40'
	D	63	" " "	-40'

These Berths are already maintained to -42 feet under the Corps permit:

Terminal	Berth No. Old	Berth No. New	Location	Maintained Depth
Howard	H	67	C.P. Howard Container	-42'
	I	68	" " "	-42'

2.4 DREDGED MATERIAL DISPOSAL SITES CONSIDERED

Several disposal site alternatives have been considered and eliminated from further consideration. Disposal alternatives eliminated include use of upland sites, all in-Bay sites other than Alcatraz and marsh creation. Four historically used and four new candidate ocean disposal sites were evaluated and two of the four new sites are considered in the evaluation of alternatives.

2.4.1 Upland Disposal. There are no upland disposal sites available in the project area with sufficient capacity to receive all of the dredged material from the Oakland Harbor project. Since 1974, the Corps has conducted three reconnaissance level studies to investigate the feasibility of disposing San Francisco Bay dredged material on land. A total of 20 potential land disposal sites have been considered in these studies. Eleven of these sites were determined to be unsuitable for disposal of dredged material due to existing development projects, existing sanitary landfill use, public agency ownership for the purpose of disposing its own dredged material on the area. The nine sites which were not physically precluded from potential land disposal use are all located in the North Bay area. These sites were evaluated for potentially constraining economic and environmental factors. Of the nine sites, seven were entirely or substantially within former tidal marshes and thus were evaluated only for their potential as reclamation sites. The two sites which were substantially upland were evaluated for potential as both permanent and reclamation/processing sites. However, these are in Solano County, too far away for receipt of Oakland material (USACE, 1987).

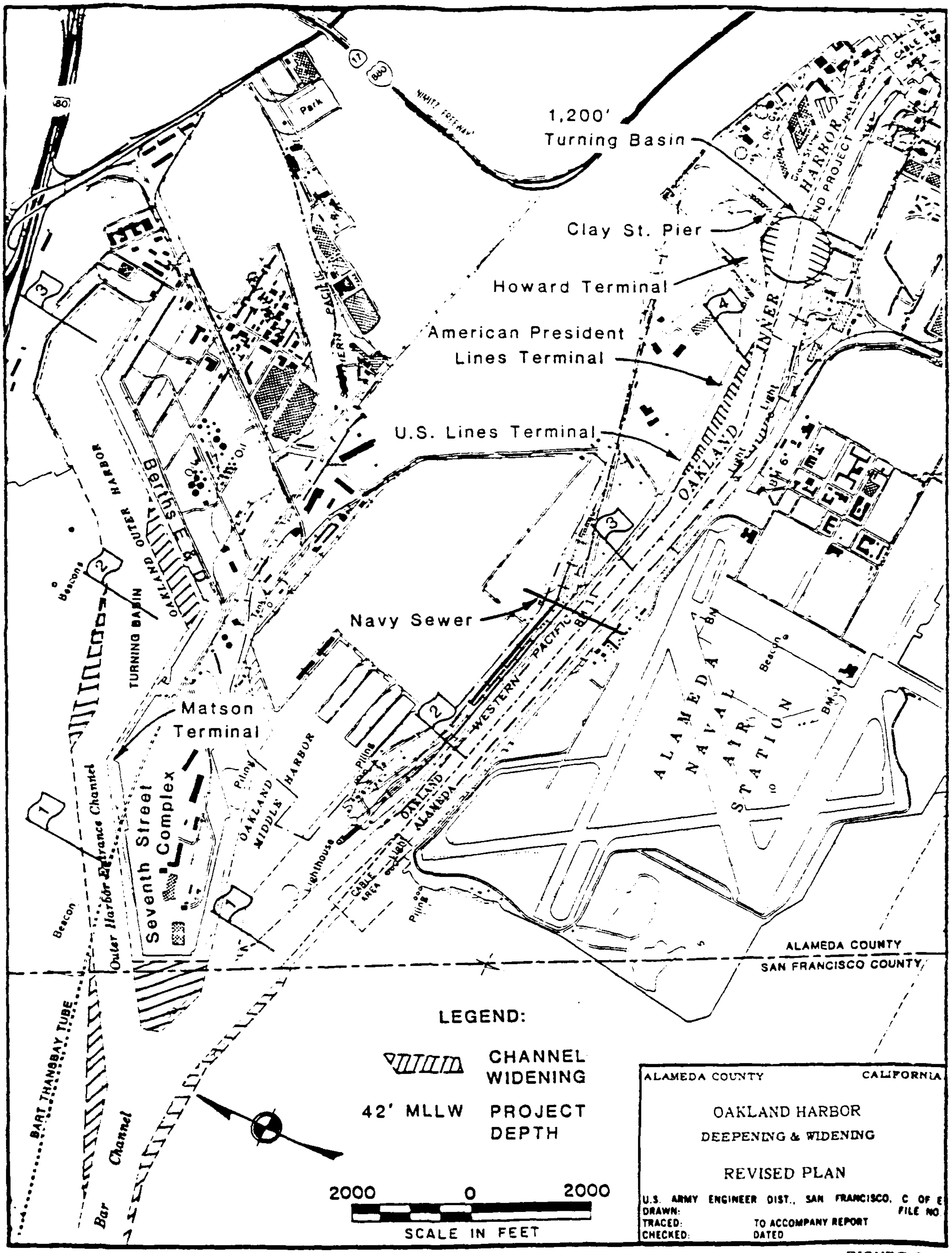

1,200' Turning Basin
Clay St. Pier
Howard Terminal
American President Lines Terminal
U.S. Lines Terminal
Navy Sewer
Matson Terminal
Seventh Street Complex
OAKLAND OUTER HARBOR
TURNING BASIN
OAKLAND INNER HARBOR
OAKLAND MIDDLE HARBOR
ALAMEDA NAVAL AIR STATION
WESTERN PACIFIC
NIMITZ FREEWAY
Park
Beacon
Piling
Lighthouse
CABLE AREA
Outer Harbor Entrance Channel
Bar Channel
BART TRANSBAY TUBE
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
LEGEND:
CHANNEL WIDENING
42' MLLW PROJECT DEPTH
2000 0 2000
SCALE IN FEET
ALAMEDA COUNTY CALIFORNIA
OAKLAND HARBOR
DEEPENING & WIDENING
REVISED PLAN
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN:
FILE NO.
TRACED:
TO ACCOMPANY REPORT
CHECKED:
DATED

FIGURE 2.1

2.4.2 Marsh Creation. The Corps of Engineers has also investigated the creation of marsh habitat during its Dredge Disposal Study (USACE, 1976). The viability of this alternative is dependent upoon the availability and location of an appropriate site. Factors to consider in selecting a site include topography, hydrological regime, sediment quality, etc. Creation of marsh environments in open water or intertidal mudflats is also constrained by institutional requirements related to filling the bay as well as by the opposition of public interest groups. Restoration of tidal marsh habitat is not considered viable because of the limited capacity of potential sites (such as salt ponds), the pump distance of approximately 30 miles to their location and the need for costly and time-consuming land acquisition by the local non-Federal interest.

2.4.3 In-Bay Disposal Sites. In 1972, disposal activities at eleven in-Bay disposal sites were consolidated to five sites. In coordination with the Environmental Protection Agency (EPA), the San Francisco District further restricted disposal operations to three sites in 1978. Carquinez Strait (SF 9), is 1.5 km (0.8 nautical miles) from Mare Island Straits entrance; San Pablo Bay (SF 10) is 4.8 km (2.6 nmi) northeast of Point San Pedro; Alcatraz (SF 11) is about 0.5 km (0.3 nmi) south of Alcatraz. Of the three Bay aquatic disposal sites designated as suitable for dredged material disposal, Alcatraz is the only designated site in the central Bay near major deep draft navigation projects. It is closest to the Oakland dredging site and is the authorized disposal site because it is within a high energy area near the Golden Gate. Material disposed at this location was determined to be the least environmentally damaging alternative as material is more likely to leave the Bay system when compared to the other two available in-Bay sites. No new in-Bay sites have been investigated for this project, since lengthy studies are needed to determine suitability for dredged material disposal in San Francisco Bay and public input would be required. A separate investigation of potential alternative dredged material disposal sites within central bay is underway. Study results are expected during the summer of 1989.

2.4.4 Historic Ocean Disposal Sites. Several ocean disposal sites previously used for the disposal of dredged material have been considered. The two historical sites situated inside the boundaries of the Gulf of the Farallones National Marine Sanctuary and the sand disposal site have been eliminated from further consideration. These include:

a. 100-Fathom Site. During the 1970's when the Oakland Outer Harbor project was planned, a 100-fathom ocean site (SF 7) in the Gulf of the Farallones had been designated by EPA for dredged material disposal. The site was approximately 55.6 km (30 nmi) from the Golden Gate. The site was located south of the Farallon Islands at latitude 37° 31' 45" N and longitude 122° 59' 00" W and was 182.9 m (100 fathoms deep). In 1980, the Gulf of the Farallones National Marine Sanctuary was established by the Department of Commerce and the 100-fathom ocean disposal site was incorporated within its boundaries. Although limited use could be certified by the Assistant Administrator of the Office of Coastal Zone Management, dredged material disposal within the sanctuary is generally not permitted (FEIS, Pt. Reyes-Farallon Island Marine Sanctuary, NOAA, 1980). In February 1983, EPA removed this site from the final designation process. Total quantity of dredged material disposed at the site between 1932 and the establishment of the marine sanctuary is estimated to be less than 765,000 m^3 (1,000,000 yd^3).

b. 100-Fathom Test Site. During September 5-7, 1974, 3,000 m^3 (3,900 yd^3) of dredged material was discharged at the 100-fathom contour north-northwest of the designated 100-fathom site. The discharge was monitored to assess ocean disposal activity and impacts to the substrate (USACE, 1975). Center coordinates at the site were $37^{\circ}41'00''$ N and 123° 07' 30" W. Again, the site was incorporated into the Gulf of the Farallones National Marine Sanctuary in 1980, and continued use of the site for disposal of dredged material is not a practicable alternative.

c. S.F. Channel Bar. This site (SF 8) is parallel to and 1,800 m (6,000 ft) south of the San Francisco Bar Channel, 8.0 km (5 mi) outside the Golden Gate. Site coordinates are 37° 45' 55" N; 122° 37' 18" W; 37° 45' 45" N; 122° 34' 24" W; 37° 44' 24" N; 122° 37' 06" W; 37° 45' 15" N; 122° 34' 12" W. The site is designated primarily for maintenance disposal of sand. The designation allows for the disposal of material from required dredging operations at the entrance of the San Francisco Main Ship Channel which "is composed primarily of sand having grain sizes compatible with that naturally occurring at the disposal site and containing approximately 5 percent of particles having grain sizes finer than that normally attributed to very fine sand" [40 CFR 228.12(b)(22)].

d. BART Site. Exact quantities of excavated sediments discharged at the dredged material disposal site 1.9 km (1.0 nmi) west of Seal Rock have not been determined. However, it is known that the bulk of the 4,340,000 m^3 (5,680,000 yd^3) of sediments excavated for the construction of the Trans-Bay Tunnel of the Bay Area Rapid Transit (BART) System, and not used for backfill, were transported to the site for disposal. Site center is located at 37° 46' 50" N and 122° 32' 40" W and lies in 24 m (13 fm) of water. Strong tidally dominated currents have induced an extreme paucity of benthic organisms by continuously shifting substrates and has subsequently reduced fishery value at the site. The same currents increase the dispersive nature of the site. Studies of the site are in the planning stage and available information is very limited. For study purposes, the site has been referred to as Candidate Site D1 and that appellation is utilized in this document. Wherever feasible, designation of a site off the continental shelf or other sites that have been historically used for dredge material disposal is preferred [40 CFR 228.5(e)]. Because Site D1 falls into the latter category of historical use, and lies with the zone of siting feasibility (ZSF) established to delineate the area in which it is economically and operationally feasible to site dredged material disposal, and is therefore feasible to designate and utilize, it is retained as a candidate disposal site in this SEIS.

2.4.5 Candidate Ocean Disposal Sites. Presently, there are no designated ocean disposal sites to receive the estimated quantity of material from either the Alcatraz disposal site or the Oakland Harbor project, and the most feasible site within San Francisco Bay is not expected to accommodate the quantity of material from the Oakland project without jeopardizing the availability of the site for disposal of maintenance dredging material. The Corps of Engineers (USACE), in consultation with the EPA, has been investigating candidate ocean sites with the intent of EPA designating a permanent ocean site for disposal of dredged material under Sections 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972, and EPA's Ocean Dumping Regulations and Criteria (40 CFR 220-225, 227-229). Since there are no ocean disposal sites presently available to receive dredged material for the Oakland deepening project, the USACE has applied its authority under Section 103 of MPRSA to select a site for ocean disposal of the dredged material, as appropriate (from the Alcatraz disposal site or the Oakland Harbor project site), for the Oakland project.

The U. S. Army Corps of Engineers is required to apply the same criteria established pursuant to Section 102 of the Act and must determine that the dumping "will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities"; and in making an independent determination as to appropriate locations for the dumping "shall, to the extent feasible, utilize the recommended sites designated by the Administrator" (of the EPA). Site screening and evaluation has been accomplished by following the guidance found in General Approach to Designation Studies for Ocean Dredged Material Disposal Sites (EPA/USACE May, 1984).

a. Zone of Siting Feasibility (ZSF). USACE and EPA have jointly developed guidance for defining the area within which disposal of dredged material would be feasible based upon operational, cost and regulatory criteria. Candidate disposal areas within this zone are then evaluated according to the Ocean Dumping Criteria. Candidate sites outside of the ZSF are not studied further as it would be unreasonable to rigorously explore and objectively evaluate the effects of disposal at a site that could not be practicably utilized for disposal of dredged material.

A ZSF analysis has been conducted for demarcating a siting area for candidate ocean dredged material disposal sites (ODMDS) off San Francisco within the Gulf of the Farallones and is appended to this SEIS (Appendix F). Factors considered in determining the ZSF boundary include the cost of transporting dredged material to the disposal site, the type and availability of dredge equipment, navigation restrictions, and marine safety. Since cost and operational constraints did not provide a distinct delineation of the zone, but increased at a rapid, almost linear rate from very close to the Golden Gate outward with increased haul distance, the ZSF boundary was placed seaward to the edge of the marine radar net to address guidance that marine safety will be considered (EPA/USACE, May 1984). The ZSF includes all the area from the Golden Gate Bridge to 44.5 km (24 nautical miles) from Pt. Bonita (Figure 2.2 and Appendix F). It is also noted, however, that project costs escalate significantly as haul distance from the Golden Gate Bridge increases and at the peripheral areas of the ZSF, disposal costs reach a point that may be impractical for most maintenance and small harbor dredging in San Francisco Bay.

b. Candidate Sites Considered. A number of candidate sites within the ZSF have been considered to receive the sediments to be dredged from the Oakland Harbor for this project (See Figure 2.3). Sites 1M, B1, B1A, C1, and D1 are evaluated as to acceptability as ocean dredged material disposal sites in sections 2.4.5(c) through 2.4.5 (f) below. Potential disposal sites investigated, but eliminated from further consideration, include Sites 2, B2, B3, B4, and B5. All of these eliminated sites lie beyond the outermost boundary of the ZSF and are not considered feasible sites for a combination of economic and operational factors (see Appendix F). Other factors were also of concern. An abundance of widow rockfish (*Sebastes entomelas*), which tend to concentrate in bottom areas of high relief was found at Site 2. The Pacific Fisheries Management Council has determined that the *Sebastes entomelas* fishery is biologically stressed and have imposed limitations on the catch. Disposing of dredged material at the Site 2 location could adversely impact this limited fishery. Site B2 and Site B5 supported brooding Dungeness crab (*Cancer magister*). Site B3 has potential for wide dispersion of material, is relatively close to shore which could have impacts on coastal beaches and kelp beds, and is distant from the dredging sites. Site B4 bathymetric surveys revealed depths ranging from 768 to 1,243 m (420 to 680 fm) with a deep canyon with rocky bottom that supported a significant, commercial fishery. The unique habitat value precluded use of the site for disposal of dredged sediments. Additionally, site testing and monitoring costs would be extremely high due to the high relief of the substrate, the depth of water and the distance from port. Surveys at Site B5 also indicated the presence of geographically limited hard bottom habitat and productive fishing grounds.

The remaining candidate ocean disposal sites considered further, Sites 1M, B1, B1A, C1, and D1, are addressed below:

(1) Site 1M. Site 1M, slightly repositioned from the site surveyed by Nybakken *et al*. and referred to in their 1984 report as Station 1, is centered at 37° 38' 42" N, 122° 42 16" W, and lies between the U.S. Navy submarine operating area U1 and the the precautionary zone of the U.S. Coast Guards Marine Traffic Separation Scheme. The center of the relatively flat site is 28.9 km

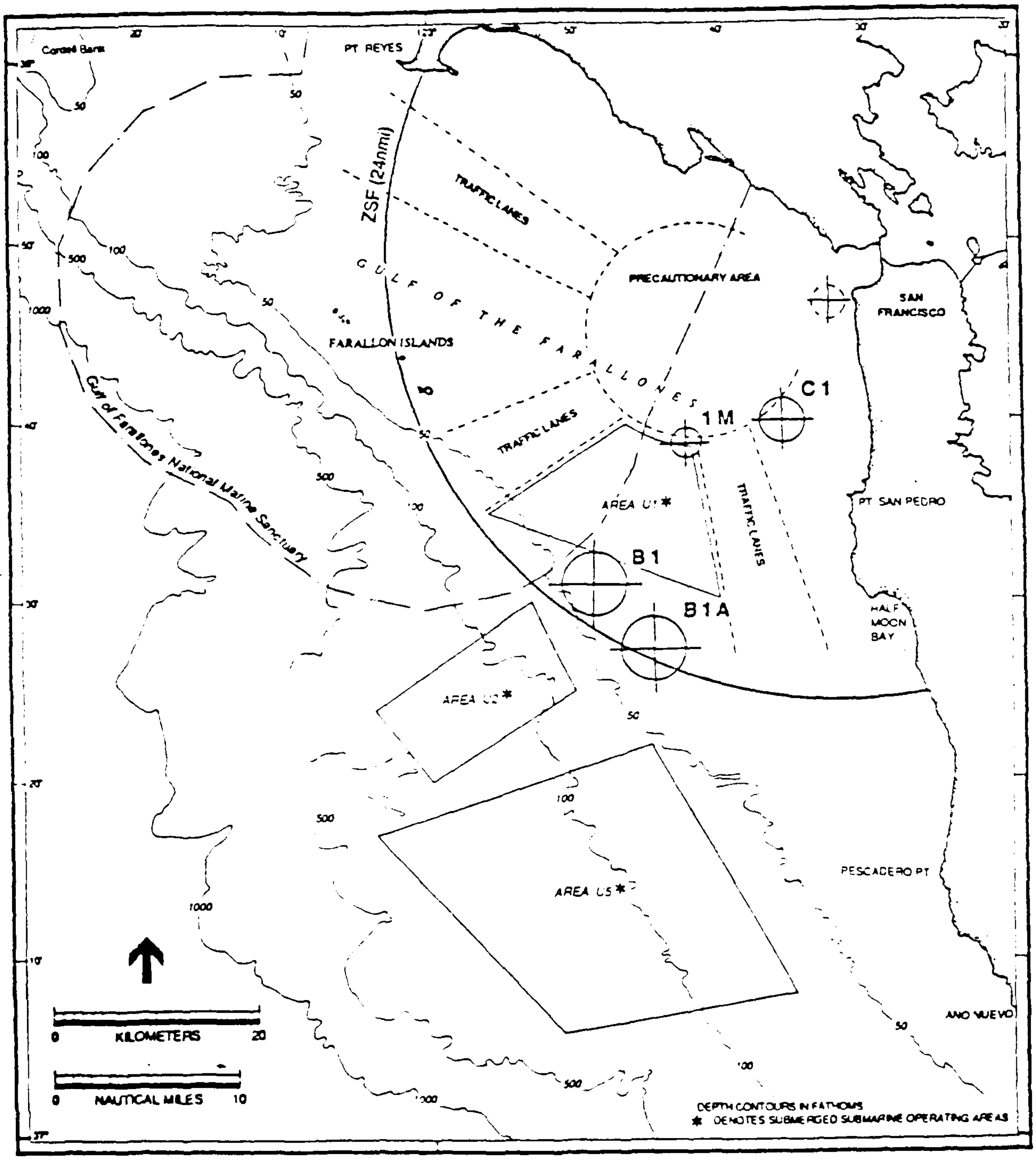


Figure 2.2 Zone of Siting Feasibilty and Candidate Ocean Dredge Material Disposal Sites

(15.6 nmi) from the Golden Gate Bridge. The site radius is estimated to be 1.3 km (0.7 nmi) based on horizontal spreading of the dredged material as it falls through the water column and impacts upon the bottom. Depths over the surveyed area range from 44 - 49 m (24 to 26.8 fm). The perimeter of the site is 2.3 km (1.2 nmi) from the Gulf of the Farallones National Marine Sanctuary and 16.9 km (9.1 nmi) to shore. Based on area surveys and available fisheries data, the site supports a commercial fishery for Lingcod (Ophiodon elongatus), English sole (Parophrys vetulus), Petrale sole (Eopsetta jordani), Pacific sanddab (Citharichthys sordidus), Halibut (Paralichthys californicus), Salmon (Oncorhynchus sp), Northern anchovy (Engraulis mordax), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister). Because of Site 1M's proximity to the Golden Gate, it is more heavily fished than the B1 or B1A site. Site 1M is a potential nursery or spawning area for English sole (Parophrys vetulus) and Dungeness crab (Cancer magister).

(2) Site (B1). The center coordinates of Site B1 are located at 37° 31' 16" N, 122° 48' 32" W. The site center is about 46 km (24.9 nautical miles) from the Golden Gate Bridge and the site perimeter is approximately 0.2 km (0.1 nmi) from the southern boundary of the Gulf of the Farallones National Marine Sanctuary and 22.6 km (12.2 nmi) from shore. The site radius is 3.1 km (1.7 nmi) and area coverage at the site floor 18.5 km^2 (5.4 nmi^2) or at least 4.5 times the size of Site 1M. The bottom is gently sloping. Depths range from 79 - 90 m (43 to 49 fm) over the area surveyed. Sediments are predominantly very fine sands. Commercial fishery resources in the area include Pacific sanddab (Citharichthys sordidus), Rex sole (Glyptocephalus zachirus), English sole (Parophyrs vetulus), Salmon (Oncorhynchus sp), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister). Site B1 is a potential nursery or spawning area for Pacific sanddab (Citharichthys sordidus), Dover sole (Microstomus pacificus), English sole (Parophrys vetulus), and Dungeness crab (Cancer magister).

(3) Site B1A. The site center coordinates are located at 37° 27' 00" N, 122° 44' 30" W. The site center is 51.5 km (27.8 nautical miles) from the Golden Gate Bridge. The site radius is 3.1 km (1.7 nmi) and area coverage at the site floor 18.5 km^2 (5.4 nmi^2) or at least 4.5 times the size of Site 1M. Closest approach of the site footprint (area within site radius) to the Gulf of the Farallones National Marine Sanctuary boundary is 10.2 km (5.5 nmi) and to shore is 18.4 km (9.9 nmi). A bathymetric survey has not been performed at the specific site. Depths recorded within a 1.8 km (1.0 nmi) radius of the site center during biological sampling in April 1987 ranged from 82 - 84 m (45 to 46 fm). The bottom is gently sloping. Sediments are predominantly very fine sands. Site B1A is located in the vicinity of a Rockfish (Sebastes sp) set-net and hook-and-line fishing area. Additionally, commercial stocks of Pacific sanddab (Citharichthys sordidius), English sole (Parophyrs vetulus), Dover sole (Microstomus pacificus),

Petrale sole (Eopsetta jordani), Salmon (Oncorhynchus sp), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister) are found at the site. Site B1A is a potential nursery or spawning area for Pacific sanddab (Citharichthys sordidus), Dover sole (Microstomus pacificus), Rockfish (Sebastes sp), and Dungeness crab (Cancer magister).

(4) Site C1. Site C1 was added to the array of sites in July 1987. Baseline data were readily available from surveys of the South West Ocean Outfall Project (SWOOP) of San Francisco. The center of the site is located at 37° 40' 00" N, 122° 36' 00" W. The site center is 26.7 km (14.4 nmi) from the Golden Gate Bridge and the site perimeter is 2.9 km (1.8 nmi) south southwest of the terminus of the San Francisco southwest ocean outfall (SWOOP) for treated sewage effluent, 9.0 km (4.9 nmi) from the Gulf of the Farallones National Marine Sanctuary, and 7.0 km (3.8 nmi) from shore. The radius of bottom impacts is expected to be 2.1 km (1.1nmi). Commercial fisheries include English sole (Parophrys vetulus), White croaker (Genyonemus lineatus), Petrale sole (Eopsetta jordani), Halibut (Paralichthys californicus), Salmon (Oncorhynchus sp), Pacific herring (Clupea harengus), Northern anchovy (Engraulis mordax), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister). Site C1 is situated in a potential nursery habitat for English sole (Parophrys vetulus), and Dungeness crab (Cancer magister).

(5) Site D1. The historical BART Site (Site D1), introduced in Section 2.4.4(d), is the final candidate site. Dispersion modeling for Site D1 is in the planning stage and site size has yet to be determined. Site radius should be similar to Site C1, but the site should be more dispersive due to the very strong currents. Aside from Dungeness crab (Cancer magister), commercial stocks are highly variable and may include Northern anchovy (Engraulis mordax), Shiner perch (Cymatogaster aggregata), English sole (Parophrys vetulus), and Sand sole (Psettichthys melanostictus).

c. Evaluation with MPRSA Site Selection Factors.

The five candidate ocean dredged material disposal sites are evaluated below to determine the acceptability of each of the sites. It is possible that more than one of the candidate site will be found acceptable. The site selection process attempts to assess compliance of each candidate site with five general criteria and eleven specific factors set forth in 40 CFR 228.5 and 40 CFR 228.6(a) and to select the one site where the disposal of dredged sediments would have the least adverse environmental impact at acceptable economic costs. Under the five general criteria given in 40 CFR 228.5 (Table 2.A), sites are selected so as to minimize interference with other marine activities, to keep temporal perturbations associated with dredged material disposal from causing impacts outside of the site, and to permit effective monitoring to detect and evaluate any unsuspected impacts at an early stage. Where feasible, selection and use of sites off the continental shelf or of historically used disposal sites is preferred and chosen. If at any time disposal operations at an interim site cause unacceptable adverse environmental impacts based on the proposed monitoring, the use of that site would be terminated as soon as suitable alternate disposal sites can be designated. The eleven specific criteria specified by 40 CFR 228.6(a) [Table 2.B] are used in evaluating proposed disposal sites to assure the general criteria are met.

d. Compliance With the General Criteria for the Selection of Ocean Disposal Sites (40 CFR 228.5).

40 CFR 228.5 (a) "The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shell fisheries, and regions of heavy commercial or recreational navigation."

Discharge coordinates for all candidate dredged material disposal sites are outside of existing navigation lanes and precautionary areas and discharge of material within the site would not affect commercial or recreational navigation. Transit to and from the various candidate sites is likely to impact commercial and recreational navigation. For the Oakland Harbor Deep Draft Navigation Project, if each barge carries 2,700 m^3 (3,500 yd^3) of dredged sediments and is transported to the site individually by tug, an additional 2,000 vessel trips out the Golden Gate to the site and back would be added to vessel traffic, a 30% to 40% increase in total vessel traffic excluding commercial fishing. Approximate routes for disposal vessels, utilizing established traffic lanes as much as possible and avoiding transit of U.S. Navy submarine operating areas are given in Figure 2.3. Calculated haul distances from the Golden Gate Bridge are 28.9 km (16.5 nmi) for Site 1M, 56.3 km (30.4 nmi) for Site B1, 57.6 km (31.1 nmi) for B1A, 26.5 km (14.3 nmi) for Site C1, and 8.3 km (4.5 nmi) for Site D1. Tug and barge traffic is generally slower and less maneuverable than other vessels in the Gulf of the Farallones and dredged material vessels would encounter and be overtaken by other vessels, often during periods of reduced visibility. (Please refer to Section 2.2.2.3 of the ZSF, Appendix F). Sites 1M, C1, and D1 are adjacent to navigation lanes or precautionary areas and require little transit in areas where larger vessel traffic is not normally encountered. Sites B1 and B1A not only require longer haul distances and travel time within established traffic lanes, but also require transit through several nautical miles of commercial and recreation fishing grounds and potential crab potting areas where larger vessel traffic is uncommon. To minimize the potential for incident between dredged material disposal vessels and other commercial or fishing vessels, Notice to Mariners would be issued concerning planned activities and the radar image of disposal vessels would be enhanced to facilitate oversight of relative vessel positions by the U.S. Coast Guard (ZSF,

TABLE 2.A.

GENERAL CRITERIA FOR THE SELECTION OF
OCEAN DISPOSAL SITES
40 CFR 228.5

a. The dumping of material into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

b. Locations and boundaries of disposal sites will be chosen so 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 seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

c. If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet criteria for site selection set forth in Section 228.5-228.6, the use of such sites will be terminated as soon as suitable alternative disposal sites can be designated.

d. The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and to permit the implementation of effective monitoring and surveillance programs to prevent adverse, long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

e. EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

TABLE 2.B.

ELEVEN SPECIFIC FACTORS FOR OCEAN DISPOSAL SITE SELECTION
40 CFR 228.6

1. Geographical position, depth of water, bottom topography, and distance from the coast.

2. Location in relation to breeding, spawning, nursery feeding, or passage areas of living resources in adult or juvenile phases.

3 Location in relation to beaches or other amenity areas.

4. Types and quantities of wastes proposed to be disposed of and proposed methods of release, including methods of packaging the waste, if any.

5. Feasibility of surveillance and monitoring.

6. Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current velocity, if any.

7. Existence and effects of present or previous discharges and dumping in the area (including cumulative effects).

8. Interference with shipping, fishing, recreation, mineral extraction, desalination, shellfish culture, areas of special scientific importance and other legitimate uses of the ocean.

9. Existing water quality and ecology of the site, as determined by available data or by trend assessment or baseline surveys.

10. Potential for the development or recruitment of nuisance species within the disposal site.

11. Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

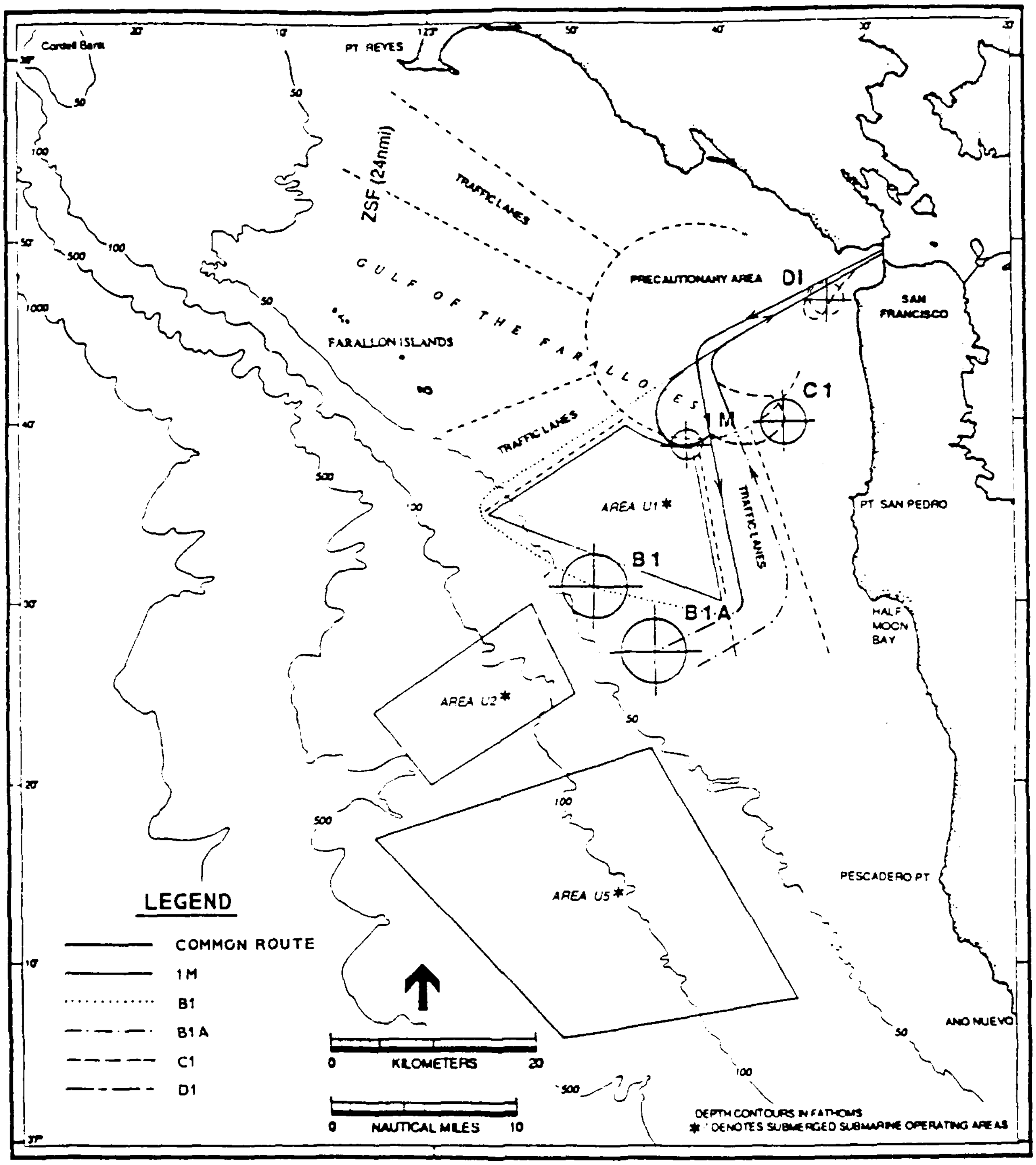


Figure 2.3 Projected Transit Routes To And From Candidate Sites (From Golden Gate)

Appendix F). Site 1M is located at the edge of the USCG's precautionary area. Site C1 is near the precautionary area and the southern inbound traffic lane. The USCG has indicated that as long as transit of disposal vessels were within the flow of normal traffic and that the actual disposal area was outside of the precautionary area and traffic lanes, navigation hazards would be minimized. Sites B1 and B1A are also located outside of navigation traffic lanes and the precautionary zone. Because of their distance at the edge of the radar range, detection becomes less certain due to variables affecting transmission of the radar signal (i.e., severe fog, storms).

The entire shelf region offshore of San Francisco Bay is utilized by commercial fishermen for bottom and pelagic fish, Dungeness crab, and other commercial marine resources. Site 1M supports a commercial fishery for Lingcod (Ophiodon elongatus), English sole (Parophrys vetulus), Petrale sole (Eopsetta jordani), Pacific sanddab (Citharichthys sordidus), Halibut (Paralichthys californicus), Salmon (Onchorhynchus sp), Northern anchovy (Engraulis mordax), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister). Commercial fishery resources in the vicinity of Site B1 include Pacific sanddab (Citharichthys sordidus), Rex sole (Glyptocephalus zachirus), English sole (Parophrys vetulus), Salmon (Onchorhynchus sp), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister). Site B1A is located in the vicinity of a Rockfish (Sebastes sp) set-net and hook-and-line fishing area. Additionally, commercial stocks of Pacific sanddab (Citharichthys sordidius), English sole (Parophrys vetulus), Dover sole (Microstomus pacificus), Petrale sole (Eopsetta jordani), Salmon (Onchorhynchus sp), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister) are found at the site. Fisheries at Site C1 include English sole (Parophrys vetulus), White croaker (Genyonemus lineatus), Petrale sole (Eopsetta jordani), Halibut (Paralichthys californicus), Salmon (Onchorhynchus sp), Pacific herring (Clupea harengus), Northern anchovy (Engraulis mordax), Albacore (Thunnus alalunga), and Dungeness crab (Cancer magister). Aside from Dungeness crab (Cancer magister), commercial stocks at Site D1 are highly variable and may include Northern anchovy (Engraulis mordax), Shiner perch (Cymatogaster aggregata), English sole (Parophrys vetulus), and Sand sole (Psettichthys melanostictus). Per unit area, Sites 1M and C1 are likely to be the most productive of candidate sites due to a combination of depth and proximity to San Francisco Bay. Sites B1 and B1A impact larger areas that are less productive per unit area as a fishery for Dungeness crab (Cancer magister) but of comparable value as a fishery for other demersal and pelagic species. Site D1, because of the dearth of food resource value, is not a productive area when compared to other candidate sites. However, the possible dispersive nature of the site may carry sediments to more productive areas. Sites nearer to San Francisco Bay are more intensely fished for convenience.

40 CFR 228.5 (b) "Locations 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 seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary or known geographically limited fishery or shellfishery."

The discharge of dredged material at the center of candidate Sites 1M, B1, B1A, and C1, under expected normal current conditions is not expected to cause perturbations in water quality beyond disposal site boundaries. Site sizes to accommodate area of bottom deposition are based on the use of the Disposal from Instantaneous Dump Model (DIFID) and computational procedures explained in the sediment and dispersion analysis performed for each of the sites (Tetra Tech, 1987). The DIFID model has not been run for Site D1. While the site is likely to be dispersive, it has not been determined if disposal plumes from disposal activity would exceed common ambient suspended particulate levels occurring at the mouth of the naturally turbid San Francisco Bay and Delta.

The perimeter of Site 1M is 2.3 km (1.2 nmi) from the Gulf of the Farallones National Marine Sanctuary and 16.9 km (9.1 nmi) from shore. The bounds of site B1 are much closer the the marine sanctuary, 0.2 km (0.1 nmi), but further from shore, 22.6 km (12.2 nmi). B1A is 10.2 km (5.5 nmi) and 18.4 km (9.9 nmi) from the marine sanctuary and shore, respectively, but encroaches upon the periphery of a geographically limited rockfish (*Sebastes sp*) fishery. Site C1's perimeter is 9.0 km (4.9 nmi) from the sanctuary and 7.0 km (3.8 nmi) from shore. Site D1 is estimated to lie about 10 km (5.4 nmi) from the Gulf of the Farallones National Marine Sanctuary but very close to shore, less than 0.4 km (0.2 nmi).

40 CFR 228.5 (c) "If at anytime during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Parts 228.5-228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated."

There is no interim designated ocean disposal site. The location selected for disposal under Section 103 of MPRSA will be monitored prior to disposal and after disposal. (See Section 4.6)

40 CFR 228.5 (d) "The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal evaluation or designation study."

Site sizes were computed based on DIFID modeling and sediment and dispersion analysis (Tetra Tech, 1987). Horizontal dispersion and spreading of dredged material as it falls through the water column and after it impacts the ocean floor, increases with site depth or site currents. Site sizes are based on disposal within 60 m (197 ft) of site center and spreading is based on average site depth. Configuration of all deposits are approximately circular. Site area, configuration, and site center coordinates are listed below:

TABLE 2.C
Site Size, Configuration, and Location

Site	Site Area	Configuration	Coordinates
Site 1M	4.1 km^2 (1.2 nmi^2)	circular	37° 38′ 42" N 122° 42′ 16" W
Site B1	18.5 km^2 (5.4 nmi^2)	circular	37° 31′ 16" N 122° 48′ 32" W
Site B1A	18.5 km^2 (5.4 nmi^2)	circular	37° 27′ 00" N 122° 44′ 30" W
Site C1	4.3 km^2 (1.3 nmi^2)	circular	37° 40′ 00" N 122° 36′ 00" W
Site D1	undetermined	circular	37° 46′ 50" N 122° 32′ 40" W

40 CFR 228.5 (e) "EPA will, wherever feasible, designate ocean dumping sites beyond the continental shelf and other such sites that have been historically used."

An analysis was made to determine the area in which it would be economically and operationally feasible to dispose of dredged material in ocean waters off San Francisco. The procedure followed joint technical guidance of the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) [EPA and USACE, 1984; SAIC, 1986). The resulting Zone of Siting Feasibility (ZSF) analysis concluded that the ZSF extended to a radius of 44 km (24 nmi) of Pt. Bonita (Appendix F). It was concluded that use of ocean dredged material disposal sites beyond the ZSF boundary was not feasible. At most locations along the western coast of North America, a 44 km (24 nmi) radius would circumscribe several off the shelf sites. However, the bathymetry of the Gulf of the Farallones results in a much wider shelf off San Francisco so that the ZSF contains no such candidate sites. The regulatory guidance recognizes that where the continental shelf is broad, disposal sites on the continental shelf may be required. In the Gulf of the Farallones, designation of an ocean dumping site beyond the continental shelf is not feasible.

The only site that has a history of dredged material disposal within the ZSF and is not designated primarily for the disposal of sand, is candidate Site D1 [Section 2.4.4(d) and 2.4.5(b)(2) above]. Site D1 is located west of Seal Rocks immediately south of the Eastbound San Francisco Bay Traffic Lane. This site was used for disposal of fine grained clay and silts excavated for the construction of the Trans-bay Tunnel for the Bay Area Rapid Transit (BART) project. Approximately 2.3 million m^3 (3 million yd^3) was deposited at this site. As the site lies within the zone of siting feasibility, it has been determined that it is economically and operationally feasible to use Site D1 for disposal of dredged material. To date, however, studies have not been completed that would conclusively demonstrate compliance with the other four general criteria for the selection of a disposal site given in 40 CFR 228.5.

e. <u>Compliance with the Specific Factors for the Selection of Ocean Disposal Sites (40 CFR 228.6).</u> The five general criteria used for the selection of ocean disposal sites are supplemented by eleven specific criteria given in 40 CFR 228.6(a). The eleven specific criteria are to be used in evaluating a proposed disposal site to assure that the five general criteria are met (SAIC, 1986). While the eleven specific criteria are commonly used to evaluate a selected site and their iteration in the site selection process may be slightly redundant, some useful information in the site selection process can be brought to light through comparison of the candidate sites under the specific criteria. Such an analysis follows. Much of the site comparison data is best presented in table form and one common table, Table 2.G - Site Comparison Criteria, with data points applicable to project costs, the five general criteria for site selection, and the eleven specific criteria for site evaluation follows this section.

<u>40 CFR 228.6(a)(1)</u>."Geographical Position, Depth of Water, Bottom Topography and Distance from Coast."

Coordinates of Site centers, water depths, bottom topography, distances from the coast of the nearest point on the site perimeters, and haul distances from the Golden Gate Bridge for all five candidate sites are presented in Table 2.F. Site D1 is the shallowest site [24 m (13 fm)], followed by Site C1 [29 m (16 fm)], Site 1M [42 m (23 fm)], Site B1A [82 m (45 fm), and Site B1 [84 m (46 fm)]. All sites have a gently sloping bottom with increasing depths farther from shore, with the exception of Site D1, which gently slopes down to the northeast. Site D1 is nearest to shore, less than 1.0 km (0.54 nmi) from the coast. Site C1 lies 7.0 km (3.8 nmi) from shore measured to the closest point on the site perimeter. All other sites range from 16.9 to 22.6 km (9.1 to 12.2 nmi) with Site B1 being furthest from shore.

40 CFR 228.6(a)(2). "Location in Relation to Breeding, Spawning, Nursery, Feeding or Passage Areas of Living Resources in Adult or Juvenile Phases."

Dungeness crab (Cancer magister) spawning occurs throughout the Gulf of the Farallones, but especially in water less than 91 m (50 fm). All five candidate sites are likely to be spawning areas. Dungeness crabs (Cancer magister) use areas less than 37 m (20 fm) deep as nursery grounds, which would include sites C1 and D1. Sites 1M, B1, B1A, and C1 provide habitat for juvenile English sole (Parophrys vetulus). Site B1 and B1A may also serve as nursery grounds for Pacific sanddab (Citharichthys sordidus) and Dover sole (Microstomus pacificus). Site B1A encroaches upon a potential spawning area and nursery for the geographically limited Rockfish (Sebastes sp).

Key food resource value is ranked "high" for sites 1M and C1, "medium" for sites B1 and B1A, and "low" for Site D1.

Total biomass of candidate sites has been subjectively rated as "high" for Sites 1M and C1, "medium high" for the "B" sites, and "low" for Site D1. Numerous demersal and pelagic species inhabit the sites. Some demersal resources are shown in Figure 2.4. Commercial stocks are listed under the discussion of 40 CFR 228.5(a) in the text and in Table 2.F. A detailed listing of species found at the site during field surveys is found in Nybakken et al, 1984, for site 1M; Parr et al, 1987, and Stevenson and Parr, 1987, for the "B" sites; CH_2M Hill, 1984 for Site C1; and Ebert and Cordier, 1966, for Site D1.

A number of anadromus fish species; salmon (Oncorhynchus sp), shad (Alosa sapidissima), sturgeon (Acipenser sp), etc., migrate through the study area to and from their inland spawning sites. None of these species are known to concentrate in the vicinity of any of the candidate sites.

A number of endangered species occur in the study area. Marine mammal haul out areas are shown in Figure 2.5. No impacts to any of these species are expected from dredged material disposal activities. Whales (Cetaceans) migrate annually through the study area (See Table 2.D.). Southbound whales generally stay within 4 km (2.2 nautical miles) of shore except in the Gulf of the Farallones where some whales pass west of the Farallon Islands. On the northward migration, the whales tend to stay closer to shore. Gray whales are not known to aggregate in the vicinity of any of the

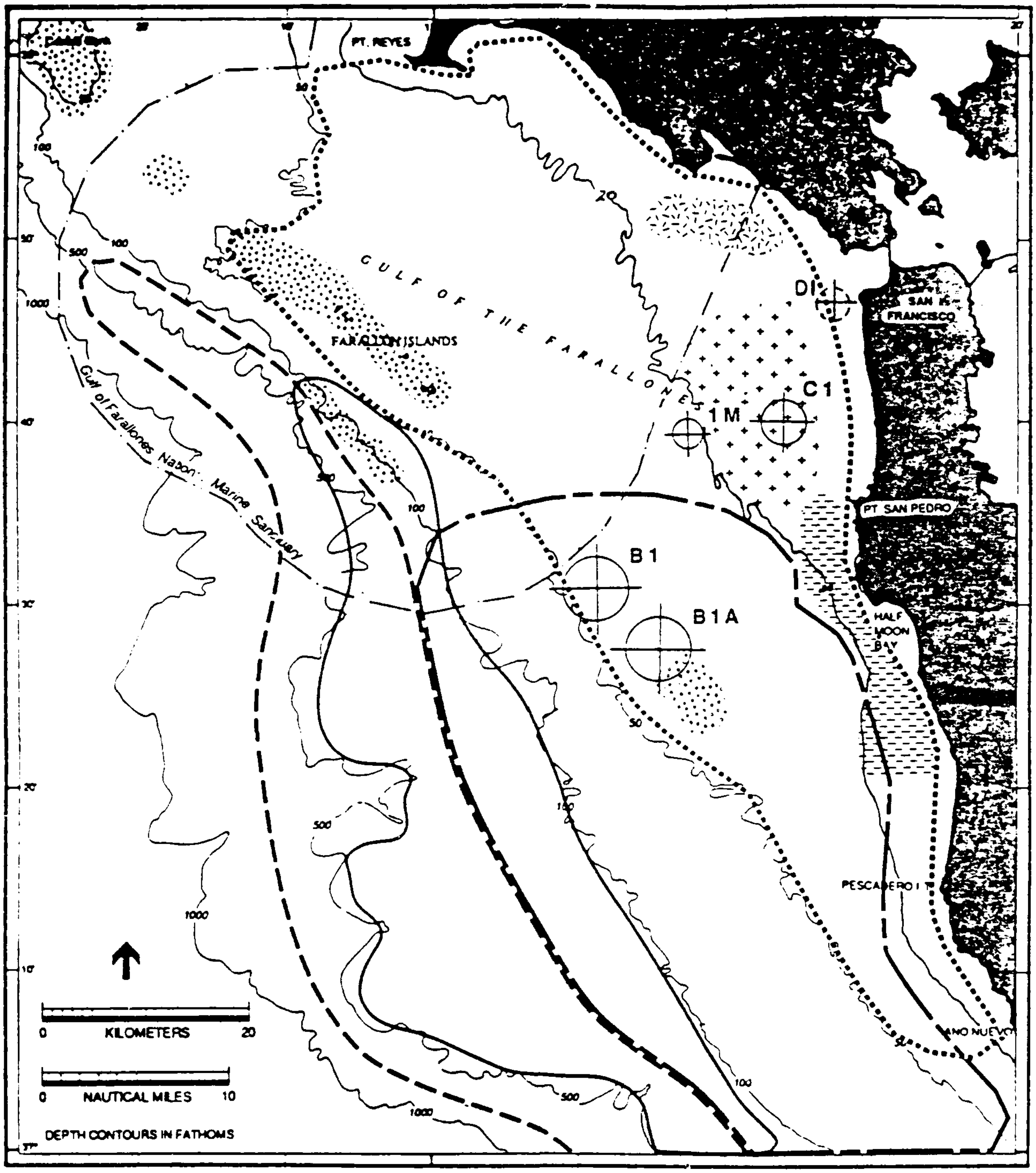


Figure 2.4 Demersal commercial fish resources (shore to 600 fm).

Reference: Tasto, various commercial fisherman (Bodega Bay, Halfmoon Bay, San Francisco, Oakland)

Blackcod (200fm to 600fm)	Dover Sole (100fm to 500fm)	Rockfish, Petrale & English Sole (3 mi. to 200fms)	Dungeness Crabs 1 to 50fms
Croaker & Halibut	Petrale & English Sole (Summer)	Rockfish	Croaker

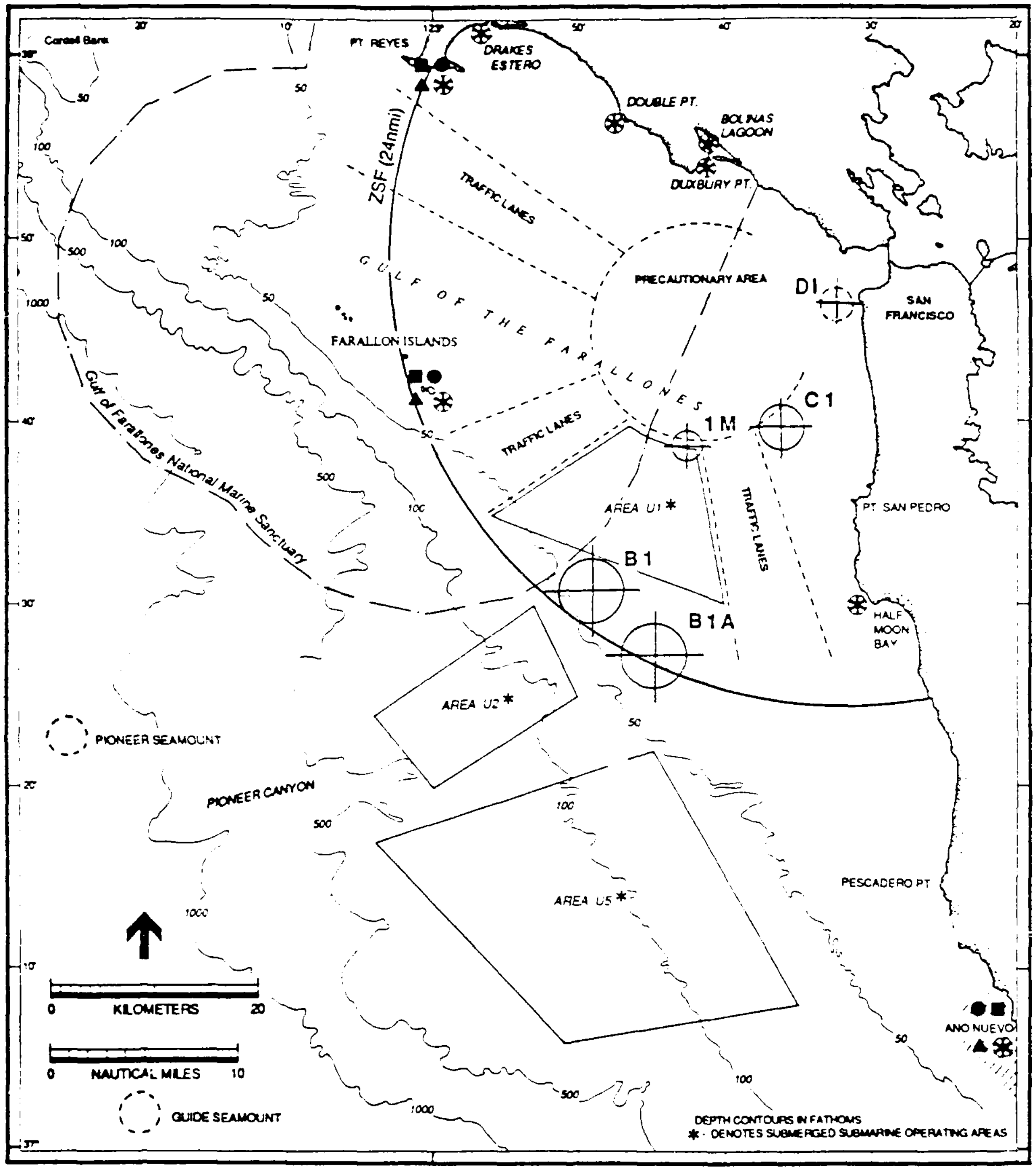


Figure 2.5 Major pinniped hauling grounds and rookeries in the project area.

TABLE 2.D.
WHALE MIGRATION PERIODS

Species	Northern Migration	Southern Migration	Feeding Pattern
Gray Whale	Feb-Jun	Oct-Jan	Bottom filter feeders in Bering & Chukichi Seas during Jun - Oct
Humpback Whale	mid Mar-Jun	Sep-Jan	Plankton & schooling fish (anchovies & sardines)
Blue Whale	May-Jun		Only krill during summer by sieving & swallowing
Fin Whale	mid May-Jun	mid Jul-Sep	Krill & anchovies by swallowing
Right Whale	Mar-Jun	Oct-Feb	Copepods & small fish along edge of shelf by skimming surface
Sea Whale	Spring	Fall	Plankton & small fish; found off California coast mid-Jul to Oct
Sperm Whale	Apr-Jun	Aug-Nov	Squid, octopus & bony deep water fish

candidate disposal sites. Interference with feeding or migration at any site would be due to chance encounter with the disposal barge rather than due to the particular characteristics of the disposal site.

Approximately two-thirds of the breeding sea birds in California breed on the Farallon Islands. The breeding colonies are among the largest in North America south of the Aleutian Islands. Breeding success is tied to current upwelling patterns. For most species, the highest reproductive success occurs during years of moderate upwelling of cold water. None of the candidate sites are located in particular bird feeding areas.

40 CFR 228.6(a)(3)."Location in Relation to Beaches and Other Amenity Areas"

Distance from site perimeters to beaches and amenity areas for all candidate sites is given in Table 2.G. The perimeter of Site D1 is the closest to the beaches or the Golden Gate National Recreation Area at less than 1.0 km (0.54 nmi), followed by Site C1 at 7.0 km (3.9 nmi). The closest site to the Gulf of the Farallones National Marine Sanctuary is Site B1, with the perimeter approaching to within 0.2 km (0.1 nmi) of the sanctuary boundary. The edge of Site 1M is substantially farther from the sanctuary's border, 2.3 km (1.2 nmi), but the center of the site is closer to the sanctuary relative to Site B1. The remaining sites are at least 9.0 km (4.9 nmi) from the sanctuary. Site C1 is 7.8 km (4.2 nmi) from Montara State Beach and 5.4 km (2.9 nmi) from the Point San Pedro kelp bed.

40 CFR 228.6(a)(4)."Types and Quantities of Wastes Proposed to be Disposed of, and Proposed Methods of Release, Including Methods of Packing the Waste, if Any"

The material from the Oakland Harbor channels is fine grained silt, sand and consolidated clay. Material to be disposed has been evaluated according to the evaluation criteria specified in the Ocean Dumping Regulations (40 CFR 227.13). With the exception of material from the Oakland Inner Harbor turning basin, the results of water column and bioassay tests indicate that their potential for release into the water column, or bioaccumulation in the marine environment is not significant (See Water and Sediment Quality Testing Synopsis). Elevated contaminant levels in the turning basin have been identified and can be treated as being unacceptable for open water disposal. However, disposal of the material in the aquatic environment can be accomplished with burying the potentially unsuitable material with the material found to be acceptable for open water disposal.

The sediments to be disposed at the ocean site would be excavated by a clamshell dredge. Disposal would occur below the water surface from a bottom dump barge. Approximately 1,900 to 2,700 m^3 (2,500 to 3,500 yd^3, respectively) of material would be dumped per barge load. No special packing of the material is anticipated.

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 3/11

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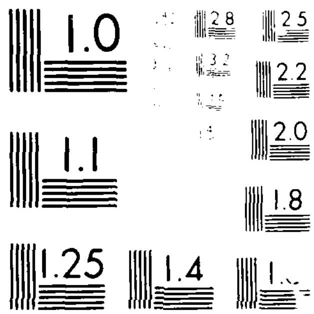
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40 CFR 228.6(a)(5)."Feasibility of Surveillance and Monitoring"

In the Gulf of the Farallones, the USCG has primary responsibility for surveillance and enforcement of ocean dumping activities, including documenting compliance with permit conditions, deterrence of unauthorized disposal, and navigational surveillance [40 CFR 1.46(n)(5)]. The routine methods of navigational surveillance include random checks using on board observers, aerial observations, reviews of trip logs, continuous surveillance by radar, and instrumentation that records draft with respect to time and location for later readout. All methods are equally applicable to all candidate sites.

The U.S. Army Corps of Engineers and the EPA have joint responsibility for the development and specification of site management plans for offshore sites. A site management and monitoring plan has not yet been prepared for this project. Under Ocean Dumping Regulations (40 CFR 228.13), the composition of a typical site monitoring program may include: seasonal sampling; experimental sampling design forwarded to test a hypothesis; studies of water column characteristics and water quality parameters; studies of plankton, benthos, and demersal fisheries; bathymetric investigations; examination of sediment characteristics and chemistry; examination of hydrological conditions; and bioaccumulation studies. At a simple mechanical level, each of these monitoring program elements is feasible to implement at any of the candidate sites. In general, sites located further offshore and at greater depths are generally more difficult and costly to monitor and sample.

40 CFR 228.6(a)(6). "Dispersal, Horizontal Transport and Vertical Mixing Characteristics of the Area, Including Prevailing Currents, Direction and Velocity, If Any"

Three seasonal current regimes, the California current with upwelling, the transition period, and the Davidson period, exist in the study area although there is a great deal of year to year variability. The California current transports low temperature, low salinity nutrient rich subarctic water southward along the coast. It is the dominant current between March and August. During May through July, the surface waters move offshore and are replaced by cooler nutrient rich waters rising up the continental slope. The transition period occurs between September and October. Between November and February, the subsurface countercurrent surfaces transporting warmer waters northward along the coast.

Current speeds at Site 1M are expected to average 11 cm/s (0.36 ft/s) with peak currents less than 50 cm/s (1.64 ft/s). Current velocities at Site B1 and B1A are slightly higher than those at Site 1M and are projected to average approximately 16 cm/s (0.52 ft/s) with peak currents less than 53 cm/s (1.74 ft/s). Site C1 has current in the

TABLE 2.E
Hydrographic Periods

	Approximate Dates	Characteristics
Upwelling Period	Mar-Aug	Low temp (<12^{o}C) High salinity >33.7 ppt Low O_2 (1.5 - 6 ml/l) Shallow thermocline
Oceanic Period	Sep-Nov	High temp (>12-18^{o} C) Low salinity <33.5 ppt High O_2 (>6 ml/l) Distinct thermocline
Davidson Period	Dec-Feb	Low temp (11-12^{o} C) Low salinity <33.5 ppt Moderate nutrients Well mixed-upper 100 m

range of Site 1M, with an average speed of 13 cm/s (0.43 ft/s) and a peak current velocity of 50 cm/s (1.64 ft/s). Currents at Site D1 are overwhelmingly dominated by tidal flow through the Golden Gate into and out from San Francisco Bay and Delta. Tidal currents at the site are likely to approach 50 percent to 60 percent of the tidal velocities given in standard tables for the Golden Gate. Direction of flow should oscillate between northeast and southwest. Predominant current directions at the other candidate sites are northeast and south.

Modeling of the dispersion and resuspension of sediments discharged at site center (Tetra Tech, 1987) indicates that dredged material discharged at Site 1M could form a slightly asymmetric deposit resulting from resuspension and transport to the east-northeast. 98.7 percent of material discharged at Site 1M is expected to be retained within the site after twenty years. Site 1M size is 4.1 km^2 (1.2 nmi^2). A more symmetric deposit over a much larger area, 18.5 km^2 (5.4 nmi^2), is projected for dredged material discharged at either Site B1 or B1A. Resuspension and transport is expected to be negligible at both "B" sites. At Site C1, 97.2 percent of sediments discharged are expected to be retained within the 4.3 km^2 (1.3 nmi^2) after twenty years. Modeling of Site D1 has not been conducted. The site is expected to be dispersive in nature and the percent of sediment retained within the site after twenty years may be significantly reduced from that would experienced at the other candidate sites.

<u>40 CFR 228.6(a)(7)</u>."Existence and Effects of Current and Previous Discharges and Dumping in the Area (Including Cumulative Effects)"

Only Site D1, of the five candidate sites, has been used previously for sediment disposal. Long term effects of previous disposal at Site D1 are negligible. Sediment disposal has historically occurred elsewhere in the study area. No historical sites are close to any of the other candidate sites. Use of the Farallon Islands Site, approximately 14.3 km (7.7 nmi) from Site B1 and 25.7 km (13.9 nmi) from Site 1M, was discontinued in 1980. The BART Site (Candidate Site D1) was used for disposal of dredged material in 1966 and 1967. Continuing disposal of sand at the Channel Bar Site occurs 14.7 km (7.9 nmi) from Site 1M, 7.8 km (4.2 nmi) from Site C1, and 3.0 km (1.6 nmi) from Site D1.

In addition to disposal of dredge materials, several other types of disposal or disturbances have taken place in the study area including disposal of: radioactive wastes at three adjacent sites seaward of the Farallon Islands (Reish 1983); construction materials at a shallow water site; refinery, acid, and cannery waste disposal at several shelf sites; explosive and chemical munitions at several shelf and slope sites ; and municipal wastewater at San Francisco's Southwest Ocean Outfall site (SWOOP). Locations are shown in Figure 2.6) Also, substantial quantities of sediments are discharged from San Francisco Bay in the form of suspended load (turbidity plumes) and bedload associated with tidal currents and runoff from the bay area drainage basins. Major episodic oil spills have taken place in the vicinity of the entrance to San Francisco Bay in recent years, and commercial fishing is a source of continuous disturbance to offshore fish populations and to the benthos throughout the study area. At present, there is no program to integrate and evaluate the cumulative effects of these diverse historical and continuing sources of impacts.

TABLE 2.F.
SUMMARY OF WASTES DUMPED OFFSHORE OF SAN FRANCISCO
(Smith and Brown 1971, Interstate Electronics Corporation 1973)

Type of Waste	Period	Estimated Total 1931-72
Refinery Wastes	1966-72	315 M gal
Acid Wastes	1948-71	240 M gal
Cannery Wastes	1960-72	246 K tons
Radioactive Wastes	1946-68	44.5 K containers
Munitions	1968-69	746 tons
Dredge Spoil	1935-72	1 M yd^3

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40 CFR 228.6(a)(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"

The Coast Guard's Vessel Traffic Service has expressed concern over locating a dredged material disposal site where navigation safety is compromised. As a result, transit of towed barges would be requested to conform with the inbound and outbound flow of the vessel traffic lanes in the Gulf of the Farallones. Site 1M is adjacent to the USCG's precautionary area and the main southern traffic lane and disposal traffic would have minimal impact. To avoid the submarine operating area, use of Sites B1 and B1A would require disposal vessels to travel further along the southern traffic lane then turn and depart from normal traffic flow while proceeding directly to the disposal site. The U.S. Navy has requested that towed disposal vessels not transit the designated submarine operating areas. Sites C1 and D1 have the least haul distance, but require crossing the oncoming traffic lane.

Commercial fishing in the vicinity of each of the disposal sites has been described previously. Recreation, primarily wildlife excursions and fishing occur throughout over the entire study area. There are no fish or shellfish culturing areas or desalination facilities in the study area. The Minerals Management Service (MMS) of the Department of the Interior plans to lease portions of the study area for oil and gas development in 1989. The MMS has indicated that use of Sites 1M or B1 would be acceptable and has taken the position that use of Sites B1A or C1 would be unacceptable.

The areas of special scientific importance in the study area are the Gulf of the Farallones Marine Sanctuary and the Areas of Special Biological Significance along the coast. The perimeter of Site 1M is 2.3 km (1.2 nmi) from the sanctuary boundary and the edge of Site B1 is 0.2 km (0.1 nmi) from the sanctuary. None of the sites are close to any of the coastal Areas of Special Biological Areas of Significance.

<u>40 CFR 228.6(a)(9)</u>. "The Existing Water Quality and Ecology of the Site as Determined by Available Data or by Trend Assessment or Baseline Surveys"

The waters of Site 1M, C1, and D1 are within the influence of perturbations from discharges along the coast and from San Francisco Bay. Nybakken <u>et al</u>. (1984) reported that the water column in the vicinity of Site 1M, a 5 m (16 feet) mixed layer of relatively warm low-salinity water overlaying the cooler, more saline deep waters. Dissolved oxygen distributions during the March and June 1983 surveys showed highly supersaturated surface waters up to 144 percent (Nybakken, <u>et al</u>., 1984). Site C1 is similarly influenced by San Francisco Bay but also lies in close proximity of San Francisco's Southwest Ocean Outfall for treated sewage effluent. Site B1 and Site B1A are further from the influences of the tidal prism of San Francisco Bay and are more representative of typical ocean regions, with lower particulate loads and lower levels of trace elements and organics. In general, abundance and resource value of benthic species decreases from inshore to offshore areas as does abundance and diversity of fisheries. As Sites 1M and C1 are closer to shore, they have a relatively higher value per unit area than Sites B1 or B1A. Site B1A is the only site with a relatively limited or unique habitat value.

<u>40 CFR 228.6(a)(10)</u>."Potential for the Development or Recruitment of Nuisance Species in the Disposal Site"

Nuisance species have been defined by the EPA as "Organisms of no commercial value, which because of predation or competition, may be harmful to commercially important organisms; pathogens; or pollution tolerant organisms present in large numbers that are not normally dominant in the area" (SAIC 1986). Included are pathogenic bacteria, viruses, fungi, protozoans, eggs and spores of parasites that may infect indigenous fauna and non-indigenous species as well as pollution tolerant organisms in inordinate numbers such that they are more dominant than under natural conditions. Nuisance species are generally rare in deeper open coastal waters, but may be found in the more confined and degraded areas of the inner harbors of San Francisco Bay. It is likely that the addition of dredged bay sediments to an offshore site would create a different habitat and that the community that becomes established in association with the disposal site, would differ from the ambient community. It is not known whether disposal would promote nuisance conditions at any of the candidate sites.

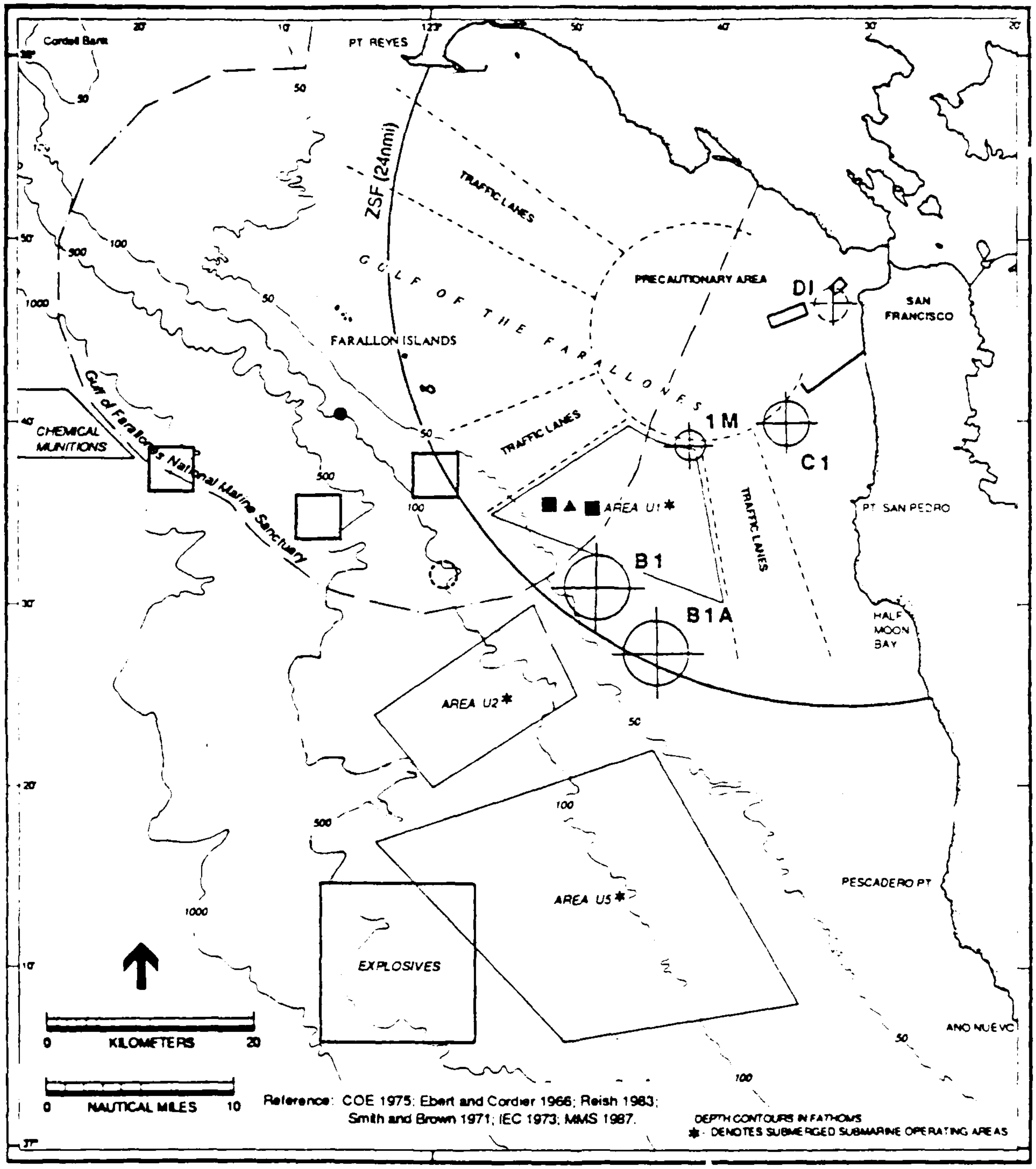
40 CFR 228.6(a)(11). "Existence At or in Close Proximity to the Site of any Significant Natural or Cultural Features of Historical Importance"

Candidate sites 1M, B1, and B1A are located within a region categorized by the Bureau of Land Management (1980) as containing a low incidence of shipwrecks (Figure 2.7). Site C1 and D1 lies in an area of higher incidence of shipwrecks. Bathymetric surveys and field sampling at the candidate sites have not indicated the presence of cultural features of historical importance.

f. Economic Comparisons of Sites. The magnitude of costs associated with dredging and transportation to each site is depicted in the table (Tables 2.H.) below. While economic feasibility was examined in the ZSF process, the relative costs related to the candidate disposal sites are described here. Dredging and disposal costs are related to haul distance between the dredge site and the disposal site. The costs reflect the dredging of material from Oakland Harbor and the disposal of the material at the alternative disposal sites. The cost comparisons include other project features as well as dredging. The basis for these numbers is addressed in section 6.1 of the GDM.

TABLE 2.H.
DREDGING COSTS FOR OCEAN DISPOSAL FROM OAKLAND

Site	Haul Distance from Oakland km	(nautical miles)	Estimated Dredging Cost
1M	43.0	(23.2)	$39.0 M
B1	70.4	(38.0)	54.0 M
B1A	71.7	(38.7)	54.0 M
C1	40.6	(21.9)	39.0 M
D1	22.4	(12.0)	33.0 M



Industrial, Chemical Dump Site (MMS 1987)	Cannery Wastes	Channel Bar Sediment Site [40 CFR 228.12 (b)(22)]	S.F. Southwest Ocean Outfall Site
Farallon Islands Interim Sediment Disposal Site	BART Sediment Disposal Site (Ebert & Cordier 1966)	Radioactive Disposal Site (Reish 1983)	Experimental Sediment Disposal Study Site (COE 1975)

Figure 2.6 Locations of historical and active disposal sites.

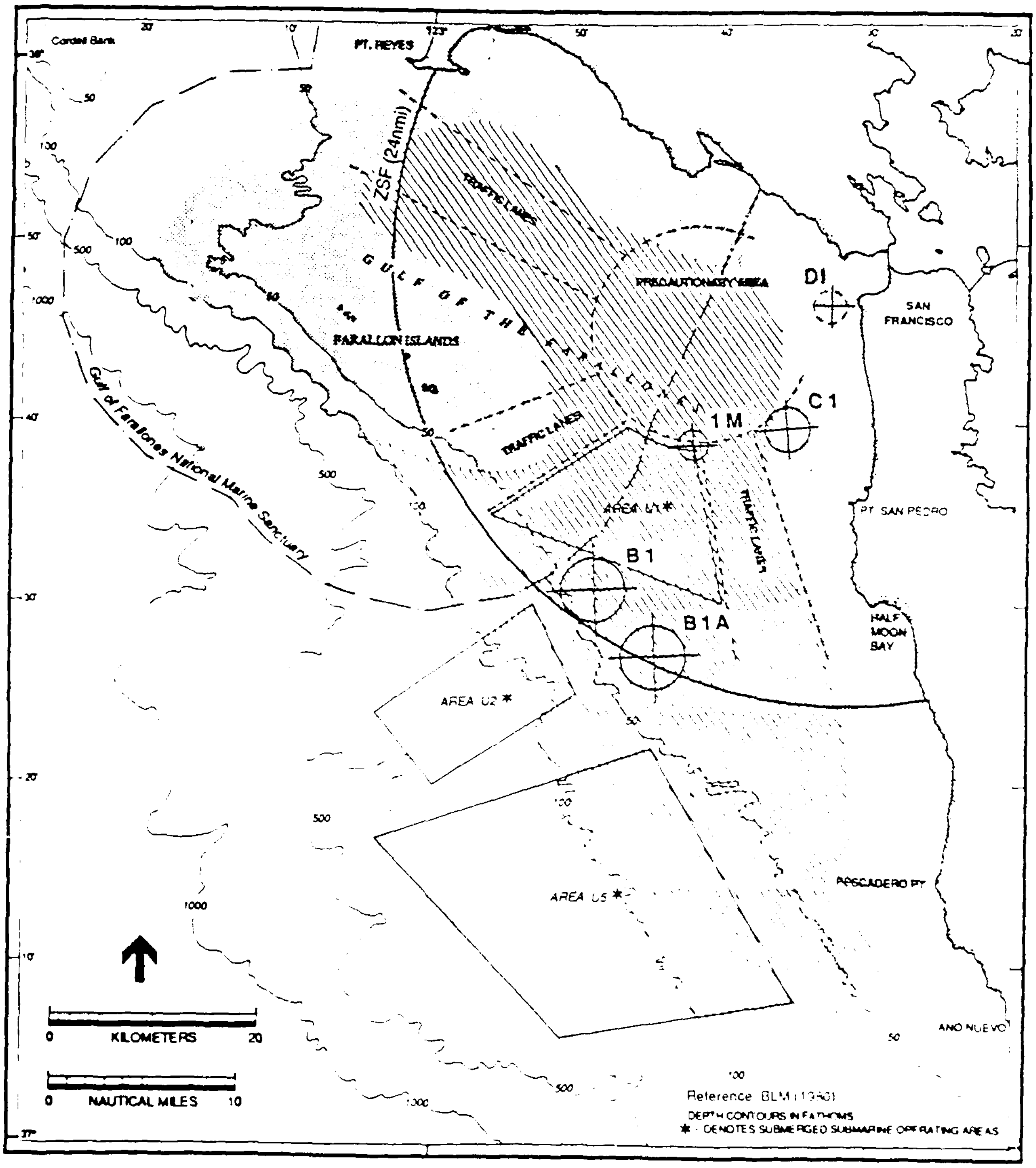


Figure 2.7 Cultural resources.

SHIPWRECKS ZONE 1: Recorded shipwrecks within 10 nautical miles

SHIPWRECKS ZONE 2: Cluster of at least three (3) shipwrecks within 5 nautical miles or single shipwreck within 1 nautical mile

Table 2-G

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
Project Costs.					
Haul distance (from Oakland)	43.0 km (23.2 nmi)	70.4 km (38.0 nmi)	71.7 km (38.7 nmi)	40.6 km (21.9 nmi)	22.4 km (12.0 nmi)
Estimated average costs per yd^3 of dredged material (April 1987 dollars, dredging and transportation costs only)	$4.54	$6.50	6.52	4.49	4.19
Estimated total project costs (April 1987 dollars) (Rounded to 000,000)	$39 million	$54 million	$54 million	$39 million	$33 million
[40 CFR 228.5(a)].					
Area of bottom impacts	4.1 km^2 (1.2 nmi^2)	18.5 km^2 (5.4 nmi^2)	18.5 km^2 (5.4 nmi^2)	4.3 km^2 (1.3 nmi^2)	undetermined
Commercial Demersal Fisheries	Lingcod English sole Petrale sole Pacific sanddab Halibut	Pacific sanddab Rex sole English sole	Pacific sanddab English sole Petrale sole Dover sole Rockfish	English sole White croaker Petrale sole Halibut	Pacific sanddab English sole Bay shrimp Sand sole
Commercial Pelagic Fisheries	Salmon Northern anchovy Albacore	Salmon Albacore	Salmon Albacore	Salmon Pacific herring Northern anchovy Albacore	Northern anchovy Shiner perch Pacific tomcod
Commercial Shellfisheries	Dungeness crab	Dungeness crab	Dungeness crab	Dungeness crab	Dungeness crab
Navigation	use existing navigation lanes entire haul distance to site	use existing navigation lanes for most of haul, then turning and proceding to site	use existing navigation lanes for most of haul, then turning and proceding to site	use existing navigation lanes for most of haul, then turning and proceding to site	use existing navigation lanes entire haul distance to site
Mineral extraction	no conflict	no conflict	potential conflict	potential conflict	no conflict

Table 2-G; continued.

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
[40 CFR 228.5(b)].					
Location (site center)	37°38'42" N 122°42'16" W	37°31'16" N 122°48'32" W	37°27'00" N 122°44'30" W	37°40'00" N 122°36'00" W	37°46'50" N 122°32'40" W
Site configuration	circular	circular	circular	circular	circular
Site radius	1.4 km (0.8 nmi)	3.1 km (1.7 nmi)	3.1 km (1.7 nmi)	2.1 km (1.1 nmi)	undetermined
Distance to shore (from site perimeter)	16.9 km (9.1 nmi)	22.6 km (12.2 nmi)	18.4 km (9.9 nmi)	7.0 km (3.8 nmi)	less than 1 km
Distance to Gulf of the Farallones Nat'lMarine Sanctuary (from site perimeter)	2.3 km (1.2 nmi)	0.2 km (0.1 nmi)	10.2 km (5.5 nmi)	9.0 km (4.9 nmi)	10 km (5.4 nmi)
[40 CFR 228.5(c)].					
Interim designation?	no	no	no	no	no
[40 CFR 228.5(d)].					
Site size	4.1 km^2 (1.2 nmi^2)	18.5 km^2 (5.4 nmi^2)	18.5 km^2 (5.4 nmi^2)	4.3 km^2 (1.3 nmi^{2W})	undetermined
Site configuration	circular	circular	circular	circular	circular
Site radius	1.4 km (0.8 nmi)	3.1 km (1.7 nmi)	3.1 km (1.7 nmi)	2.1 km (1.1 nmi)	undetermined
Location (site center)	37°38'42" N 122°42'16" W	37°31'16" N 122°48'32" W	37°27'00" N 122°44'30" W	37°40'00" N 122°36'00" W	37°46'50" N 122°32'40" W
[40 CFR 228.5(e)].					
Off continental shelf?	no	no	no	no	no
Historically used site?	no	no	no	no	yes

Table 2-G; continued.

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
[40 CFR 228.6(a)(1)].					
Geographic position	37°38'42" N 122°42'16" W	37°31'16" N 122°48'32" W	37°27'00" N 122°44'30" W	37°40'00" N 122°36'00" W	37°46'50" N 122°32'40" W
Depth of water	42 m (23 fm)	84 m (46 fm)	82 m (45 fm)	29 m (16 fm)	24 m (13 fm)
Bottom topography	gently sloping	gently sloping	gently sloping	gently sloping	gently sloping
Distance to coast (from site perimeter)	16.9 km (9.1 nmi)	22.6 km (12.2 nmi)	18.4 km (9.9 nmi)	7.0 km (3.8 nmi)	less than 1.0 km
Haul distance (from GG Bridge)	28.9 km (15.6 nmi)	56.3 km (30.4 nmi)	57.6 km (31.1 nmi)	26.5 km (14.3 nmi)	8.3 km (4.5 nmi)
[40 CFR 228.6(a)(2)].					
Potential spawning habitat	Dungeness crab	Dungeness crab	Dungeness crab	Dungeness crab	unknown
Potential nursery habitat	English sole	English sole Pacific sanddab Dover sole	English sole Pacific sanddab Dover sole Rockfish	English sole Dungeness crab	Dungeness crab
Total biomas (objective rating)	high	medium high	medium high	high	low
Key fish food resources (objective rating)	high	medium	medium	high	low
Area of bottom habitat affected	4.1 km^2 (1.2 nmi^2)	18.5 km^2 (5.4 nmi^2)	18.5 km^2 (5.4 nmi^2)	4.3 km^2 (1.3 nmi^{2W})	undetermined

Table 2-G; continued.

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
[40 CFR 228.6(a)(3)].					
(note: distances are measured from closest point on site perimeter)					
Distance to coast	16.9 km (9.1 nmi)	22.6 km (12.2 nmi)	18.4 km (9.9 nmi)	7.0 km (3.8 nmi)	less than 1.0 km
Distance to Gulf of the Farallones Nat'l Marine Sanctuary	2.3 km (1.2 nmi)	0.2 km (0.1 nmi)	10.2 km (5.5 nmi)	9.0 km (4.9 nmi)	10.0 km (5.4 nmi)
Distance from Golden Gate Nat'l Recreation Area	21.3 km (11.5 nmi)	36.7 km (19.8 km)	11.5 km (6.2 nmi)	20.9 km (11.3 nmi)	less than 1.0 km
Distance from Montara State Beach	18.0 km (9.7 nmi)	20.8 km (11.2 nmi)	18.5 km (10.0 nmi)	7.8 km (4.2 nmi)	20.9 km (11.3 nmi)
Distance from Pt San Pedro kelp bed	13.3 km (7.2 nmi)	21.3 km (11.5 nmi)	20.0 km (10.8 nmi	5.4 km (2.9 nmi)	16.7 km (9.0 nmi)
Distance from James V. Fitzgerald Marine Reserve	17.8 km (9.6 nmi)	23.0 km (12.4 nmi)	18.3 km (9.9 nmi)	15.2 km (8.2 nmi)	25.2 km (15.5 nmi)
Distance from Pillar Pt. kelp bed	15.0 km (8.1 nmi)	24.3 km (13.1 nmi)	18.9 km (10.2 nmi)	17.0 km (9.2 nmi)	28.7 km (15.5 nmi)
[40 CFR 228.6(a)(4)].					
Type of material	cohesive, dredged silts and clays from Oakland Harbor	cohesive, dredged silts and clays from Oakland Harbor	cohesive, dredged silts and clays from Oakland Harbor	cohesive, dredged silts and clays from Oakland Harbor	cohesive, dredged silts and clays from Oakland Harbor
Quantity of material	5.4 million m^3 (7 million yd^3)	5.4 million m^3 (7 million yd^3)	5.4 million m^3 (7 million yd^3)	5.4 million m^3 (7 million yd^3)	5.4 million m^3 (7 million yd^3)
Transport methods	split hull barges 2300-3100 m^3 (3000-4000 yd^3)	split hull barges 2300-3100 m^3 (3000-4000 yd^3)	split hull barges 2300-3100 m^3 (3000-4000 yd^3)	split hull barges 2300-3100 m^3 (3000-4000 yd^3)	split hull barges 2300-3100 m^3 (3000-4000 yd^3)
Release methods	below water surface from split hull	below water surface from split hull	below water surface from split hull	below water surface from split hull	below water surface from split hull
Dredging method	clamshell	clamshell	clamshell	clamshell	clamshell or hopper

Table 2-G; continued.

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
[40 CFR 228.6(a)(5)].					
Surveillance	OVMRS radar and printout of draft vs. time and position	OVMRS radar and printout of draft vs. time and position	OVMRS radar and printout of draft vs. time and position	OVMRS radar and printout of draft vs. time and position	OVMRS radar and printout of draft vs. time and position
Monitoring	Feasible	Feasible, increased costs due to distance from shore, depth, and size of area to be monitored	Feasible, increased costs due to distance from shore, depth, and size of area to be monitored	Feasible, potential for difficulties in assessing and evaluating data due to proximity of outfall	Feasible, increased difficulties and costs due to dispersive nature of site
Area of expected bottom impacts	4.1.km^2 (1.2 nmi^2)	18.5 km^2 (5.4 nmi^2)	18.5 km^2 (5.4 nmi^2)	4.3 km^2 (1.3 nmi^2)	undetermined
Depth	42 m (23 fm)	84 m (46 fm)	82 m (45 fm)	29 m (16 fm)	24 m (15 fm)
Type of site	Retentive	Retentive	Retentive	Retentive/dispersive	Dispersive
[40 CFR 228.6(a)(6)].					
Site Depth	42 m (23 fm)	84 m (46 fm)	82 m (45 fm)	29 m (16 fm)	24 m (13 fm)
Horizontal spread of dredged material disposed at site site diameter)	2.8 km (1.6 nmi)	6.2 km (3.4 nmi)	6.2 km (3.4 nmi)	4.2 km (2.2 nmi)	unknown
Current direction	northeast and south	northeast and south	northeast and south	northeast and south	highly variable
Average current velocity	11 cm/s (0.36 ft/s)	16 cm/s (0.52 ft/s)	16 cm/s (0.52 ft/s)	13 cm/s (0.43 ft/s)	dependent on tides
Peak current velocity	50 cm/s (1.64 ft/s)	53 cm/s (1.74 ft/s)	53 cm/s (1.74 ft/s)	50 cm/s (1.64 ft/s)	unknown
[40 CFR 228.6(a)(7)].					
Previous dredged material discharges at site	none	none	none	none	2,300,000+ m^3 (3,000,000+ yd^3)
Concurrent use	none	none	none	none	none

Table 2-G; continued.

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
[40 CFR 228.6(a)(8)].					
Shipping	no impedance to normal vessel traffic flow	no impedance to normal vessel traffic flow	no impedance to normal vessel traffic flow	no impedance to normal vessel traffic flow	no impedance to normal vessel traffic flow
Fishing	potential impacts to 4.1 km^2 (1.2 nmi^2) of "high" value fishery; high use since close to Golden Gate	potential impacts to 18.5 km^2 (5.4 nmi^2) of "medium high" value fishery; moderate use since farther from Golden Gate	potential impacts to 18.5 km^2 (5.4 nmi^2) of "medium high" value fishery; moderate use since distant from Golden Gate	potential impacts to 4.3 km^2 (1.3 nmi^2) of "high" value fishery; potentially high use since close to Golden Gate but outfall also close	potential impacts to an unsized area of "low medium" value fishery; though close to Golden Gate, wave and current conditions not amenable to fishing opportunities
Recreation	no conflict	no conflict	no conflict	no conflict	no conflict
Mineral extraction (rating by Minerals Management Service)	acceptable	acceptable	*unacceptable*	unacceptable	unknown
Desalination	no desalination	no desalination	no desalination	no desalination	no desalination
Fish and shellfish culture	no cultivation	no cultivation	no cultivation	no cultivation	no cultivation
Areas of special scientific importance	no impacts	no impacts	no impacts	no impacts	no impacts
Other legitamate uses:					
U.S. Navy submarine operating area	potential bathymetric changes to remote northeast corner of submarine area U1	no effects	no effects	no effects	no effects
City of San Francisco Southwest Ocean Outfall	no effects	no effects	no effects	potential cumulative and/or synergistic effects	no effects

Table 2-G; continued.

SITE COMPARISON CRITERIA

	Site 1M	Site B1	Site B1A	Site C1	Site D1
[40 CFR 228.6(a)(9)].					
Water quality	influenced by coastal discharges and tidal prism of San Francisco Bay; shallow surface layer of relatively warm, low salinity water; supersaturated oxygen levels	less likely to be influenced by San Francisco Bay waters or coastal discharges; mixing typical of three seasons of currents common to Gulf of Farallones; supersaturated oxygen levels	less likely to be influenced by San Francisco Bay waters or coastal discharges; mixing typical of three seasons of currents common to Gulf of Farallones; supersaturated oxygen levels	apt to be largely influenced by discharges from the San Francisco southwest ocean wastewater outfall and to a lesser extent, by the tidal prism of San Francisco Bay;	dominated by the tidal oscillations of San Francisco Bay, with wide swings in salinity and turbidty common to estuaries.
Ecology of the site	high planktonic productivity largely due to a combination of seasonal upwelling (Jan-May) characteristic of California coast and nutrients from San Francisco Bay; high planktonic production contributes to higher trophic levels of sea life.	high planktonic productivity (largely due to upwelling (Jan-May) characteristic of California coast; high planktonic production contributes to higher trophic levels of sea life.	high planktonic productivity largely due to upwelling (Jan-May) characteristic of California coast; high planktonic production contributes to higher trophic levels of sea life.	high planktonic productivity largely due to combination of seasonal upwelling (Jan-May) characteristic of California coast, nutrients from San Francisco Bay, and possible nutrients from San Francisco wastewater outfall; high planktonic production contributes to higher trophic levels of sea life.	variable planktonic community and extreme paucity of benthos, caused by strong tidally dominated currents, reduce overall habitat value of site considerably when compared to other candidate sites
[40 CFR 228.6(a)(10)].					
Development or recruitment of nuisance species	indeterminate	indeterminate	indeterminate	indeterminate	indeterminate
[40 CFR 228.6(a)(11)].					
Significant natural or cultural features	low shipwreck incidence	low shipwreck incidence	low shipwreck incidence	higher incidence of shipwrecks	higher incidence of shipwrecks

2.5 ALTERNATIVE DISPOSAL SITES CONSIDERED IN DETAIL

2.5.1 Alcatraz Disposal Site (Section 404 Clean Water Act). The Alcatraz aquatic disposal site (SF 11) is located in San Francisco Bay south of Alcatraz Island. Coordinates of the site center are 37° 49' 17" N latitude, 122° 25' 23" W longitude. The site is circular with a diameter of 2,000 ft (609.6 m) and a surface area of 0.11 square mile. The site is an unconfined, open water disposal site within a high energy area. The Alcatraz site has been used since the late 1800s for disposal of dredged material. Since being designated in 1972, it has been the most widely used disposal site in the Bay. The site was originally selected for this use because of the swift tidal currents that occur in the area. The currents were predicted to disperse disposed sediments over a large area of the Bay and to the Ocean. The position of the site close to the Golden Gate is presumed to accelerate transport of disposed sediments out of the bay system and to the ocean; however, a fraction of the material does accumulate at the site and the existing capacity cannot accommodate continued disposal indefinitely without expanding the site or removing some of the accumulated material.

The approximately 5.4 million m^3 (7.0 million yd^3) of sediments from the Oakland Harbor project would cause significant further accumulation and a considerable reduction in remaining site capacity. The avoid such an impact, a program to remove accumulated sediments, before or after the disposal of sediments from the Oakland Harbors has occurred, is necessary. The predredged or redredged material would need to be transported to the ocean for disposal.

2.5.2. Candidate ODMDS 1M. Candidate Ocean Dredged Material Disposal Site (ODMDS) 1M was selected from the candidate nearshore disposal sites and is shown on Figure 2.8. Due to a combination of water depth and currents at Site 1M, bottom impacts of the dredged sediments would spread over the smallest area of any of the candidate sites. While unit area value as a demersal or pelagic fishery does not vary greatly for most commercial fishing between Site 1M and the significantly larger sites (B1 and B1A), Site 1M is closer to home base for many fishermen and is fished more intensely. Habitat value for Dungeness crab (*Cancer magister*) may be as much as 4 times the unit area value of the "B" sites, but bottom impacts at Sites B1 and B1A are approximately 4.5 times the area of Site 1M. Therefore the total habitat for Dungeness crab (*Cancer magister*) affected by dredged sediment disposal is roughly equivalent at Site 1M, Site B1, and Site B1A, and total biomass within site boundaries is considerably less at Site 1M as opposed to Sites B1 or B1A. Site 1M provides potential spawning habitat for Dungeness crab (*Cancer magister*) and a potential nursery habitat for English sole (*Parophrys vetulus*), but Sites B1 and B1A comprise larger potential spawning or nursery habitats for the same species.

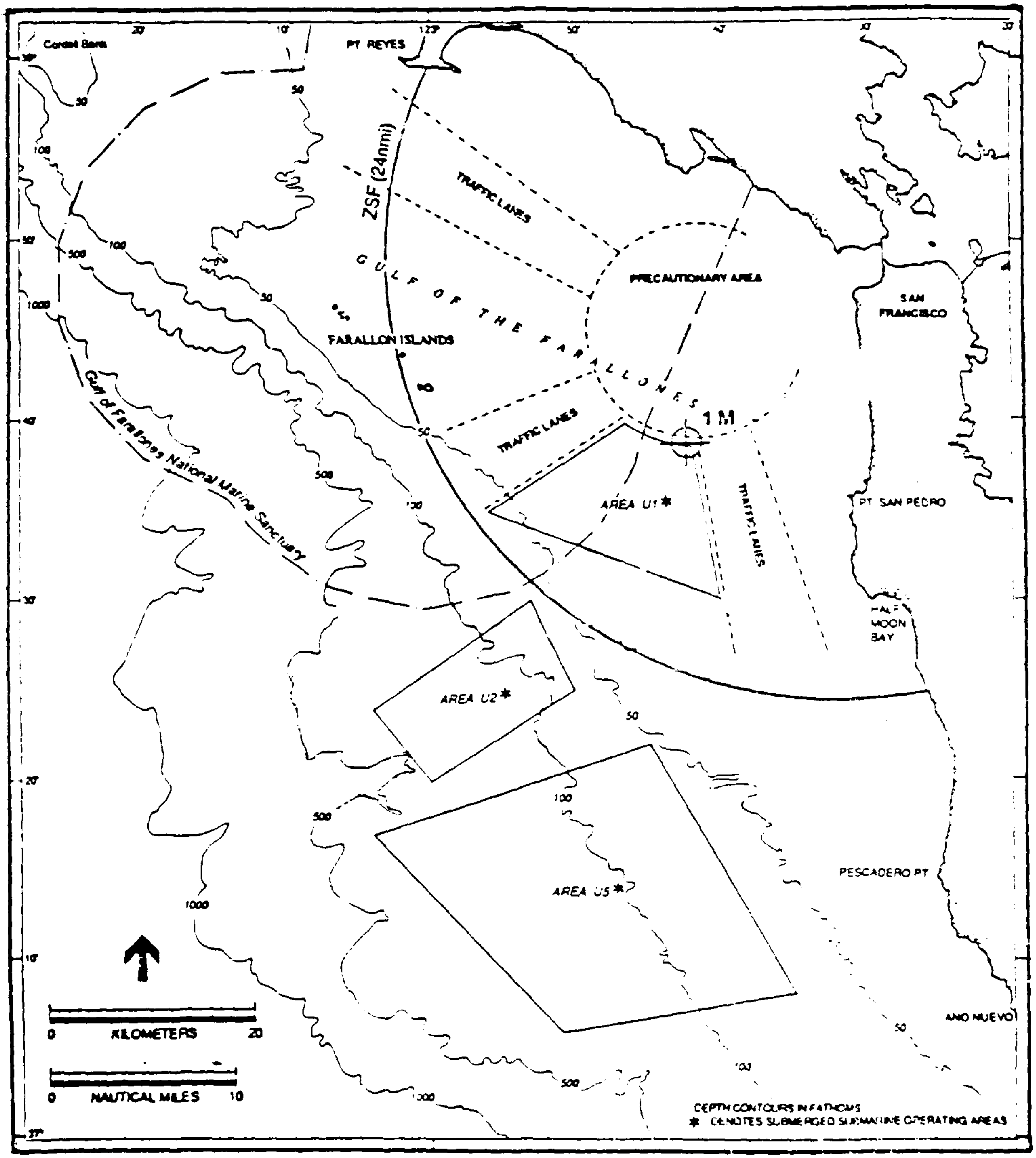


Figure 2.8 Proposed Ocean Dredged Material Disposal Site 1M

Compared with Sites C1 and D1, Site 1M is a more retentive site. Unlike Site C1, Site 1M would not be subject to potential cumulative or synergistic effects from the City of San Francisco Southwest Ocean Outfall and it is acceptable to the Mineral Management Service. Site 1M is also significantly farther from the dredging site than Site D1 but also significantly closer than the "B" sites. Consequently, total project costs for the Oakland Project are expected to be $15 million less for disposal at Site 1M as opposed to either Site B1 or B1A. Use of Site D1, would be $6 million less, but the environmental effects of disposal at Site D1 are more difficult to assess and not enough information is available at this time for site designation.

2.5.3 Candidate ODMDS B1. Though having a larger total fisheries resource value, primarily due to size of the site, Site B1 is valued less as a fishery due to its distance from the home base of most fishermen. Site B1, like Site 1M, is a potential spawning habitat for Dungeness crab (*Cancer magister*) and and a potential nursery habitat for English sole (*Parophrys vetulus*). Unlike Site 1M, Site B1 is also a potential nursery for Pacific sanddab (*Citharichthys sordidus*) and Dover sole (*Microstomus pacificus*). Site B1 is preferable over companion Site B1A in the respect that B1A encroaches upon potential habitat, spawning area, and nursery grounds of the geographically limited Rockfish (*Sebastes sp*). Because of this and its unacceptability to the Mineral Management Service, Site B1A has been eliminated from further consideration. The site "footprint" for Site B1 is closer to the Gulf of the Farallones National Marine Sanctuary than any other candidate site, 0.2 km (0.1 nmi) as opposed to 2.3 km (1.2 nmi) for the next closest site (Site 1M), but perturbations to the water column from dredged material disposal are not expected at the Sanctuary boundary.

Haul distance to Site B1, shown in Figure 2.9, is about 27.4 km (14.8 nmi) farther than Site 1M and the subsequent project cost increase is estimated to be $15 million dollars. However, the benefit to cost ratio of the project still exceeds unity with the increased expenditures to haul dredged sediment to the B1 site and the site is within the operational and economic zone of siting feasibility.

2.6 ALTERNATIVE DISPOSAL METHODS CONSIDERED

2.6.1 Ebb-tide Disposal. For disposal of dredged material at the Alcatraz disposal site, restricting disposal activity to periods of ebb tide is the alternative preferred by the U. S. Fish and Wildlife Service (FWS) if upland or ocean disposal sites are unavialable. (See letters in Appendix D) submitted in compliance with the Fish and Wildlife Service Coordination Act (P.L. 86-624, 16 USC 661-666C). It is believed by FWS that a larger portion of material disposed at the Alcatraz site would be transported to the ocean if disposal is restricted. However, ambiguities in implementing ebb tide disposal involve: (1) stratified currents at the disposal site that vary in strength and direction; (2) the gradual building and

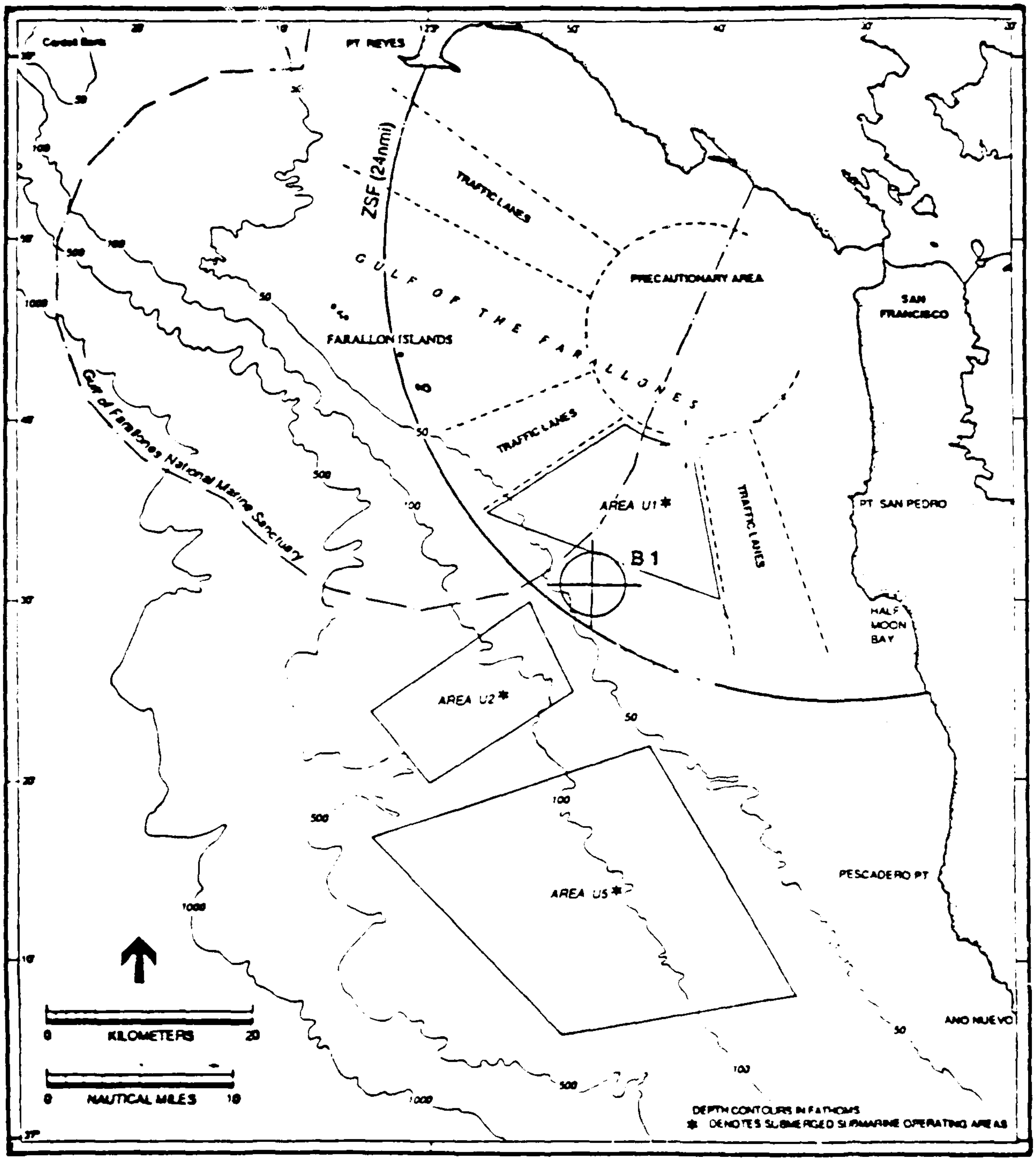


Figure 2.9 Proposed Ocean Dredged Material Disposal Site B1

loss of strength of currents during the ebb cycle; and (3) the large range of maximum ebb currents during the monthly lunar cycle. If a suitable period of ebb tide disposal were identified, restriction would have significant impacts on the disposal site. Easily erodible materials disposed at the site would be inundated by subsequent discharges before significant resuspension and transport occurred. The increased rate of loading required to take advantage of a reduced period of beneficial currents is self defeating because rate of retention of material would increase. Additionally, equipment and operation costs would rise prohibitively compared to unrestricted use of the site.

2.6.2 Unrestricted Disposal. Oakland Harbor sediments, typical of those found in the entire San Francisco Bay, are a blend of medium to fine sands, silts, and clays. The clays tend to elevate the shear strength (cohesiveness) of the sediments. Because this is a deepening project, sediments are older and more consolidated than the typical material discharged at Alcatraz. Consequently, the density and internal shear strength of the material exceed the average of most disposal material.

High shear strengths and densities from the Oakland material would yield higher rates of material retention. While the currents are set by tides and Sacramento-San Joaquin Delta outflow, the density and internal shear strength of the dredged material can be reduced by mechanical agitation. The dredged material disposal monitoring studies of 1986-87 demonstrated that the centrifugal pumps on a hopper dredge reduced density and internal shear strength of sediments from the Richmond Long Wharf Maneuvering Area sufficiently that it accumulated at the Alcatraz Disposal Site at a rate one-half that of typical clamshelled material (SAIC, 1987). Even with a hopper dredge, or a clamshell in conjunction with a centrifugal pump, the quantity of material expected to be retained at the disposal site will contribute to the filling of the site. The slurry requirement is being advanced because dispersion and erosion from the Alcatraz Disposal Site are dependant on both currents at the site and shear strength of the discharged material. High currents and low shear strength yield minimal accumulation. The quantity of material accumulating without mechanical processing to reduce the shear strength would be unacceptable.

2.6.3 Material Pre-Dredging at Alcatraz. About 37.5 percent of the Oakland Harbor dredged material that is transported to and discharged as slurry at the Alcatraz disposal site is projected to be retained within 609.6 m (2,000 ft) of the center of the site. This accumulation of new work material in addition the accretion from maintenance and other already scheduled dredging would fill the site to where even navigation for disposal purposes may be hindered (-39 ft [-11.9 m] for some hopper dredges). This rapid filling of the Alcatraz site with no immediate alternative for in-bay disposal is unacceptable.

Removing a quantity of material from the Alcatraz site equivalent to the expected volume of retainage and transporting it to the designated ocean disposal site before commencing discharge of Oakland Harbor material would negate bathymetric impacts on the disposal site. Continued use of the Alcatraz disposal site would not be jeopardized by dredged material from the Oakland Harbor. The premium cost on hauling and disposing of dredged material at an ocean disposal site would be required only for a fraction of the project quantities. Such action alone, however, would not solve the long-term use of Alcatraz. Remedial action related to the necessary continued in-Bay disposal requirements is beyond the scope of the Oakland project authorities. An independent investigation of in-Bay disposal alternatives is currently being performed by USACE.

2.6.4 Material Rehandling at Alcatraz. This alternative is the same as that presented in Section 2.6.3, Material Predredging at Alcatraz, but with a slightly different sequencing. By delaying the excavation of sediments from Alcatraz until after the disposal of the dredged material from the Oakland Harbors has taken place, the sediments from Alcatraz may be transported to an EPA desinated, general use, ocean dredged material disposal site when it becomes available.

2.6.5 Capping at an Ocean Site. Sediments from the project have been tested in accordance with evaluation procedures for Section 103 of the Marine Protection Research and Sanctuaries Act as described in EPA/USACE (1977) and in the Corps' Management Strategy and Decision Making Framework for dredged material (Peddicord, et al., 1986). Additional testing of approximately 270,000 cubic yards of fine-grained consolidated material within the turning basin at the terminus of the Inner Harbor Channel, known as the Schnitzer Steel and Todd Shipyard areas, indicates that it is potentially unsuitable for unrestricted open water disposal because of potential toxicity and bioaccumulation. Potential bioavailability of contaminants cannot be determined without time consuming bioassay and bioaccumulation testing, which would delay start of construction of the project. The material is, therefore, assumed to be unacceptable for unrestricted open-water disposal. In accordance with the Management Strategy, capping is an appropriate control measure for eliminating potential benthic effects.

The capping concept can be summarized as three basic components: (1) controlled, accurate, subaqueous placement of the contaminated dredged material; (2) isolation of the contaminated material from the receiving environment (typically with a covering or cap of clean sediments); and, (3) monitoring and maintenance of the site. The term "contaminated" refers to those sediments which are considered unsuitable for unrestricted ocean disposal, while the term "clean" refers to those sediments which are acceptable for ocean disposal.

The characterization of both the contaminated material and capping material indicates that significant clumping would occur and a mound would be formed at the disposal site. The nature of the materials indicate that they are compatible for a successful capping operation. The overabundance of capping material for this project insures that sufficient cap thickness should be easily obtained, and the characteristics for sites 1M and B1 indicate that they are both technically suitable for capping operations. A more detailed discussion of capping is presented in paragraph 3.16 of the GDM.

2.7 FINAL ALTERNATIVE PLANS

2.7.1 No Action. Improvements to the Oakland Harbors are needed in order to accommodate third generation, deep-draft commercial vessels. Material dredged from the harbors must be disposed at a location which is economically justifiable and environmentally acceptable. If no action to select an appropriate disposal site were taken, the Oakland Harbors could not be dredged, and the Port would be unable to compete with harbors which are capable of accommodating modern vessels. No economic benefits would be realized.

The proposed Oakland Inner and Outer Harbor Channels were sized for Third Generation Panamax container ships. These larger vessels have lower operating costs and represent improvement in the efficiency of a port operation. Much of the infrastructure for the new generation vessels is already in place at the Port of Oakland and along the rail network, or is now being modified. Under the no action alternative, larger vessels would be unable to use the channel and some existing container operations would go to another west coast port. Some increased cost would result, since the Port of Oakland is centrally located on the west coast and results in minimum north or south rail travel for access to transcontinental rail lines.

The growth and viability of the Port of Oakland is a factor in the economic growth of the city of Oakland and the Bay Area in general. Under the no action alternative, the long-term viability of the Port could be reduced with a direct adverse impact on the economy of the city of Oakland and on the Bay Area.

2.7.2 Unrestricted Disposal at Alcatraz.

a. Description. With this alternative, the entire 5.4 million m^3 (7.0 million yd^3) of dredged material from the Oakland Harbor would be disposed at the Alcatraz site. Initial dredging would deepen the Inner Harbor to -11.6 m (38 ft) MLLW to allow immediate access of larger ships to the APL terminal. Retention of material at the site is expected to be 37.5 percent if disposed under the existing slurry requirement. The San Francisco District, USACE has promulgated the slurry requirement to optimize dispersion of dredged material discharged at the Alcatraz site.

Without the slurry requirement on dredged material from the Oakland Harbors, accumulation at the Alcatraz disposal site is expected to approach 75 percent. In both cases the entire disposal site would be utilized for disposal, and filling would continue until site depths limited navigation by disposal vessels. It is estimated that with the slurry requirement in place, the site could accommodate hopper dredges during the entire project. Without the slurry requirement, depths at the site would diminish rapidly. However, required drafts of scows used for transport of dredged material from clamshell dredging operations is much less than for hopper dredges. The disposal site could probably be filled to -5.5 m (-18 ft) MLLW before restraining navigation of the site by dump scows. Accordingly, if the site were limited to barge disposal, the entire amount of material dredged from the Oakland Harbors could be discharged at the Alcatraz site in non-slurried form.

The authorized project scenario was for disposal of material from Oakland Inner harbor as a homogenous slurry. Recent disposal monitoring efforts by the San Francisco District, USACE have shown that accumulation of discharged material is greatly reduced but not totally eliminated, when in slurry form. With or without slurried disposal, the Oakland Harbors deepening material, and the subsequent maintenance material over the fifty year life of the project, cannot all be deposited at the Alcatraz disposal site.

b. Summary Evaluation. This alternative would expand accumulation around the Alcatraz site and decrease depth in the disposal area. Disposal options with slurried or non-slurried dredged material have been considered. In both cases, sediment accumulation would occur, shortening the useful life of the site and filling the site to capacity or near capacity by the end of the deepening phase of the project. If slurried disposal were required, the site would be accessible to barges for disposal of maintenance material for a limited time after the deepening phase of the project. Either alternative would affect future use of the site by USACE and others for many smaller projects (including maintenance) as well as other major harbor improvement projects. Navigation traffic lanes would require modification in order to divert ship traffic from shallow areas. Operational constraints as a result of continued disposal and filling would ultimately eliminate disposal viability. Additionally, the San Francisco Bay Plan policies related to dredging and disposal would require modification to accommodate filling aspects of unrestricted disposal. Initially, the estimated cost of this alternative would be $20.2 million. The elimination of capacity for the disposal of maintenance material at Alcatraz would, however, result in additional costs, such as for rehandling Alcatraz material to an ocean disposal site. Therefore, the overall costs of this alternative may exceed those of other alternatives presented in this report. Since approximately 206,000 m^3 (270,000 yd^3) of fine grained consolidated material within the turning basin is potentially unsuitable for unrestricted open water disposal, this alternative is not completely implementable.

2.7.3 Alcatraz with Pre-dredging to the Ocean.

a. Description. Recent studies indicate that the Alcatraz disposal site will continue to fill regardless of the material to be disposed. Economically, an in-Bay site is desirable for both maintenance dredging and improvements to existing projects. In planning for continued, long-term use of the Alcatraz site, USACE has evaluated dredging the sediment that may be retained at the site in order to provide the capacity for disposal of the Oakland Harbor dredged material in compliance with requirements of Section 404(b) of the Clean Water Act. With this alternative, the estimated retention volume (estimated at 2.1 million m^3 [2.7 million yd^3]) from the Oakland projects would be dredged from the Alcatraz site by clamshell and material would be taken to the appropriate ocean disposal site. All dredged material from the Oakland channels would then be released in slurried form at Alcatraz.

Dredging equipment used is dependent on several factors including, but not limited to, type of material to be dredged, configuration of the project area, and distance to the disposal site, etc. The dredging of the Alcatraz site is likely to be accomplished by a large bucket, (15 m^3 [20 yd^3] capacity) clamshell dredge with transport to the ocean by barges. Likely equipment configurations are based on the most cost-efficient method as estimated by USACE; however, contracted dredgers may choose other methods which meet the disposal objectives. Approximately 2.1 million m^3 (2.7 million yd^3) of consolidated clay, silt and fine sand material would be transported 32 km (18.2 nautical miles) to Site 1M from the Alcatraz site after disposal of the Oakland channel material.

b. Summary Evaluation. All 5.4 million m^3 (7.0 million yd^3) from the Oakland Harbors would be disposed at Alcatraz as a homogenous slurry. Prior removal of accumulated material at the site to a designated ocean site would allow use of the Alcatraz site to be prolonged and may allow indefinite use with continued management. This alternative would have environmental impacts in-Bay and in the ocean, which are of concern to varied interests including resource agencies and fishing enterprises. A percentage of the material disposed as a slurry would remain in the Bay, and additional temporary turbidity episodes would occur during secondary dredging. The project cost for this alternative is estimated to be $28.1 million. Since approximately 206,000 m^3 (270,000 yd^3) of fine grained consolidated material within the turning basin is potentially unsuitable for unrestricted open water disposal, this alternative is also not implementable. Similarly, material from the Alcatraz disposal site has been tested and determined to be potentially unsuitable for unrestricted open water disposal. The degree of contamination cannot be determined without time consuming biological testing which would delay the construction of the project. Predredging of the Alcatraz site is also not implementable at this time.

2.7.4 Direct Ocean Disposal to Site 1M.

a. Description. The Oakland Harbors would be dredged by clamshell and all 5.4 million m^3 (7.0 million yd^3) of material would be transported directly to Site 1M. This disposal alternative represents a change from disposal at the Alcatraz site. The distance from the Oakland Outer Harbor is approximately 40.8 km (22 nmi) from the Oakland Outer Harbor and 42.6 km (23 nmi) from the Oakland Inner Harbor. For ocean disposal, clamshell dredge would be used due to the long distance to the ocean disposal location from the dredging site. Material would be loaded onto barges which would operate in tandem for transport to the selected ocean disposal site. The distance of the ocean disposal site from the dredge site would probably preclude use of a hopper dredge because effective hopper dredging time is reduced as the haul distance increases. With clamshell operations the dredging and hauling are accomplished by separate pieces of equipment. Dredging can be continuous if enough scows are used to transport material to the disposal site. The project would be constructed in two phases. In the first phase, approximately 52,000 m^3 (68,000 yd^3) of potentially contaminated material would be dredged from the Oakland Inner Harbor turning area and placed at the disposal site in a single mound. This would be followed by dredging approximately 330,000 m^3 (432,000 yd^3) of clean material from the Inner Harbor to lower the channel to -11.6 m (38 ft.) MLLW. The second phase would place 157,000 m^3 (205,000 yd^3) of potentially contaminated material from the Inner Harbor turning area at the disposal site. This would be followed by the disposal of 2.2 m^3 (2.9 yd^3) of clean material from the Inner Harbor and 2.1 m^3 ((2.7 yd^3) of clean material from the Outer Harbor which would be placed as a cap over the potentially contaminated mound.

b. Summary Evaluation. All dredged sediment from Oakland Harbor would be taken directly to the ocean disposal site. Upon discharge, material would mound on the ocean bottom at the ocean disposal location; however, the depth (42 m [23 fm]) and area (4.1 km^2 [1.2 nmi^2]) of Site 1M allows for adequate capacity to retain all the new work and maintenance dredging quantities.

Clamshell dredging of both Oakland Inner and Outer Harbors with transport by barges directly to the ocean disposal site would have minimal environmental effect. Cost of this alternative is $37.9 million.

2.7.5 Direct Ocean Disposal to Site B1.

a. Description. The Oakland Harbors would be dredged by clamshell and all 5.4 million m^3 (7.0 million yd^3) of material would be transported directly to Site B1. The distance from the Oakland Outer Harbor is approximately 69.5 km (36.8 nmi) from the Oakland Outer Harbor and 71.3 km (37.8 nmi) from the Oakland Inner Harbor. Similar to the direct to Site 1M alternative, use of a clamshell dredge is also assumed for this alternative because of the long distance to disposal Site B1 from the dredging site. A tandem barge operation would transport the sediment to the selected ocean disposal site and clean material would be used to cap the potentially contaminated material in a manner similar to the direct to Site 1M alternative.

b. Summary Evaluation. All dredged sediment from Oakland Harbor would be taken directly to the Site B1. Material disposed there would mound on the ocean bottom although the depths are greater than at Site 1M. The 82 m (45 fm) depth at Site B1 would result in a greater spread of the material and thus, a larger bottom area would be impacted. The estimated bottom area of Site B1, 18.5 km^2 (5.4 nmi^2), allows for adequate capacity to retain all the new work and maintenance dredging quantities. Although the estimated bottom area of Site B1 is approximately 4 times greater than the estimated area of Site 1M, Site B1 is the ocean disposal site preferred by resource agencies over Site 1M since it is further removed from other uses of the offshore region such as commercial fishing.

Clamshell dredging of the Oakland Harbors with transport by barges directly to the ocean disposal site would also have minimal environmental effect. Cost of this alternative is $54 million.

2.8 COMPARISON OF FINAL ALTERNATIVE PLANS

A summary comparison of environmental impacts for the final array of disposal alternatives is provided in Table 2.I. Impacts of the four alternatives are compared below:

2.8.1 No Action. If a feasible disposal site was not selected, the navigation improvements for the Oakland Project would not be constructed. The Port of Oakland would be unable to accommodate deep-draft container vessels and economic benefits would not be realized. Shoaling at Alcatraz would continue with the addition of material from other new work and maintenance dredging projects.

2.8.2 Unrestricted Disposal at Alcatraz. This alternative allows disposal at the Alcatraz site and decreased depth in the disposal area. Dredged sediment could be disposed in non-slurried or slurried form. Sediment accumulation would occur in either case, shortening the useful life of the site and filling the site to capacity; however, the rate of accumulation from disposal would be faster for the non-slurried versus the slurried condition.

This alternative is not consistent with the San Francisco Bay Plan policies related to dredging and disposal. The existing navigation lane would be impeded by unchecked accumulation. Without some further management of the Alcatraz disposal site, complete project benefits would not be realized since there would be no provisions for providing disposal of maintenance dredging over the project life.

This requirement would result in additional costs, such as for rehandling Alcatraz material to an ocean disposal site. Therefore, the overall costs of this alternative may exceed the costs of other alternatives. With redredging, the impacts of the alternative would be similar to those described below for the alternative of Alcatraz Disposal with Predredging to Site 1M. Small projects, maintenance, and future major harbor improvement projects requiring an economic means for dredged material disposal would also be jeopardized. Since some fine grained consolidated material within the turning basin is potentially unsuitable for unrestricted open water disposal and capping is not appropriate at the Alcatraz site, this alternative is not implementable.

2.8.3 Alcatraz Disposal With Pre-dredging to Site 1M. The Alcatraz disposal site would be dredged after disposing material from the Oakland Harbor. Material dredged from Alcatraz would be taken to the Site 1M. The quantity of material removed from the Alcatraz site would be equal to the estimated amount of Oakland material retained there after slurried disposal. Use of the Alcatraz site would be prolonged. Navigation at Alcatraz would not be impeded.

This alternative would have impacts in-Bay and in the ocean. This alternative would result in short-term turbidity and depressed oxygen levels at Alcatraz during the disposal operation of slurried material from the Oakland Harbors. The suspended sediment load attributable to the dredging and disposal activity for the Oakland project is very small when compared to the natural sediment regime within San Francisco Bay. Additional short-term turbidity and depressed oxygen levels would occur during the dredging at the Alcatraz site, and at the ocean disposal site when the material is released. Bottom impacts at Alcatraz would remain constant since the amount of material to be taken to a suitable ocean disposal site would be the same as that expected to remain from the Oakland disposal.

Though sediments have the potential to clog gills and feeding apparatus in marine organisms, San Francisco Bay waters support an enormous sediment load (estimated 130 million m^3 [170 million yd^3] annually from wind-storm wave action) and turbid conditions, often exceeding short term levels at the disposal site in intensity, area affected, and duration. Swimming organisms in the pelagic environment would be likely to leave, or avoid, an area where dredging and disposal equipment are operating because of the elevated noise levels and heavy, albeit temporary, sediment loading in the water column.

Impacts on floating organisms (plankton) in the water column would not be significant because of the highly dynamic and variable characteristics of plankton assemblages and rapid mixing and dilution that occurs in the water column. Burial of benthic organisms at the Alcatraz site is not significant as variation of species composition results from continued disposal. Since it has been determined that some fine grained consolidated material within the turning basin is potentially unsuitable for unrestricted open water disposal, it must be assumed that the contaminants would be potentially bioavailable.

Direct impacts in the water column at the ocean disposal site would also be short-term and minimal. Physical impacts at the ocean disposal site would be less than for direct transport of dredged material to the ocean because of the smaller amount of material to be disposed. Site 1M is located within the Dungeness crab fishery and other fisheries, but the crab fishery occupies the offshore area from north of Pt. Reyes to Half Moon Bay within the 18 to 91 m (10 to 50 fm) depth range and the disposal site only occupies approximately 1.2 nmi^2. Since material from the Alcatraz disposal site has been tested and also been determined to be potentially unsuitable for unrestricted open water disposal, it must be assumed that the contaminants would be potentially bioavailable. The site is situated outside of major navigation lanes and the Navy submarine operating area. Site 1M is located in 42 to 55 m (23 to 30 fm) of water.

Because some of the material from both the Inner Harbor turning basin and from the Alcatraz disposal site has been determined potentially unsuitable for unrestricted open water disposal, this alternative is not implementable.

2.8.4 Direct Ocean Disposal to Site 1M. With this alternative, all dredged material from the Oakland Harbor channels would be transported directly to Site 1M. Clamshell dredging of the Oakland Harbors with transport by barges directly to the ocean disposal site would result in minimal environmental effects. Sediment would be taken out of the Bay System. Although direct ocean disposal of dredged material from Oakland Harbor project would avoid "double" physical impacts by eliminating disposal at Alcatraz, physical impacts would occur in the marine environment. This alternative also allows the continued use of the Alcatraz disposal site for smaller projects and maintenance disposal without the need for immediate dredging or further action.

The short-term, increased turbidity and suspended solids associated with dredging and disposal at the Alcatraz site would not occur. Due to a combination of water depth and currents at Site 1M, bottom impacts of the dredged sediments would spread over the smallest areas of the two potential ocean sites. Site 1M provides potential spawning habitat for Dungeness crab (Cancer magister) and a potential nursery habitat for English Sole (Parophrys vetulus). Habitat value for Dungeness crab (Cancer magister) may be as much as 4 times the unit area value of Site B1. While the unit value of the area as a demersal or pelagic fishery does not vary greatly for most commercial fisheries between the two potential ocean sites, Site 1M is closer to local fishing ports and is fished more intensely. Impacts, however, to pelagic species would be minimal due to discrete dumping and the large water volume within the disposal area. The proposed capping is an appropriate control measure for potential benthic effects.

2.8.5 Direct Ocean Disposal to Site B1. This alternative is similar to the alternative of direct ocean disposal to Site 1M except for the location of the ocean disposal site. Site B1 is 18.5 km^2 (5.4 nmi^2) which is approximately 4.5 times the area of Site 1M. Though having a larger total fisheries resource value, primarily due to the size of the site, Site B1 is valued less as a commercial fishery area due to its distance from the Golden Gate. Site B1 is a potential spawning habitat for Dungeness crab (*Cancer magister*) and a potential nursery habitat for English Sole (*Parophrys vetulus*), Pacific sanddab (*Citharichthys sordidus*) and Dover sole (*Microstomus pacificus*).

Again, however, impacts to pelagic species would be minimal due to discrete dumping and the large water volume within the disposal areas. The proposed capping would be similar to that proposed for Site 1M and is an appropriate control measure for potential benthic effects.

TABLE 2.1
IMPACTS ON SIGNIFICANT ENVIRONMENTAL RESOURCES

ALTERNATIVES	PHYSICAL	BIOLOGICAL	SOCIO-ECONOMIC
NO ACTION	Existing rate of shoaling would continue. Turbidity and water quality would be the same.	Same as existing.	Same as existing.
UNRESTRICTED DISPOSAL AT ALCATRAZ	Rate of shoaling at Alcatraz would be accelerated. Significant bathymetric changes would occur as disposal site filled. Potential for turbidity and water quality impacts would increase. Material potentially unsuitable for open water disposal may be dispersed at the Alcatraz disposal site.	Disposal of some potentially unsuitable material may result in toxicity and bioaccumulation.	Without subsequent management, Alcatraz capacity for disposal of all in-Bay O&M dredged material disposal would be eliminated in 4-6 years. There would be a loss of Oakland project benefits without an available disposal site for O&M. Navigation in the vicinity of the mound would be restricted.
ALCATRAZ DISPOSAL WITH PREDREDGING TO 1M	Bathymetric changes would occur at Site 1M but would not be significant at Alcatraz because of pre-dredging. Turbidity and potential for water quality impacts would be increased by pre-dredging. Material potentially unsuitable for open water disposal may be dispersed at the Alcatraz disposal site.	Benthic and demersal organisms would be potentially impacted by dredged material released at the ocean disposal site. Approximately 4.1 km^2 (1.2 nmi^2) would be dedicated to the bottom impact zone at Site 1M. Disposal of some potentially unsuitable material may result in toxicity and bioaccumulation.	Project benefits would be realized. Potential conflict with commercial fishing interests. Aesthetic impacts caused by dredge plant at Alcatraz disposal site.
DIRECT DISPOSAL TO 1M	Bathymetric changes would occur over 4.1 km^2 (1.2 nmi^2) at Site 1M. Turbidity and potential for water quality impacts would not be significant.	Potential for impact to Dungeness crab and demersal fisheries (exists over area of Site 1M)	Project benefits would be realized. Potential conflict with commercial fishing operations. Least cost direct to ocean alternative.
DIRECT DISPOSAL TO B1	Bathymetric changes would occur over 18.5 km^2 (5.4 nmi^2) at Site B1, but not at Alcatraz. Turbidity and potential for water quality impacts would not be significant.	Potential for impact to Dungeness crab and demersal fisheries exists over the larger area of Site B1.	Project benefits would be realized. Potential conflict with commercial fishing operations. Most costly direct to ocean alternative.

2.9 THE SELECTED PLAN

The selected plan is for the direct ocean disposal of 5.4 million m^3 (7.0 million yds^3) of dredged material for the Oakland Harbors to be disposed of at Site B1. This selection is based on the evaluation criteria presented in Table 2.J. The alternative of no action was rejected because it did not meet the planning objectives (see SEIS, section 1.2). The alternative of unrestricted disposal of dredged material at Alcatraz and the alternative of disposing at Alcatraz after predredging material from Alcatraz to Site 1M were both eliminated from further consideration since some of the dredged material is unsuitable for unconfined aquatic disposal. Based on available data, there is no compelling environmental reason to choose between Site B1 and Site 1M for the direct disposal of dredged material. While disposal of the dredged material at Site B1 would affect a Dungeness crab (Cancer magister) area approximately 4 times greater than the area affected by disposal at Site 1M, the value of the habitat per unit area at Site B1 may be one-fourth the value at Site 1M. Disposal at Site B1 was selected over Site 1M because the potential for conflict with fishery interests was less. The selection of Site 1M would not be acceptable to resource agencies and local fishermen. Although the cost of this plan is estimated to be $15 million more than disposal at Site 1M, the benefit to cost ratio of the project still exceeds unity. Since disposal of dredged material at Site 1M would be institutionally unacceptable, disposal at Site B1 is the only implementable plan and it is, therefore, the NED plan.

TABLE 2.J

RESPONSE TO ASSOCIATED EVALUATION CRITERIA

ALTERNATIVE	ACCEPTABILITY	COMPLETENESS	EFFECTIVENESS	EFFICIENCY
NO ACTION	Not acceptable to the Port of Oakland or other shipping interests.	Not applicable.	Not applicable.	Not applicable.
UNRESTRICTED DISPOSAL AT ALCATRAZ	Not acceptable due to potential water quality impacts and the reduction of disposal capacity for maintenance and small projects.	Not complete. There would be no future capacity for maintenance dredging disposal. Not implementable due to potential water quality impacts.	Not effective. Loss of benefits after six years.	While initial project cost is $20,000,000 additional requirements are required to provide future maintenance of this and other projects.
ALCATRAZ DISPOSAL WITH PREDREDGING TO 1M	Not acceptable due to potential water quality impacts.	Not implementable due to potential water quality impacts.	Effective. Project benefits would be realized.	Project cost is $28,000,000. Least cost plan but not implementable due to potential water quality impacts
DIRECT DISPOSAL TO 1M	Of concern to NMFS, FWS and commerical fishermen because of high use as a commerical fishery.	Complete.	Effective. Project benefits would be realized.	Project cost is $39,000,000. Least cost direct ocean disposal plan.
DIRECT DISPOSAL TO B1	Acceptable.	Complete.	Effective. Project benefits would be realized.	Project cost is $54,000,000. Most costly direct ocean disposal plan.

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SECTION 3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

San Francisco Bay is a natural estuary which is separated from the Pacific Ocean by an approximately one mile wide natural opening called the Golden Gate. The Oakland-San Francisco Bay area is situated on the central California coast about 640 km (400 miles) north of Los Angeles. The primary fresh water inflow into San Francisco Bay is into the north Bay from the Sacramento and San Joaquin Rivers. It is estimated that ten million cubic yards of sediment moves into San Francisco Bay annually from these sources and other natural runoff (Krone, 1966). Due primarily to the substantial inflow from the north, the northbay has relatively deeply scoured natural channels while the southbay is quite shallow.

The Bay Area is one of the major shipping and port centers on the west coast of the United States. The other major shipping centers are San Diego and Los Angeles, California; Portland, Oregon; and Seattle, Washington. The Bay Area has a population of about three million people. The primary commercial shipping centers are Oakland, San Francisco, and Richmond, all of which have excellent access to the Pacific Ocean shipping lanes via the Golden Gate and San Francisco Bay. In the last twenty years the Port of Oakland has shown substantial growth and is a major factor in the economy of the area.

This discussion of the existing environment will focus on conditions at the project site and disposal locations and on project changes that have occurred since publication of the Final Environmental Impact Statements.

3.2 OAKLAND HARBOR

3.2.1 Site Characterization. The waters of the Oakland Harbor area have been improved for navigation purposes since 1897. Present channel alignment have been in existence since World War II. Since that time the channels have been deepened periodically, and maintenance dredging is performally annually. The Oakland Harbor therefore is described as a "port area" in the San Francisco Bay (BCDC, 1979).

3.2.2 Sediment Quality. Sediment core samples were collected from 3 reaches within Oakland Inner Harbor and from two reaches within Oakland Outer Harbor in December, 1986 (Figures 3.1, 3.2, and 3.3 and Table 3.A). Sample collection and composite sampling were performed after consideration of the actual dredging operation, entire depth of dredging, whether the dredging activity was a deepening or a widening of the channel, the expected nature of the material, adjacent land use, and cost effectiveness. The three reaches within Oakland Inner Harbor were based on the overall length of the harbor and adjacent land use. Oakland Outer Harbor is a

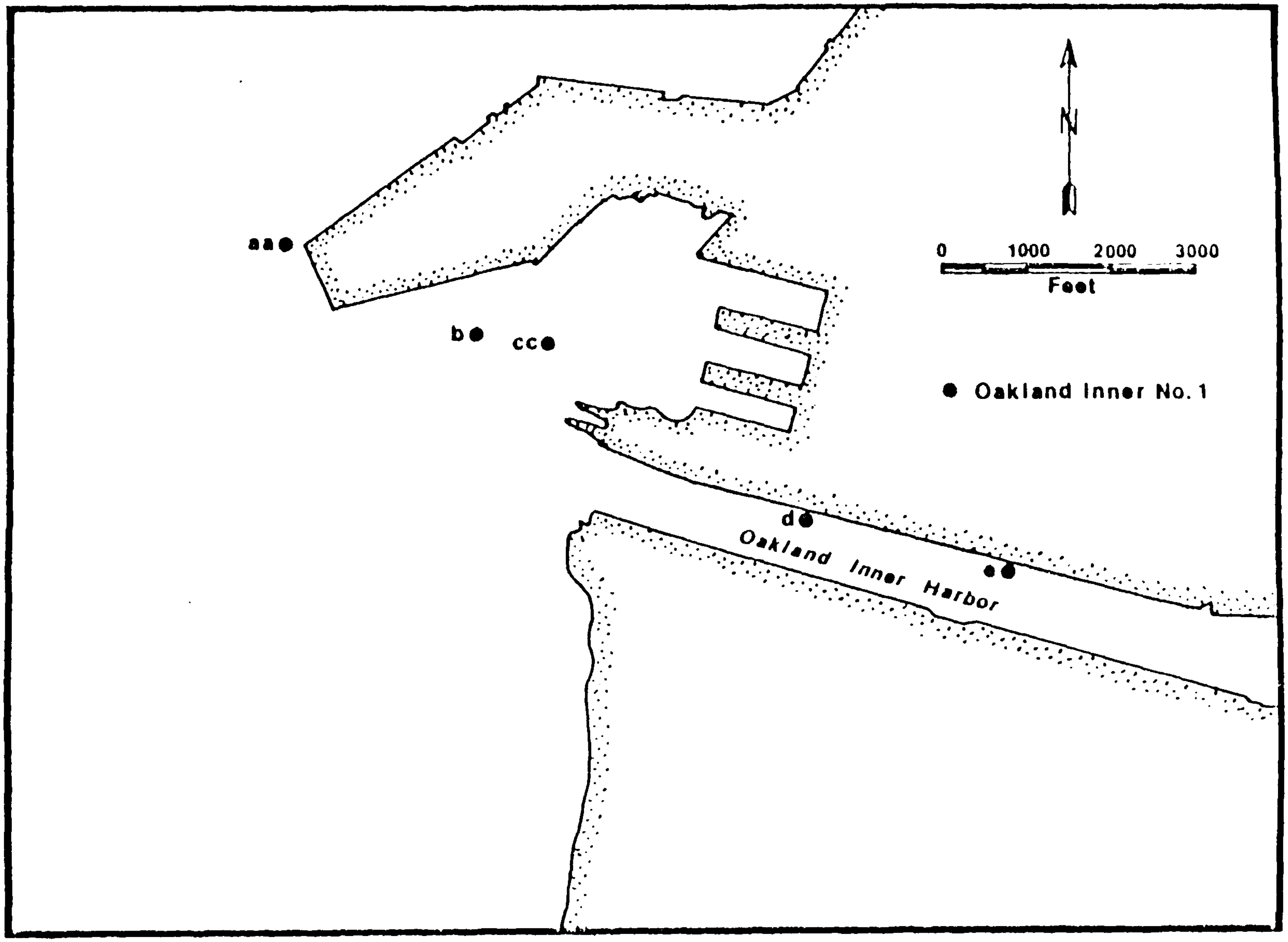


FIGURE 3.1 - SEDIMENT CORE ST[illegible]N LOCATIONS - OAKLAND INNER NU[illegible]R 1

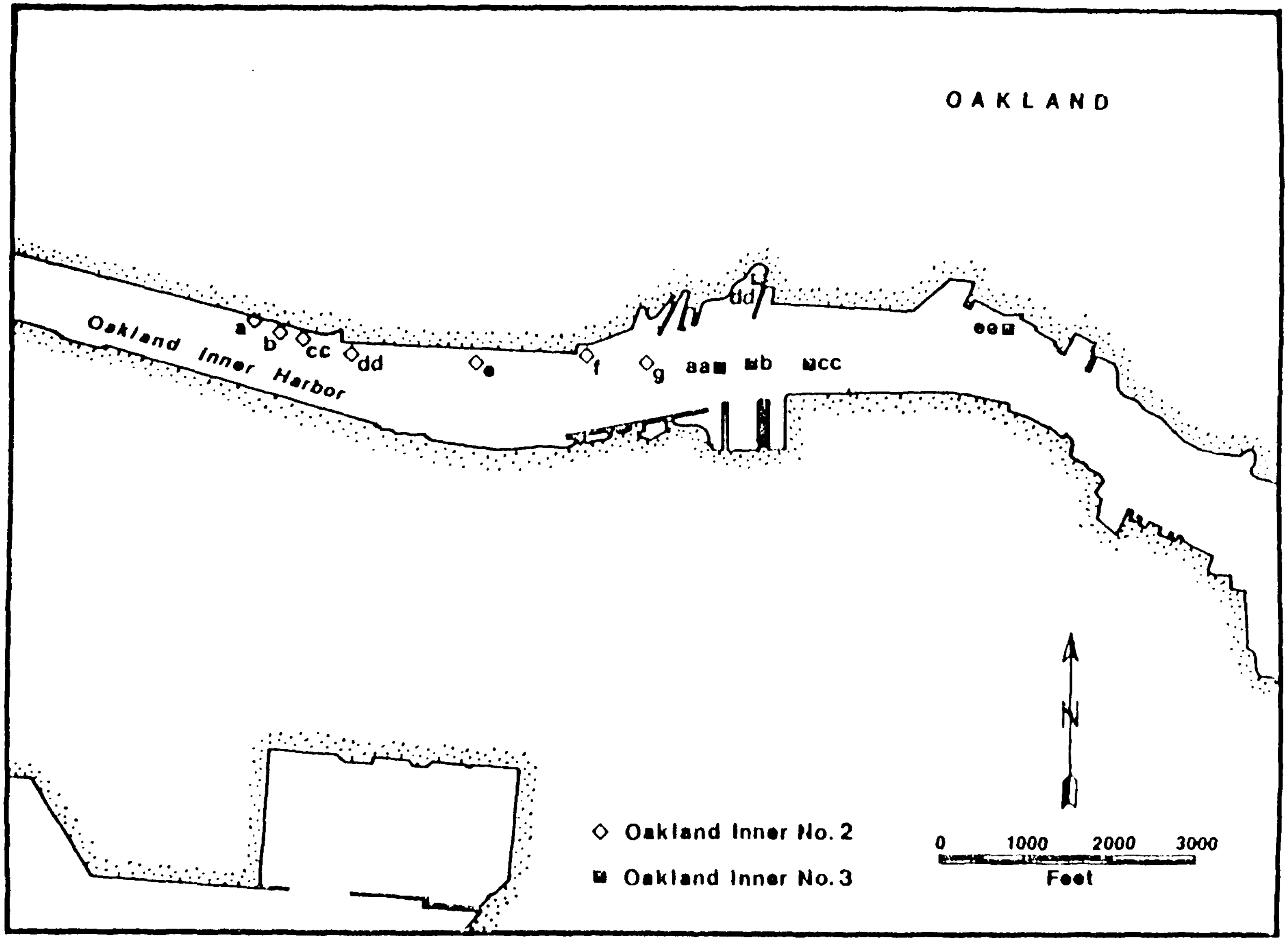


FIGURE 3.2 - SEDIMENT CORE AND STATION LOCATIONS - OAKLAND INNER N[illegible] and 3

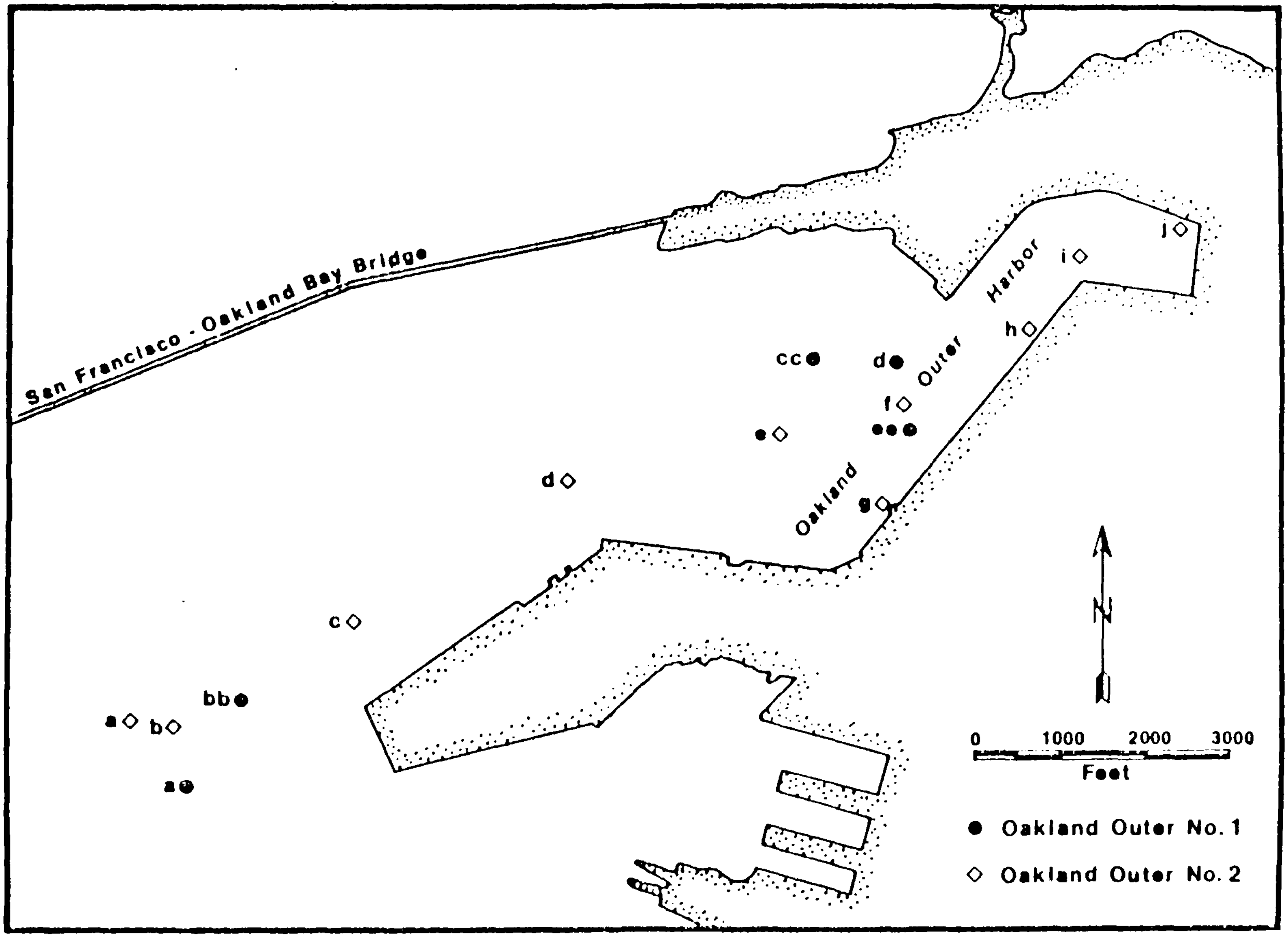


FIGURE 3.3 - SEDIMENT CORE STATION LOCATI... - OAKLAND OUTER NUMBERS 1 AND ...

TABLE 3.A
SEDIMENT CORE LOCATIONS AND DEPTH
OAKLAND INNER AND OUTER HARBORS

OAKLAND INNER HARBOR

Station	Core Identification	Core Location N. Latitude	Core Location W. Longitude	Core Length
Oakland	0I-1-aa*	37°48'13.9"	122°20'37.4"	9'
Inner #1	0I-1-b	5.2"	10.2"	28'
	0I-1-cc	2.2"	1.1"	26'
	0I-1-d	47'48.1"	19'22.2"	4'
	0I-1-e	41.9"	18'53.6"	6'
Oakland	0I-2-a	37°47'40.9"	122°18'38.6"	6'
Inner #2	0I-2-b	40.2"	33.7"	14'
	0I-2-cc	35.8"	27.1"	5'
	0I-2-dd	34.6"	17'56.3"	13'
	0I-2-e	27.7"	57.4"	13'
	0I-2-f	35.1"	48.0"	13'
	0I-2-g	32.2"	42.1"	9'
Oakland	0I-3-aa	37°47'34.2"	122°17'29.6"	7'
Inner #3	0I-3-b	32.3"	20.8"	12'
	0I-3-cc	30.6"	16.4"	9'
	0I-3-dd	40.5"	19.5"	19'
	0I-3-ee	41.5"	16'47.5"	26'
		OAKLAND OUTER HARBOR		
Oakland	00-1-a	37°48' 6.7"	122°21' 1.2"	**
Outer #1	00-1-bb	19.9"	20'53.8"	10'
	00-1-cc	49.5"	19'43.2"	14'
	00-1-d	51.9"	31.9"	23'
	00-1-ee	39.4"	20.2"	18'
Oakland	00-2-a	37°48'14.3"	122°21'10.7"	11'
Outer #2	00-2-b	12.1"	4.3"	4'
	00-2-c	23.4"		
20'36.4"	5'			
	00-2-d	38.4"	7.8"	4'
	00-2-e	43.7"	19'39.7"	5'
	00-2-f	45.2"	24.8"	6'
	00-2-g	39.8"	24.6"	14'
	00-2-h	58.3"	5.7"	9'
	00-2-i	49' 6.2"	18'57.5"	6'
	00-2-j	14.9"	36.7"	9'

*Core locations identified by double lower case letters were sampled in duplicate to provide sediment for chemical analysis.
**Depth at location 00-1-a exceeded project depth - no sample was collected.

shorter harbor and therefore was divided into channel widening (Oakland Outer Harbor Area #1) and channel deepening (Oakland Outer Harbor #2). Bulk sediment analyses, elutriate tests, and bioassay tests were then performed on these samples. The core locations are described in Table 3.A. Seven (7) stations within the Alcatraz disposal site were sampled in March 1987. Bulk sediment analyses were conducted on these samples. Summary results of the bulk analyses for Oakland Harbors are presented in Table 3.B (see Appendix A for detailed discussion). The sediments from several stations within Oakland Inner and Outer Harbor appear to contain higher concentrations of trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) than sediments from the Alcatraz disposal site. Oakland Inner Station 3dd, adjacent to the Schnitzer Steel Company, has the highest concentration of contaminants of all of the stations tested. No statistics were performed on these data because the Oakland Harbor results are reported for individual sediment samples whereas the Alcatraz results are a range of seven values. In an urban estuary, elevated concentrations of these contaminants commonly occur. As discussed in Appendix A of the SEIS, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a results of dredging or disposal of this material (Bricker, 1975). At present, there are no numerical criteria for evaluating contaminant concentrations in dredged sediments.

Concerns were raised during the comment period on the draft SEIS about the quality of sediments in the proposed turning basin adjacent to Schnitzer Steel and Alameda Gateway (formerly Todd Shipyard) because of landbased activities. Consequently, additional testing was conducted on material from these areas. Three sediment core samples were obtained from the areas adjacent to Schnitzer Steel and four from the area adjacent to the old Todd Shipyard site to a depth of -44 feet MLLW wherever possible (see Figure 3.4). Sediment and water samples were also obtained from the Alcatraz disposal site to be used as a reference. All of the sediment samples were analyzed individually for twelve trace metals, eighteen chlorinated pesticides, seven PCB congeners, sixteen polycyclic aromatic hydrocarbons (PAH's), phenols, pthalates, cyanide, and sulfides. These data are summarized in Table 3.C. Oyster larvae bioassays were also performed on individual sediment samples (See Appendix A for detailed discussion).

The concentration of trace metals in sediment from the Schnitzer Steel stations appeared to be elevated when compared to sediment from Alcatraz. The concentration of mercury at Station S2 (1.3 ug/g dry weight) is five times greater than at Alcatraz. The concentration of trace metals at the Todd Shipyard Stations were much greater than at the Schnitzer Steel site. Of greatest concern is the concentration of mercury at Station T5 (8.0 ug/g dry weight).

No pesticides or phenols were detected in any of the samples. The concentration of PAH's ranged from a low of 6.60 ug/g at Station S1 at Schnitzer Steel to a high of 31 ug/g at Station T5 at Todd

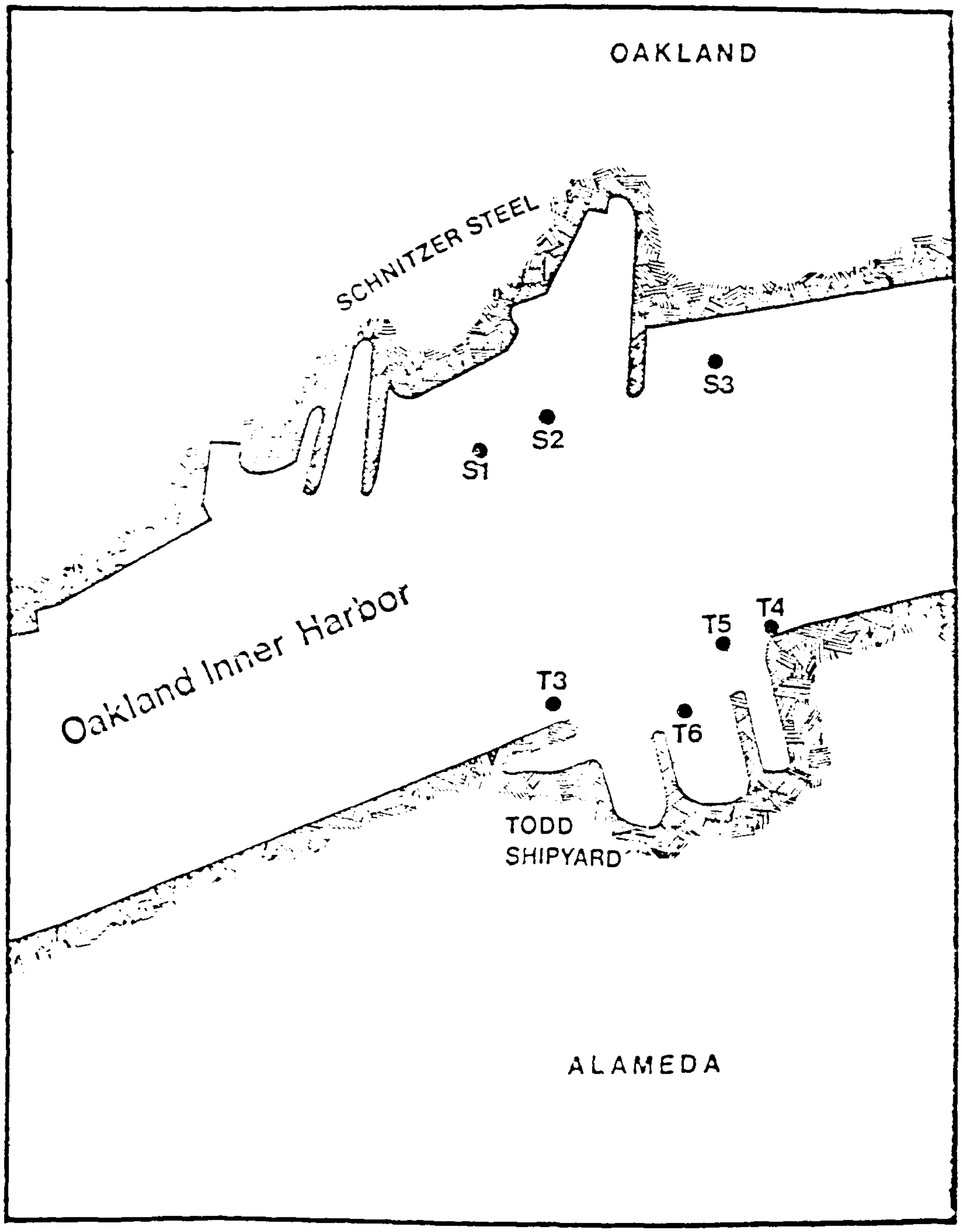


Figure 3.4 Sediment Core Locations - Schnitzer Steel and Todd Shipyard

TABLE 3.8
SEDIMENT CHEMISTRY FOR OAKLAND HARBORS
(wet weight)

	OAKLAND INNER								OAKLAND OUTER			ALCATRAZ[b]
	1aa	1cc	2cc	2dd	3aa	3cc	3dd	3ee	1bb	1cc	1ee	
Arsenic (ppm)	-3.0[a]	-3.0	3.0	-3.0	4.0	5.0	20.0	-3.0	9.0	8.0	9.0	0.4-1.2
Cadmium (ppm)	0.16	0.13	0.30	0.27	0.57	0.38	2.70	0.92	0.94	0.23	0.47	0.81-1.0
Chromium (ppm)	56.0	39.0	57.0	62.0	86.0	73.0	130.0	58.0	80.0	40.0	86.0	56.0-74.0
Copper (ppm)	18.0	19.0	23.0	34.0	76.0	54.0	440.0	45.0	52.0	18.0	60.0	12.0-26.0
Lead (ppm)	9.1	2.5	16.0	13.0	36.0	34.0	200.0	43.0	35.0	7.1	29.0	11.0-45.0
Mercury (ppm)	0.21	0.03	0.26	0.21	0.50	0.68	3.4	1.4	0.38	0.15	0.35	0.06-0.26
Nickel (ppm)	51.0	32.0	53.0	70.0	73.0	77.0	98.0	60.0	75.0	34.0	90.0	28.0-46.0
Silver (ppm)	-0.1	-0.1	0.2	-0.1	-0.1	0.1	-0.1	0.1	0.1	-0.1	0.2	0.58-0.86
Selenium (ppm)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	0.09-0.14
Zinc (ppm)	60.0	42.0	69.0	81.0	170.0	120.0	540.0	137.0	140.0	46.0	163.0	36.0-64.0
Oil and Grease (ppm)	185.0	60.0	700.0	750.0	745.0	785.0	3600.0	2300.0	805.0	140.0	875.0	--- [c]
Petroleum Hydrocarbons (ppm)	70.0	25.0	90.0	111.0	205.0	135.0	134.0	118.0	200.0	50.0	160.0	---
PCB's (ppb)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-20.0
Aldrin (ppb)	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-.5
Dieldrin (ppb)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	-0.1	-.5
Chlordane and related compounds (ppb)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
DDT and Deriv (ppb)	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	d
Endrin (ppb)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	0.5	-0.5	-0.5	-0.5	e
HCH & Toxaphene (ppb)	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-30.0

a Values with minus sign are less than detection limits

b Values are a range of seven values

c --- indicates test not performed.

d Detection limits are as follows: DDT (1ppb), 4,4'-DDE (0.5ppb), and 2,4'DDE (1ppb). DDD was detected in 2 samples with a high value of 8 ppb. DDE was detected in 4 samples with a high value of 3.4 ppb. DDT was detected in 1 sample with a value of 2 ppb. All other values were below level of detection.

e None detected. The detection limit for Endrin is .5 ppb and 2 ppb for Endrin aldehyde.

TABLE 3.C

SUMMARY OF BULK SEDIMENT ANALYSES - SCHNITZER STEEL AND TODD SHIPYARD

(ug/g dry weight)

	Alcatraz	Schnitzer Steel			Todd Shipyard			
		S1	S2	S3	T4	T5	T6	T7
Antimony	2.82	2.58	7.37	3.78	3.09	13.12	18.83	11.39
Arsenic	10.90	10.60	7.10	10.50	5.90	16.30	13.30	9.20
Cadmium	0.69	1.42	1.97	1.05	0.67	2.02	1.16	1.33
Chromium	246.00	230.00	343.00	217.00	416.00	390.00	930.00	437.00
Copper	56.20	71.10	79.00	81.40	96.70	326.00	423.00	224.00
Lead	29.00	48.40	100.00	87.60	78.30	177.00	246.00	174.00
Mercury	0.26	0.41	1.30	0.76	1.30	8.30	4.20	2.70
Nickel	118.00	129.00	101.00	130.00	85.70	146.00	212.00	155.00
Selenium	0.31	0.38	0.16	0.23	0.08	0.31	0.23	0.31
Silver	0.37	0.45	0.57	0.63	0.33	1.00	0.62	0.70
Thallium	0.64	0.64	0.52	0.65	0.39	0.52	0.45	0.65
Zinc	131.00	179.00	260.00	208.00	183.00	428.00	549.00	287.00
Total Low Molecular Weight PAH's	0.14	0.39	0.93	0.56	0.25	2.86	1.84	0.44
Total High Molecular Weight PAH's	1.29	5.27	12.47	17.19	8.89	26.96	29.13	7.21
Total Pthalates	1.24	0.74	1.91	ND	1.09	0.38	1.47	0.84
Total Phenols	ND	ND	ND	ND	ND	ND	ND	ND
Total PCB's	0.09	0.09	0.25	0.22	0.49	0.67	1.37	1.44
Tributyl Tin(ug/kg)	30.40	30.50	19.40	16.60	58.80	ND	180.00	582.00
% TOC	1.30	1.90	1.50	2.60	0.80	2.00	1.60	1.40
% Sand	11.00	5.00	33.00	7.00	62.00	22.00	42.00	28.00
% Silt	49.00	30.00	27.00	35.00	13.00	24.00	20.00	27.00
% Clay	40.00	65.00	40.00	58.00	25.00	54.00	38.00	45.00

Shipyard. The Schnitzer Steel site had two stations with concentrations of PAH's an order of magnitude above the reference. Station S2 had a concentration of 13.4 ug/g; Station S3 a concentration of 17.7 ug/g. Two stations at Todd Shipyard had concentrations of PAH's an order of magnitude above the reference. Station T5 had a concentration of 29.8 ug/g; Station T6 had a concentration of 31 ug/g. The concentration of total pthalates ranged from 0.7 ug/g at Station S1 to 1.9 ug/g at Station S2. Alcatraz sediment had a concentration of 1.2 ug/g. Todd Shipyard had concentrations of PCB's between five and six times the reference concentration (0.09 ug/g). Todd Shipyard sediments had concentrations of tri-butyl tin that were between five and nineteen times the reference concentration. Station T6 had a concentration of 180 ug/kg; Station T7 had a concentration of 582 ug/kg (For a detailed discussion of the data, see Appendix A).

3.2.3 Biological Resources. The existing biological conditions at the project work site were previously discussed in the FEIS of each individual project.

3.3 ALCATRAZ DISPOSAL SITE

3.3.1 San Francisco Bay. The San Francisco Bay estuary is a drowned valley through which passes the drainage of the great Central Basin of California. It has an area of 1,026 square kilometers [km^2] (396 square miles [mi^2]) at mean lower low water and 1,190 km^2 (460 mi^2) at mean higher high water. Extensive intertidal mudflats, encompassing an area of 166 km^2 (64 mi^2), are exposed at lower low water. The Bay is generally shallow with two-thirds of the area less than 5.5 meters [m] (8.0 feet [ft]) deep, and only 20 percent of the Bay is greater than 9 m (29.5 ft) deep.

The estuary is a very complex environment not easily classified into one of the typical estuarine types. It is atypical in that its opening to the Pacific Ocean is not at the end but near the middle and thus divides the Bay into a "north" bay and a "south" bay. Conditions are further complicated by the asymmetrical fresh water input into the Bay. The greatest influx is from the northern end through the Delta; whereas in the southern end, there is very little fresh water inflow. Consequently, the oceanographic conditions between opposite ends of the Bay are quite different.

An estuary is the mixing area between an ocean and a river. It is this interaction between these two dissimilar bodies of water that essentially influences all other environmental conditions in the estuary. Ocean water is brought in by tidal oscillations; its salinity (and therefore its density) is greater than fresh water. Typically, this dense, oceanic water flows beneath the lighter, river water, and a two-layer circulation system is established (i.e., saline, oceanic water flowing into an estuary along the bottom, and fresh, river water moving to the sea along the surface). The degree of stratification between these two water masses depends on the volume of water contributed by each. In San Francisco Bay, where tidal volume is much greater than river volume, there is little pronounced stratification except at the northern end of San Pablo Bay and Suisun Bay during high, winter runoff. At other times, stratification is only a few parts per thousand in the upper estuary. In the lower estuary (South Bay), the circulation pattern can be the inverse of the upper bay. Because of evaporation in the warmer months, water in the South Bay may become denser than the flooding sea water and sink to the bottom. Thus reversed circulation is setup with the bottom water flowing seaward, and the incoming ocean water flowing landward on the surface.

The Bay is actually four separate shallow bays connected by deep, narrow straits. South Bay covers about 40 percent of the total surface area with an average depth of 4.6 m (15 ft). Central Bay comprises 15 percent with an average depth of 12.2 m (40 ft). San Pablo represents 25 percent of the surface area, with more than half this area less than 1.8 m (6 ft) deep. Finally, Suisun Bay (20%) is also very shallow with about 50 percent less than 2.4 m (8 ft) deep.

The Bay receives most of its fresh water runoff from the Central Valley drainage basin which covers 40 percent of the land area of California (163,000 km^2 or 63,000 mi^2) The runoff from this basin provides 90 percent of the fresh water inflow to the Bay with 80 percent of this flow contributed by the Sacramento River and its tributaries to the north. Fifteen percent of the flow comes from the San Joaquin River system to the south and 5 percent from the east-side streams. This watershed provides about two-thirds of all water used in the State including 40 percent of the State's drinking water.

a. Fresh Water Diversions. The reservoirs and canals of California's water distribution system, in total, represent the largest man-made structure on the planet's surface. The reservoir's regulated flows and the export pumping diversions have altered outflows into the Bay. Water projects for irrigation were first discussed in the late 1800's. The first formal plan called the Central Valley (CV) project was proposed by the Col. Marshall, USGS, in the 1920's. This plan was developed and approved by the voters of California in 1933. However, because of the depression, the State bonds did not sell, and the project was taken over by the Federal government's Bureau of Reclamation (USBR) in 1935. Shasta Dam is the key unit in the USBR's project and went on-line in 1944. The State Water Project followed in the late 1950's and early 1960's with its key reservoir at Orville completed in 1967.

These two water systems have drastically altered the fresh water hydraulics of the estuary. First, consumptive uses and diversions have reduced fresh water outflow by 60 percent from historical levels (Nichols et al., 1986). Second, flow in late summer has been augmented by releases from the upstream reservoirs. Third, construction of large reservoirs in the Central Valley has significantly reduced the frequency of the large peak flows that formerly occurred in the spring (Williams and Vorster, 1987). The reduction is most marked in years with lower than average runoff.

This is because upstream storage begins in March/April with the capturing of snow melt runoff. Williams and Vorster (1987) found that flow pulses exceeding 2,832 m^3 per second (100,000 cfs) for 5 days previously occurred in 40 percent of all years, now occur in only 10 percent of all years. Flow pulses that exceeding 2,832 m^3 per second (100,000 cfs) for 5 days during April previously occurred in about 75 percent of all years. Now they occur in 35 percent of all years.

The significance of the spring flow peaks is that they influence (1) water residence or replacement time and (2) productivity in the estuary. With respect to replacement time, it is obvious that the higher the fresh water inflows the more quickly a specific parcel of water will move to the ocean through the northern reach. Furthermore, fresh water inflows have also been shown to influence the replacement time in the South Bay (Imberger et al., 1977). Productivity in the estuary has also been found to be affected by Delta outflow. Rozengurt et al. (1987) indicates that spring (April/May/June) fisheries need about 3.7 km^3 (3 Million Acre Feet or MAF) to remain productive. Presently spring Delta discharges are about 1.3 km^3 (1.1 MAF). A 4.4 km^3 (3.6 MAF) discharge in spring is normal under natural conditions. Both commercial/sport fisheries appear to require 23.4 km^3 per year (19 MAF/yr). This is a 30 percent reduction from the historic annual mean of 33.9 km^3 (27.5 MAF). As previously mentioned, Delta discharge is already reduced by 60 percent. Studies of other estuaries have indicated that reductions greater than 30 percent (range 0 to 40%) in fresh water flow result in ecological damage (Rozengurt et al., 1987).

b. Land Reclamation. The surface area of San Francisco Bay (including marshlands) prior to 1850 is estimated to have been 2,038 km^2 (786 mi^2). The pre-1850 Bay consisted mostly of a shallow, shelving Bay floor with extensive sub-tidal and intertidal flats coupled with expanses of salt marshland, situated mainly in South Bay, San Pablo Bay and Suisun Bay.

The physical geography of the Bay has been significantly modified by land reclamation work since the middle of the nineteenth century. The purpose of historical land reclamation has differed throughout the Bay and resulted in a variety of land use patterns on the new land recovered. Since the mid-nineteenth century, approximately 619 km^2 (239 mi^2) or 31 percent of the Bay system has been either filled or diked-off and drained to provide new land for a wide range of activities.

Of the reclaimed lands, about 40 percent are situated in Central and South San Francisco Bay, 30 percent in San Pablo Bay, and 30 percent in Suisun Bay. The largest portion of this new land (93%) was recovered from marshlands, while the remaining 7 percent was recovered from intertidal and sub-tidal lands.

Hydraulic mining operations have also reduced the Bay's volume drastically modifying the Bay's bathymetry. Hydraulic mining, or the use of high pressure water jets to expose ore deposits, began in 1853 and continued until stopped by court injunction in 1884. The debris obstructed Delta river channels that because of the blockage could not contain winter and spring runoff. Periodically massive flooding resulted along the Sacramento River and in the Delta. Decades of flushing and dredging were required to return the area to its pre-mining depths in the late 1920's. Eventually these materials moved down into the Bay altering the bathymetry with newly formed shoals and mudflats. Ultimately approximately 1.1 billion m^3 (1.5 billion yd^3) were added to the bottom of San Francisco Bay. These materials were deposited in Suisun, San Pablo and Central Bays to 1.0, .75 and .25 m (3, 2.5 and 0.8 ft) depths respectively. The result was a permanent reduction in water volume and altered tidal circulation patterns.

Reclamation and hydraulic mining have radically changed the geometry of the Bay by reducing both the volume and surface area of Bay waters. The tidal prism has been diminished, causing a general reduction of tidal current velocities and, to a lesser extent, reduction of tidal elevations and ranges. This reduction of the tidal prism has diminished the capability of tidal currents to disperse and flush contaminants out of the Bay system. In addition, the reduced surface area of the system has diminished the system's ability to reoxygenate Bay waters. Lowering the dissolved oxygen content of the Bay has reduced the capability of the estuary to decompose biodegradable contaminants. These factors combined with the reduced inflows have caused alteration of the salinity distribution in different parts of the estuary.

Alteration of the submarine configuration of the Bay basin coupled with the reduced tidal prism has increased shoaling rates and changed sedimentation patterns in many areas. The accelerated shoaling rate is caused by reduced tidal current velocities, increased salinity (and therefore, flocculation), and decreased Bay volume.

c. <u>Contaminant Loading</u>. Besides reducing the freshwater inflow to the estuary and reducing its size since the mid-1850's, the contribution of anthropogenic contaminants to the water has increased as the population has grown. Spanish soldiers and missionaries first arrived in the San Francisco region around 1769. At that time, there were about 10,000 natives in the estuary's surrounding regions. The number of humans remained small until gold was discovered in 1848. Within two years, San Francisco's population grew from 400 to 25,000 beginning the State's population boom. Since that time the population has dramatically increased with concomitant increases in waste production.

Waste production is an unavoidable result of the progress of social, industrial and economic development. As chemical processes supporting the growth and quality of modern society has become more prolific, they have also generated significant synthetic by-products requiring waste management (Kester, 1987). Beginning in the 1940's the use of fertilizers, soil amendments, herbicides and pesticides in the Central Valley effected composition of river water, notably the San Joaquin River. The San Joaquin is less than one-quarter the Sacramento's flow and is approximately 20 percent agricultural drainage. The sulfate (SO_4) and nitrate (NO_3) levels have increased during the irrigation season some 3 to 5 times since 1950 (Nichols et al., 1986). To remove these waste waters from the valley, the San Luis Drain was authorized by Congress in 1960. In 1978 water began to flow and by 1982 the Kesterson Reservoir problem was apparent (e.g., selenium levels increased 130 times).

Agricultural drainage is an important source of contaminants entering the Bay but there are several other sources tied to the San Francisco Bay megalopolis. Contaminants enter the Bay system directly via municipal sewage and industrial waste outfall (known as point sources), storm drains and surface runoff (non-point sources), aerial fallout, overboard discharge or spills from vessels; and indirectly via local catchment basins conveying materials from upland erosion and leachates percolating from waste disposal sites adjacent to Bay and tributary receiving waters. There are approximately 100 municipal and industrial point sources discharging into the estuary -- some 30 municipal and 40 industrial sources. South Bay receives 76 percent of the municipal discharges. Most industrial discharges are in the North Bay including oil refineries, sugar mills, power plants, steel mills, etc. Combined wastewater flow rates generated by municipal and industrial sources range between 26 and 30 m^3 per second (600 and 700 million gallons per day). Approximately 10 percent of the total flow originates directly from industrial sources. However, the flow rates are increasing. These discharges contributed approximately 4 percent of the total fresh water entering the Bay in 1978 and may increase to as much as 10 percent by year 2000.

Improvements in sewage and in waste treatment systems went into effect in the mid-1970s following the passage of new environmental laws and regulations. In the period that followed, Bay water quality parameters have indicated reduced loading. Dissolved oxygen in South Bay has improved from 20 to 25 percent below saturation (typically) to presently being near or at saturation. Coliform (enteric bacteria) counts have decreased from 800/100 ml to 4/100 ml.

d. "Stressed" Estuary. Much discussion occurred during the recent State Water Resources Control Board Bay-Delta hearings with respect to whether or not the San Francisco Bay is a "stressed" environment. During these hearings two views were expressed, both supported by scientific experts and data collected over a period of years. The first view was that the natural resources of the Bay have continued to decline from their historic prominence; the second was that the Bay is healthier than it was in the mid-1960's. Several reasons have been presented for the first position including freshwater diversions and contaminant loading. The second position was supported by evidence suggesting that only surplus water, previously lost to the ocean, is being exported and that the estuary's water quality has improved since the upgrading of municipal and industrial waste treatment facilities during the 1970's.

In fact, an estuary by definition is a highly dynamic or "stressed" environment with widely fluctuating ambient conditions. This estuary is naturally influenced by large-scale physical processes to include oceanic water exchange and mixing, droughts (1976-77), enormous suspended sediment and bedload transport (1986), and meteorological influences (e.g., El Nino). Obviously, from the previous discussion of water diversions, land reclamation and contaminant loading, the San Francisco Bay estuary has been drastically modified or "stressed" by human activities as well. Thus there are both natural and man-induced stresses operating on the system. However, the incremental contribution to the stressed nature of the estuary resulting from human actions is nearly impossible to quantify, and resolving each singularly is even more problematic. For example, to quantify the affects of each alteration, a long-term baseline defining the natural fluctuations would be necessary. Then each alteration would have to be studied individually to discriminate the influence of each on the pristine estuary. Furthermore, the contribution of each would have to be inspected without any of the influences from the others. Finally, all changes would have to be combined to determine the incremental increase resulting from synergism on some target group or species. The clock can not be turned back and the estuary unstressed from human actions. Thus, determination of the contribution of any activity on the composite, natural and human-induced, stress level of the environment will be highly subjective and qualitative.

Turning to dredging and disposal activities as one of the human activities occurring in the estuary and trying to assess their incremental contribution to the system's stress -- these activities obviously cause a quantifiable disruption of the local environment during their conduct. Furthermore, the redistribution of sediment by these activities can cause movement of contaminant-laden sediments out of harbors or marinas into the open Bay system. The incremental stress caused by these activities on the estuary must be assessed with respect to the previously mentioned historic activities in the estuary. By comparison, subjectively speaking, the impacts are minor and are measurable only on a local basis. Based on documentation studies, turbidity impacts resulting from dredging and disposal operations are minor. These impacts have been described as being of short duration and localized to the dredging and disposal sites (Stern and Stickle, 1978). The redistribution of contaminant-laden sediments by disposal operations is an important concern. To identify the acceptability of non-confined dredged material disposal into open waters, dredged material is tested in accordance with the appropriate statutory requirements (i.e., for ocean or bay envrionments) prior to the dredging operation.

3.3.2 Currents and Tides. San Francisco Bay consists of a complex set of broad, relatively shallow embayments interconnected by narrow openings. The western portion of the Central Bay (i.e., Golden Gate environs) and the narrow strictures are kept scoured and quite deep by strong tidally dominated currents. The large volume of the Bay, the huge tidal prism (24% of total Bay water volume), and the narrow strictures, combine to induce progressive tidal delays and establish a resonance of flow between the southern and northern reaches of the Bay that is out of phase with the tidal flow through the Golden Gate.

Mixed and semidiurnal tides oscillate flow between San Francisco Bay and the Gulf of the Farallones (see sections 3.4.1. and 3.4.2). Each tidal day, 24.84 hours, consists of two tidal cycles, with two high tides and two low tides of differing heights. Nearly equal successive tides (equatorial tides) occur when there is no lunar declination with respect to the equator and the maximum differential between successive tidal elevations (tropic tides) occurs coincident with the maximum lunar declination. The greatest difference between sequential highs attributable to lunar declination is over 1.5 m (5 ft). Absolute tidal range is highest, 2.7 m (8.9 ft) twice a lunar month near the times of the full moon and the new moon (spring tide) and lowest absolute tidal range (neap tide) occurs midway interstitially to the spring tides.

The complex bathymetry of the San Francisco Bay induces spatial and temporal variations in mean tidal range and tidal elevation. Mean tide range is 2.6 m (8.5 ft) in the southern extremities of the Bay, 1.7 m (5.6 ft) at the Golden Gate, and 1.3 m (4.3 ft) at Pittsburg. Mean tidal elevation is 0.2 m (0.4 ft) higher in the northern reach than in the South Bay. High tides also appear earlier at a given distance from the Golden Gate in the southern reach as opposed to San Pablo or Suisun Bays. This phenomenon occurs because the standing tidal waves oscillating in the South Bay are propagated more rapidly than the progressive tidal waves migrating upstream through the northern reaches (Conomos, 1977).

Superimposed upon the tidal pulses of San Francisco Bay is the highly seasonal outflow from a drainage basin encompassing over 40 percent of the land area of California. Over 90 percent of the annual inflow to the Bay, 20.9 billion m^3, enters through the Sacramento-San Joaquin River Delta. The freshwater inflow consists primarily of storm runoff in winter and runoff from melting snowpack in spring. Additional riverine inflow to the northern reaches of the Bay is provided by the Napa, Petaluma, and Sonoma Rivers. Tributary input to the southern reaches of the Bay drains a small local area and is very intermittent. Because the South Bay receives 76 percent of the wastewater inflow to the Bay, effluent flow often exceeds freshwater inputs in the southern reaches during summer and autumn (Luoma and Cain, 1979).

The circulation and mixing in San Francisco Bay are dominated by the tidal constituent. Typical tidal excursions through the central and northern reaches of the Bay are about 10 km (5.4 nmi) with the strongest flow in the channels and lesser flux measured in the shoals. The asynchronism of tidal flow in the northern and southern reaches induces flow between the two parts of the Bay. The water mass of the southern reach begins to ebb while the northern reach is still flooding (about three hours after maximum flood). Later in the tidal cycle (approximately 3 hours after maximum ebb) water ebbing from the northern reach is carried into the southern reach while as it begins flooding. Charts depicting surface currents in San Francisco Bay and tables of tidal elevation and tidal currents are available in 1988 Tides & Currents (San Francisco Bar Pilots, 1987).

Nontidal currents, mass water movement due to the highly seasonal riverine inflow or prevailing winds, normally have only a small influence on Bay currents. However, infrequent riverine flow events can significantly perturb normal current direction and velocities over several tidal cycles. Normally, nontidal velocities are one-tenth of tidal velocities. The strongest nontidal flow is experienced in the channels of the northern reaches and in the Central Bay where net displacement can reach 10 to 20 km (5 to 11 nmi) per day (Conomos, 1977). Net displacement in the South Bay is minimal.

The northern reaches of San Francisco Bay exhibit a normal estuarine circulation cell with ebb dominance of surface waters and flooding predominant in near bottom waters. This density induced stratification of flow is primarily caused by the freshwater inflow from the Delta entering the Bay with greater hydraulic head and overflowing the colder, saline waters from the ocean (Schultz and Simons, 1957). Vertical mixing does occur, yet there are still two layers of net flow over a long reach. This reach of vertical stratification and mixing is referred to as the mixing zone. Salinity increases from the surface to the bottom within the mixing zone with the largest gradient being in the strata of no net flow interstitial to diametric flows. Upstream from the mixing zone, a null zone forms where net landward flow of the bottom layers is is terminated by countervailing riverine flow. Consequently near surface salinity also increases from ambient river levels above the null zone to the maximum at the seaward end of the mixing zone. Nontidal current speeds estimated by drifter movements, average 4 cm/s for the landward flowing density current and 5 cm/s for the seaward flowing surface current (Conomos and Peterson, 1977). Seasonally increased riverine flow drives the mixing zone seaward, compresses the reach of the mixing zone, and increases stratification within the mixing zone (Arthur and Ball, 1978). Low summer flows tend to extend the mixing zone and drive it further upstream while turbulence from tidal flow and wind generated waves tends to increase vertical mixing.

The South Bay has little freshwater inflow and a estuarine circulation cell is not present. Mixing in this portion of the system is dependent on extreme freshet conditions or local wind conditions. The South Bay water column exhibits little or no salinity stratification in the summer when the prevailing northwest winds are strongest. Surface transport in the general direction of the prevailing winds, to the southeast, generates a compensating near bottom flow to the northwest. Drifter studies have estimated these currents at 1 to 2 cm/s.

Mixing and circulation of bay water affects the transport of sediments, nutrients and other organic and inorganic substances brought into the estuary by both tides and freshwater runoff. Tidal and wind-induced currents together with the Delta inflow are one of the primary reasons why San Francisco Bay is naturally turbid year-round with visibility confined only to a meter (probably less than a meter for the most part).

The currents and wind-wave action tend to keep the material suspended throughout the water column but it eventually settles out either in the ocean or in the shallows of the estuary. Sedimentation normally occurs where low salinity water meets high salinity water, and the material differentially settles onto the intertidal flats and channels. The fine material that settles on the tide flats is often resuspended and redistributed by wind-generated currents and waves whereas sedimentation of coarser material in the deep channel is more or less permanent and often compacted to several meters deep. Many of these deep channels are periodically dredged for use as shipping lanes, and as a result are out of equilibrium with their environment.

Another important process of mixing in an estuary is that it creates a unique physico-chemical environment so different from fresh or saline water alone. Sediments in an estuary adsorb or chelate many chemicals and thereby play an important role in trapping and releasing nutrients and trace metals. These chemicals can range from a simple metal ion to a complex hydrocarbon molecule (such as pesticides, plastics, oil, etc.). Trapping and releasing of these chemicals could thus have a profound effect on the estuarine biota.

All of these estuarine processes - tides, freshwater inputs, sediment transport, turbidity, transparency and their interaction - which result from mixing of the sea and river are the reasons why a very rich and diverse ecosystem is so characteristic of an estuary - different from that of the original waters. The San Francisco Bay estuary is no exception.

3.3.3 <u>Sediment Transport</u>. An estuary such as San Francisco Bay is both a sink and a holding area for fluvial sediment in transit to the ocean from soil erosion in the Bay's extensive drainage system. Sediment entering the Bay system is either temporarily or permanently held in residence, depending on the dynamic conditions in the estuary. Surficial bottom sediments quickly respond to changes in the distributing forces from wind-wave action and currents. The nature and energy of the forces responsible for development of a profile of equilibrium fluctuate moment to moment. However, there are seasonal patterns manifested by these forces (e.g., river inflow, wind characteristics, wave climate, tidal action, and sediment availability) that will result in seasonal trends of deposition and erosion.

Inflowing sediment is not, for the most part, carried directly to the ocean. A large percentage of the inflowing sediment remains in residence in the Bay for a number of years, being deposited, then resuspended, circulated, and redeposited elsewhere. The net effect of this process is that some portion of these sediments are always being progressively transported toward the mouth of the estuary as suspended load and bedload. Most new sediment enters the Bay system during the months of maximum runoff (November to March). When the sediment laden water mixes with the saltwater, aggregation and settling occur. The broad expanses of the shallow bays, where tidal velocities are low, are the repository areas for the aggregated sediments. During the winter months wave suspension of sediment is at a minimum, allowing accumulation of sediments. In the spring and summer months, daily onshore breezes generate waves over the shallow areas, resuspending sediments and maintaining them in suspension, while tidal and wind-generated currents circulate them throughout the bay. The suspended sediments are repeatedly deposited and resuspended in the shallow areas until they are finally deposited in deeper water below the effective depth of wave influence. In spring and summer there is a net movement of sediment from the shallow repository areas, bringing the shallows back to a profile of equilibrium where wave action is no longer influential in resuspending the sediment.

Once the sediment reaches deeper water, usually in natural channels or along the margins of these channels, tidal currents become the primary transporting mechanism. Like the shallow areas in equilibrium with the depth of effective wave action, the depth of the natural flow channel is in equilibrium with the flow volume and current velocity in the channel. When suspended sediments from the shallows are transported into natural channels, the sediment has a tendency to be transported along the channel in the direction of net flow. Sediments may be transported by tidal currents back into shallow areas, especially after the sediment has been transported through a constricted strait into a broad bay, such as through San Pablo Strait into Central Bay, or moved back into the fresh-saltwater mixing zone in Carquinez Strait with net water movement upstream near the bottom and mixed upward with flows moving into the Bay.

Some sediment is permanently retained in the Bay system. This sediment is deposited and accumulated in low energy areas where wind-wave action and water velocities are not sufficient to transport sediments. These areas may be found along the margins of the Bay such as intertidal flats, marshes and inlets, as well as around structures and dredged channels. Marshes trap sediments by decreasing flow velocities and wind-wave action to the extent that a portion of the sediments may no longer be flushed out. Inlets and sloughs provide sheltered areas with very low current velocities.

Figure 3.5 presents a schematic depiction of sediment movement in the San Francisco Bay system. As displayed in the figure, sediment transport is a large scale phenomena in the estuary with millions of cubic meters being conveyed into and out of the system annually. The estimated average annual sediment inflow to San Francisco Bay is approximately 6 to 8 million m^3 (8 to 10.5 million yd^3). Hydrographic surveys of San Francisco Bay taken between 1897 and 1950 show an annual increase in sediment accumulation from Suisun Bay to North San Francisco Bay of 4.2 million m^3 (5.5 million yd^3). South San Francisco Bay actually shows a net loss of 0.7 million m^3 (0.9 million yd^3) per year (Krone, 1979).

Sediment outflow through the Golden Gate is generally estimated to be between two and three million cubic meters. Taking a median value of 2.5 million cubic meters (3.3 million yd^3), approximately 4.5 million cubic meters (5.8 million yd^3) of material is added to the sediment regime of San Francisco Bay annually. Within the sediment regime of the Bay, the major source of suspended sediments is resuspension of previously deposited material by tidally dominated currents and, especially in the shallower areas of the Bay, by waves. These waves can be induced by prevailing westerly winds in the summer or strong Pacific storms in the winter. The quantity of sediment that is annually resuspended in the shallow areas by wind waves and wind driven currents has been estimated by Krone (1966) to be 120 to 130 million cubic meters (160 to 170 million yd^3).

Dredged navigation channels are out of equilibrium with the overall Bay sediment regime in that the channels must be maintained to a depth greater than the natural depth. Maintenance of dredged channels is required since the channels, with few exceptions, will tend to regain the equilibrium depth of their surroundings. Flow velocities in these dredged channels are usually not great enough to maintain required depths. For this reason, sediment that accumulates in maintained channels will remain there until the channels are dredged.

Shoaled sediment may be derived directly from sediment inflow to the Bay or it may be derived from some part of the resuspension-circulation-redeposition cycle. Shoaling rates in the dredged channels are not constant but vary from year to year, depending on the variable sediment inflow volume, wind-wave action and current velocities. During a season of exceptionally high sediment inflow into the Bay, for example, dredged channels will normally experience higher sedimentation rates than usual, both in winter and spring-summer seasons. The same process occurs in the shallow areas where the depths of accumulation will be greater than normal reducing local water depths. In the spring-summer season, shoaling in the dredged channels is due to the redistribution of sediment accumulated in the shallow areas during winter.

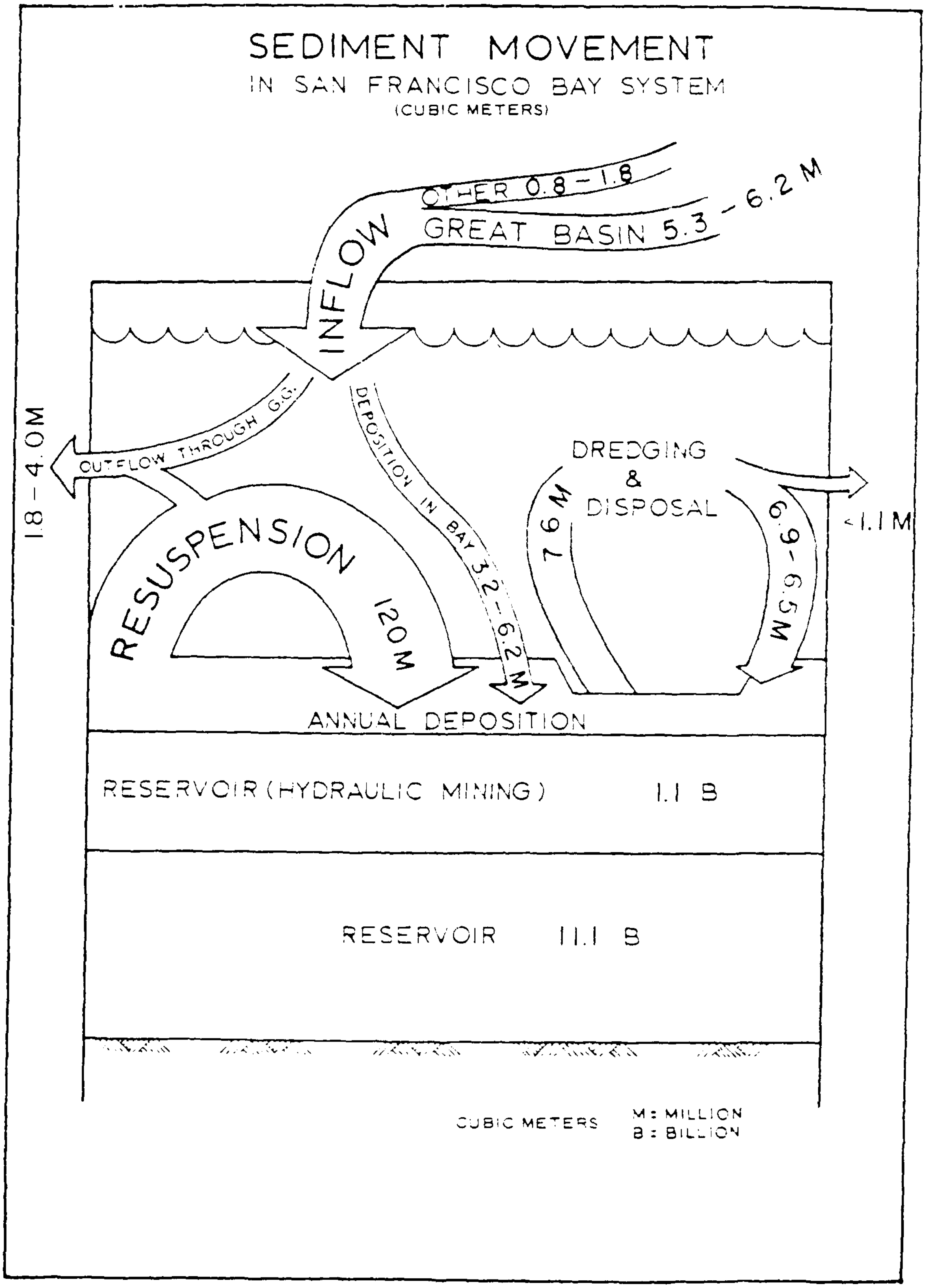

SEDIMENT MOVEMENT
IN SAN FRANCISCO BAY SYSTEM
(CUBIC METERS)
OTHER 0.8 - 1.8
GREAT BASIN 5.3 - 6.2 M
INFLOW
OUTFLOW THROUGH G.G.
1.8 - 4.0M
DEPOSITION IN BAY 3.2 - 6.2 M
DREDGING
&
DISPOSAL
7.6 M
6.9 - 6.5 M
<1.1 M
RESUSPENSION
120 M
ANNUAL DEPOSITION
RESERVOIR (HYDRAULIC MINING) 1.1 B
RESERVOIR 11.1 B
CUBIC METERS
M : MILLION
B : BILLION

FIGURE 3.5

Disposal of dredged sediments in the Bay brings back into circulation material that would otherwise remain out of circulation (retained in the channel). Upon disposal, the dredged sediment will reenter the deposition-resuspension-redeposition cycle, eventually being permanently placed in low energy areas or carried to the ocean. Since dredged channels are out of equilibrium, some of the disposed dredged sediment will likely reenter the same or other dredged channels (USACE, 1977, Appendix E).

The major transportation mechanism of the dredged sediments in the natural channels is by tidal currents and occurs at depths greater than the depth of effective wave action. Just as the water has a tendency to remain in the natural channels, as evidenced by the high current velocities, dredged sediments also have a tendency to remain within the confines of the natural channels for at least a short period of time. The natural channel network in the Bay leading to the ocean is not continuous, causing the dredged sediments, like the natural sediments, to leave the boundaries of the natural channels and move onto the shallows to become part of the resuspension-circulation-redeposition cycle.

Discharged dredged material can be highly mobile. Based on tagging studies (USACE, 1977, Appendix E), the dispersion of dredged sediments after disposal at the Carquinez disposal site was found to be very rapid. During the dredging operation, however, dredged sediments make up a large percent of the total sediment in and around the disposal site. In March 1974, while dredging of Mare Island Strait was still continuing, large quantities of dredged sediments were found in the sampled 80 square kilometer area around the disposal site, including dredged sediments that re-entered the dredged channel. After the completion of dredging operations at Mare Island Strait dredged sediments were found dispersed in April 1974 over a 260 square kilometer area including San Pablo Bay, Carquinez Strait and Suisun Bay. Localized areas were found in San Pablo Bay that had higher percentages of dredged sediments. By August 1974, five months after dredging had been completed, very little evidence of dredged sediments was present in the first 23 centimeters of sediment over the 260 square kilometer study area.

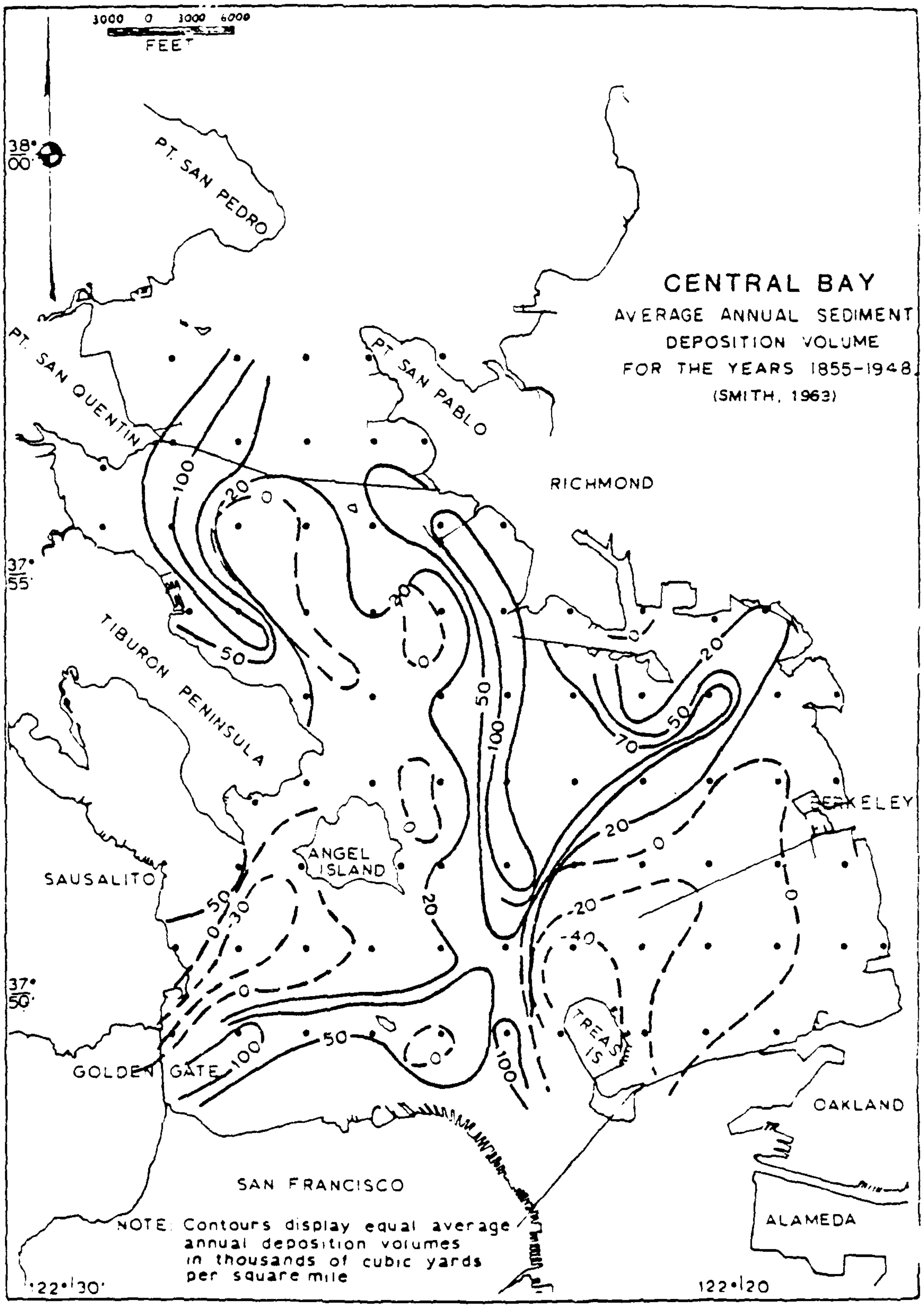
In September-October 1974, large quantities of dredged sediments were found in the upper 23 centimeters of sediment. The increase was due to the redredging of sediments in Mare Island Strait and the wind-wave recirculation of sediments on the shallows of San Pablo Bay. A large portion of the dredged sediments in October was located in the natural channel leading to San Pablo Strait and Central Bay. By December 1974, most of the dredged sediments were again absent from the study area. Analysis of samples obtained from Mare Island Strait and the hopper during dredging and previous studies of the area indicated that about 10 percent of the dredged sediments returned to the dredged channel in Mare Island Strait.

At the Alcatraz disposal site, following the initial deposition of sediments suspended during material discharge, a portion of the material is again resuspended and carried from the site by tidal currents. Dredged material retained at the site, based on monthly bathymetric surveys and logs of disposal quantities, is calculated to be 20 percent within 305 m (1000 ft) of site center and 30 percent within a 610 m (2000 ft) radius of site center. An additional 5 to 10 percent (7.5% is used for subsequent calculations) is estimated to have been deposited in the bathymetric depression on the east and south perimeter of the site. This material accumulated through gravity induced flow of the fluid mud fraction of material deposited during the passive transport phase.

It follows that slightly more than half (52.5%) of the total material discharged at the site is resuspended and transported from the vicinity after initial deposition by the strong currents. The erosional capacity of the site for the high water content, fluid material (1.3 g/cc or less) is much higher than the amount of material deposited (Teeter, 1987). Thus, combined with the ten percent lost to the water column during the convective descent phase, approximately five-eighths (62.5%) of the material discharged at the site is dispersed and transported from the site. In light of the above, it is estimated that annually five-eighths (62.5%) of the 3.8 million m^3 (5.0 million yd^3) of dredged material discharged at the site, or 2.4 million m^3 (3.1 million yd^3) is added to the Bay's suspended and surficial sediment regime.

The ultimate fate of this eroded material must be estimated from circumstantial evidence because quantitative data are lacking. Useful information is available from previously conducted field work looking at Central Bay water quality and geomorphic conditions. First, all suspended sediment plumes tracked during recent field investigations (SAIC, 1987a and 1987b) at Alcatraz moved in an east-west direction. The suspended material did not disperse significantly in a north-south direction. Second, geomorphic evidence that is useful includes an investigation of erosion and accretion patterns gleamed from historic surveys (Smith, 1963) and studies of the movement of bedforms in Central Bay (Rubin and McCulloch, 1979).

Smith (1963) developed estimates of historic sedimentation patterns for the years 1855-1948. Figure 3.6 presents his data in graphical format for the Central Bay locale (taken from USACE, 1979, Appendix B). In this figure areas of erosion are depicted by dashed lines, and areas of accretion are depicted using solid lines. As shown in the figure, Smith's data indicate that the highest shoaling rates have occurred along the flanks of the deep water channels in water depths of 3 to 9 m (10 to 30 ft). These areas are located along the fringes of Berkeley Flats on the east side of Central Bay and along the fringes of San Rafael and Corte Madera Flats on the western side. Intermediate shoal areas are adjacent the high shoaling areas in water depths of 1.2 to 3 m (4 to 10 ft). Large intermediate shoal areas are located in northern Berkeley Flats, San Rafael and Corte



3000 0 3000 6000
FEET
CENTRAL BAY
AVERAGE ANNUAL SEDIMENT
DEPOSITION VOLUME
FOR THE YEARS 1855-1948
(SMITH, 1963)
38° 00'
37° 55'
37° 50'
PT. SAN PEDRO
PT. SAN QUENTIN
PT. SAN PABLO
RICHMOND
TIBURON PENINSULA
ANGEL ISLAND
SAUSALITO
BERKELEY
GOLDEN GATE
TREAS IS
OAKLAND
SAN FRANCISCO
ALAMEDA
NOTE: Contours display equal average annual deposition volumes in thousands of cubic yards per square mile
122°30'
122°20

FIGURE 3.6

Madera Flats, Richardson Bay and along the San Francisco waterfront. The deep water channels of Central Bay including Richmond and West Richmond Channels, Raccoon Strait and the Golden Gate have shown little or no shoaling. The southern portion of Berkeley Flats has experienced moderate to high scouring.

The channel margins in Central Bay have experienced the highest rates of shoaling as a result of diminishing current and wave action. These deposition zones are too far away from the channel axis to be affected by current generated erosion and too deep to be affected by wave generated erosion. The deep water channels of Central Bay appear to be in approximate dynamic equilibrium as a result of scouring action of currents. The shallow sub-tidal flats such as Berkeley Flats also appear to be in approximate dynamic equilibrium as a result of scouring by wind-wave action.

Rubin and McCulloch (1979) investigated bedform movement in Central Bay. They found that many of the bedforms are very active under normal tidal conditions. Bedforms asymmetry was used to deduce the net direction of bottom sediment transport. In general, the transport of bed material was determined to parallel with the circulation and velocity characteristics of tidal flows. The narrow stricture at the Golden Gate produces ebb and flood jets as tidal flow accelerates to pass through the opening. These jets tend to move sediment away from the Golden Gate portal. Lower velocity flows occurring between the jets and shore were ebb dominant within the Bay and flood dominant outside. These flows tend to move sediment toward the Gate. There are boundaries between these mobile zones that form ridge lines, and one of these lines is in the area of Alcatraz Island. The asymmetrical sand waves at that location indicate that the bed is moving east to the north of the island and to the west on the south side of the island (Rubin and McColloch, 1979, Figure 10).

Extrapolating from the findings of these three studies, it appears that the dominant direction of sediment transport, whether suspended or surficial load, under normal tidal circulation is in an east-west alignment in Central Bay. Of course, under extreme events, such as high freshet conditions or coastal storm episodes, tidal circulation patterns may not dominate in determining predominate accretion and erosion patterns. However, during normal periods, sediment transport in the northern part of Central Bay appears to be oriented to the east and transport in the southern part oriented towards the west. This conclusion is supported by the reported accretion and erosion patterns of San Pablo Bay and South Bay. Movement of sediment at the bed appears to occur under conditions of flood predominance into San Pablo Bay and upstream (Conomos et al., 1979). Movement of sediment out of South Bay has been suggested by Krone (1979) and Conomos et al.(1979).

Thus, returning to the fate of material discharge at Alcatraz, the ten percent in the water column is probably about equally divided between being carried out the Gate and farther into the Bay. The portion moving into the Bay probably settles in an accretion zone near one of the channel margins. The material that is subsequential eroded from the settled deposit at the Alcatraz site and in the depression to the southeast probably moves toward the Gate with a portion shunted back into the Bay as it approaches the Gate. Using the San Francisco Bay-Delta hydraulic model studies of dredged material disposal (Schutz, 1965) to estimate movement of this transient material, those studies indicate about 47 percent of the material discharged at Alcatraz moves out the Gate and about 53 percent moves back into the Bay. The portion that moved into the Bay was distributed with 2 percent moving into San Pablo Bay, 28 percent remaining in Central Bay, 22 percent into upper South Bay and one percent into lower South Bay. The 47 percent actually equates to 24.7 percent of the initial deposit that moved from the site, and the 53 percent equates to 27.8 percent of transient deposit.

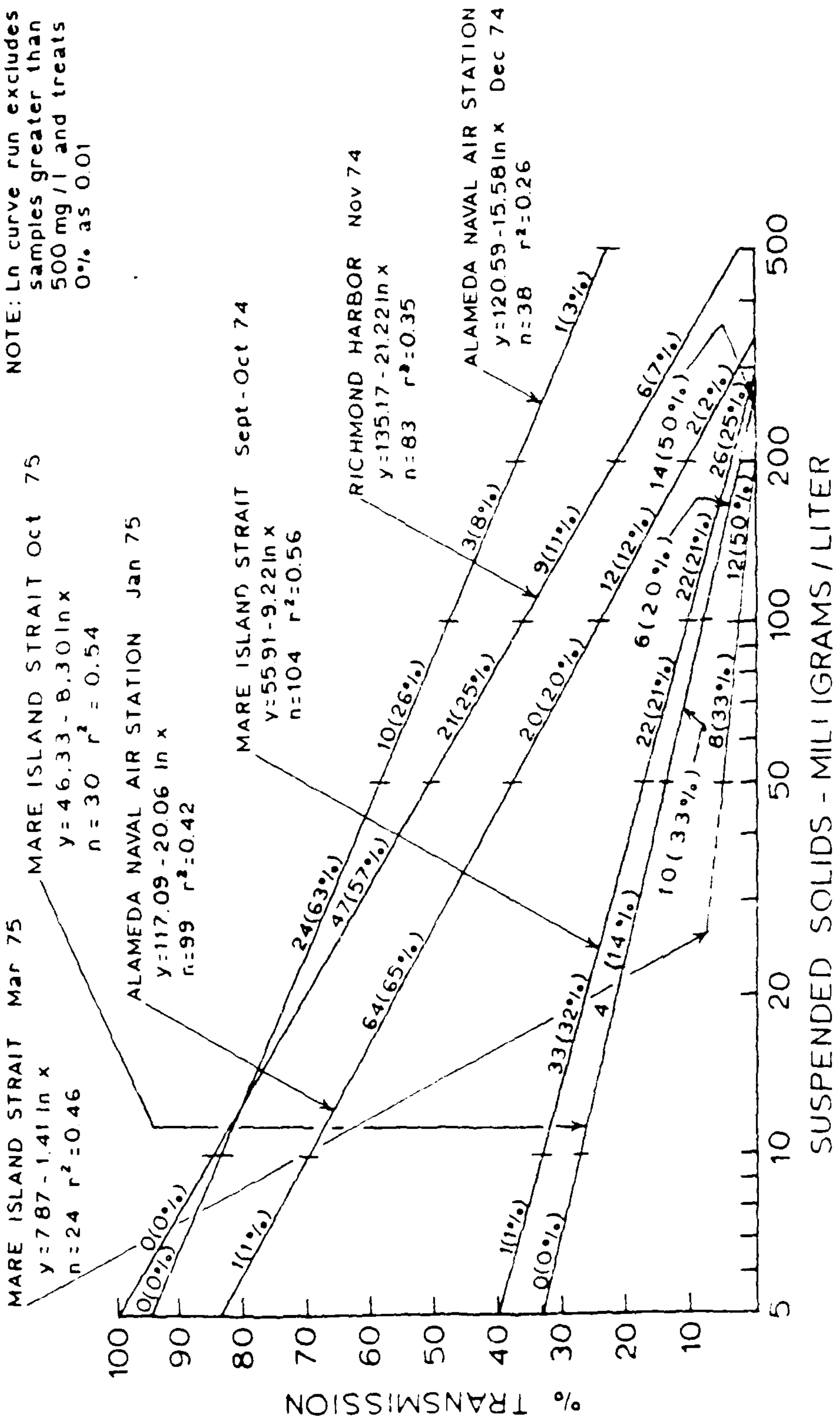
In summary, the percentage of discharged material that is retained in Central Bay is approximately 50 percent -- 37.5 percent retained at Alcatraz and 12.8 percent (7.8% from the bed and 5% in the water column) being widely distributed over the Bay. Upper South Bay (the area encompassing the Port of Oakland, Alameda and south to the San Mateo Bridge) receives approximately 6.1 percent of the transient deposit and possibly some small percentage (less than 1%) of material suspended in the water column. The amount of material that is lost from the Bay environment to the ocean is approximately 30 percent (24.7% from the transient deposit and 5% in the water column).

3.3.4 Turbidity and Suspended Sediment. Because it has been and continues to be a source of semantic error and confusion, it should be noted that the terms turbidity and suspended sediment are not synonymous. Turbidity is the measure of the amount of light that will pass through a liquid and describes the degree of light attenuation produced by colored dissolved materials along with particulate matter suspended in the liquid (LaSalle, 1986) The particulate matter in the liquid is often referred to as suspended solids or suspended sediments. Again, it is not quite correct to use the terms interchangeably. Suspended solids consists of both lithogenous and biogenous particles. The biogenous particles may be either living (phytoplankton, zooplankton, or bacteria) or nonliving (organic detritus)[Conomos, 1979]. Suspended sediment refers only to the bottom material (both lithogenous and biogenous) that has been physically disturbed and mixed into the water column. Planktonic matter (phytoplankton and zooplankton) may constitute a substantial potion of the suspended particles in estuarine environments and is not part of the sediment regime. Organic acids and dissolved solids can change the color and may effect the amount of light that will pass through Bay water.

Similarly, turbidity in San Francisco Bay and the level of suspended sediment within the Bay are not synonymous. High levels of solute organic acids and other substances that can inhibit light transmission are found in Bay water. Particulate matter is contributed by rivers, the ocean, sewage effluent, the atmosphere, resuspended from the substrate, and produced in situ by biological processes. The total quantity of material in solution and the amount of particulate matter in suspension at any given time is highly variable and is greatly influenced by the dynamics of San Francisco Bay. Because many factors can affect turbidity, measurements of turbidity in San Francisco Bay do not accurately define the level of suspended sediment present in Bay waters. Correlation between suspended particulate or suspended sediments and light transmission can be established for a specific location for a limited time period by calibrating simultaneous measurements of both and extrapolating relationship curves.

Measurement of light transmission and suspended solids was undertaken as part of the Dredge Disposal Study, San Francisco Bay and Estuary by the U.S. Army Corps of Engineers (USACE), San Francisco District (USACE, 1976). Transmission measurements and suspended solids measurements of water samples collected in situ were correlated to enable curve generation. Results are shown in Figure 3-7. The interdependence of turbidity and suspended solids was highly variable over time and location within the Bay. Examination of the generated curves clearly establishes the inefficacy of measuring turbidity or light transmission and drawing conclusions regarding suspended particulate levels in San Francisco Bay. Conclusions concerning suspended sediment loading based on turbidity are even less sound as suspended sediments are a subset of suspended solids. To assess turbidity and suspended sediment levels in San Francisco Bay it is essential to understand the ocean, waste, and surface runoff waters entering the Bay and the water properties, circulation, and mixing of the diverse components. An overview of circulation and mixing in San Francisco Bay is presented in Conomos, 1977. A brief description of tides and currents in San Francisco Bay is presented in section 3.3.2. Suspended particulate and suspended sediment loading of Bay waters are presented below:

Riverine inflow, mostly from the Sacramento-San Joaquin River Delta contributes 8.3 million m^3 (10.5 million yd^3) of largely lithogenous suspended sediments to the Bay annually, mostly in the winter and spring. An estimated 130 million m^3 (170 million yd^3) of sediments are resuspended annually from the shallow areas of the Bay by wind generated waves. Wind generated resuspension of sediments is most prevalent during prolonged periods of strong northwest winds in summer. Riverine inflow also carries large quantities of biogenous matter, particularly plant fragments (detritus) and freshwater phytoplankton. Warmer temperatures, increased insolation, and heightened mixing in summer months induce huge increases in the planktonic population. Late summer concentrations of phytoplankton and zooplankton in the turbidity maximum range up to 30 percent of suspended particulate matter, up from typical winter concentrations of 3 percent (Conomos and Peterson, 1973). Ocean waters that mix with the Bay waters can also contribute suspended particulate matter. An estimated 5 percent of Bay water is replaced by "new" ocean water in an average tidal cycle during the summer and over 15 percent of Bay water can be replaced in



% TRANSMISSION Vs SUSPENDED SOLIDS

FIGURE 3.7

winter months (Parker, 1972). From March to as late as September, northerly winds along the California coast generate periods of upwelling that produce episodic blooms of netplankton (Malone, 1971). Maxima of planktonic diatoms in the Central Bay often result from these offshore blooms during the upwelling period (Cloern, 1979).

As shown above, suspended sediments in San Francisco Bay contribute to the suspended particulate loading of the Bay and the suspended particles augment turbidity in San Francisco Bay. Dredged sediment disposal, in turn, is a small addition to the total suspended sediment regime of the Bay. The total annual quantity of dredged material disposed at aquatic sites within the Bay is a distant third in quantity behind natural resuspension of sediments by wind generated waves and riverine sediment inflow and is quite small in comparison (Table 3.D). Further, only part of the dredged material disposed at aquatic sites is dispersed and contributes to the Bay's suspended sediment regime. Determining the amount of sediments suspended and recirculated in the Bay from dredged material disposal at the Alcatraz site requires an understanding of the physical discharge and descent of dredged material and the mixing characteristics of the site.

Fall of dredged material through the water column and distribution on the Bay floor occurs in three distinct phases: convective descent, dynamic collapse, and passive transport. Density differential between released dredged material and the water at the receiving site enables convective descent of the dredge material to the Bay floor. Average descent velocity at the site has been measured at 1.2 m/s (3.8 ft/s). The mass of material moving downward conveys lighter particles to the bottom simultaneously. The dynamic collapse phase begins when the mass of material impacts the bottom and vertical momentum is translated to horizontal spreading. Examination of the area immediately after impact and initial settling of typical Bay mud reveals a central deposit of relatively cohesive, high density sediments surrounded by soft, low density, high water content material that behaves like a viscous fluid (SAIC, 1987c). The passive transport phase begins when erosion, gravity induced flow, or a combination of both, act to remove the material from the site.

Release of dredged material from a hopper dredge in October 1986 was monitored to determine the movement and persistence of turbidity or suspended material (SAIC, 1987a, SAIC, 1987b). The longest period of time that an elevated suspended sediment level was detectable above background levels in the vicinity of the site extended up to fifteen minutes. The maximum suspended sediment load of six monitored plumes (two coincident with strong ebb currents, two during periods of strong flood currents, and two simultaneous with slack water), reached about 60 mg/l near the surface and 120 mg/l near the bottom. Suspended sediment levels dropped to less than 40 mg/l very rapidly.

Table 3.D: ESTIMATED SUSPENDED PARTICULATE LOADING TO SAN FRANCISCO BAY WATERS[a]

Volume (m^3)[b]	Source
130,000,000	wind/wave resuspension
8,000,000	riverine inflow
unknown	netplankton[c]
2,800,000	dispersion from Alcatraz dredged material disposal site
2,010,000	Bay basin surface runoff[d]
994,000	dispersion from San Pablo Bay dredged material disposal sites
443,000	net erosion from South Bay[e]
174,000	point sources[f]
157,000	aerial[g]

a) annual figures irrespective of residence time.
b) volumes calculated with specific gravity value of 2.65 and saturated density of 1.3 g/cc.
c) 3% to 30% of suspended matter in turbidity maximum is living or detrital biogenous matter (Conomos and Peterson, 1977)
d) (Russel, 1982)
e) (Conomos, 1977)
f) Municipal and industrial wastewater discharges (Russel, 1982; Miller, 1986.)
g) inputs directly to surface of Bay, includes precipitation and dustfall (Russel, 1982; Miller 1986)

All plumes tracked east-west and material did not disperse significantly in a north-south direction. Calculations based on volume and suspended solids concentration measurements of the respective plumes, indicate that about ten percent of the material disperses in the water column during the convective descent and dynamic collapse phases. It is important to note that that the contribution of this suspended dredged material to the overall suspended sediment load of the water column at the site is minuscule. Assuming a 4000 m^3 disposal load, with an average sediment density of 1300 g/l, and the ten percent dispersed over an area of 1 km^2 25 m deep, the increase in suspended sediment for that volume is 0.02 mg/l. Ambient concentrations at the site can be as low as 12 to 15 mg/l near the end of a flood tide in summer when the site is dominated by relatively clear coastal waters, or up to 30 to 50 mg/l at the end of an ebb tide when the site is dominated by the sediment laden waters of San Pablo and Suisun Bays.

Dredged material retained at the site, based on monthly bathymetric surveys and logs of disposal quantities, is calculated to be 20 percent within 305 m (1000 ft) of site center and 30 percent within a 610 m (2000 ft) radius of site center. An additional 5-10 percent (7.5% is used for subsequent calculations) is estimated to have been deposited in the bathymetric depression on the east and south perimeter of the site, through gravity induced flow of the fluid fraction of material deposited during the dynamic collapse phase. The distribution of the viscous fluid mud in the vicinity of the disposal site is presented in SAIC, 1987a and SAIC, 1987b.

It follows that slightly more than half (52.5%) of the total material discharged at the site is resuspended and transported from the vicinity after initial deposition by the strong currents. The erosional capacity of the site for the high water content, fluid material (1.3 g/cc or less) is much higher than the amount of material deposited (Teeter, 1987). Combined with the ten percent lost to the water column during the convective descent phase, approximately five-eighths (62.5%) of the material discharged at the site is dispersed and transported from the site. In light of the above, it can be estimated that for an average year, five-eighths (62.5%) of the 3.8 million m^3 (5.0 million yd^3) of dredged material discharged at the site, or 2.8 million m^3 (3.7 million yd^3) is added to the Bay's suspended sediment regime by disposal of dredged material at the Alcatraz site (see Table 3.D).

The turbidity attributable to the additional sediments resuspended by dredged material disposal at Alcatraz is minor. The overall concentration of suspended sediments measured between July 1986 and February 1987 in the vicinity of the Alcatraz Disposal Site was dependent on the stage of the tide. Greatest concentrations occurred after slack low water and the lowest concentrations were observed immediately after slack high water. The influence of tidal circulation in the Bay, transporting sediment laden waters from the shallow areas of the Bay and Delta, and relatively clear waters from the Golden Gate and beyond, back and forth across the disposal site, as overwhelmingly the most important factor affecting suspended sediment load. If resuspension of sediments from the substrate was a major contributing factor to the sediment load and turbidity in the vicinity of the disposal site, then the amount of suspended sediment would be relative to tidal velocity and not tidal stage.

The oscillating flow of sediment laden waters from upstream in the Bay system and the less turbid waters from beyond the Golden Gate across the Central Bay has been widely observed (Carlson and McCulloch, 1974; Winzler and Kelly, 1985; SAIC, 1987c). A significant portion of the estimated 130 million m^3 (170 million yd^3) of sediments resuspended annually by wind generated waves can be transported miles to the ocean or miles upstream during a typical tidal excursion. In the summer months, when riverine inflow is the low and prevailing winds from the west or northwest are augmented by daily pressure gradient induced movement of air due to solar heating of air masses in the interior valley, the interface between sediment laden waters and the relative clean ocean waters is readily visible at the Bay's surface. The migration of the interface back and forth through the Central Bay can be observed from boats and planes, from elevated topographic locations around the Central Bay, and from bridges or even offices buildings in San Francisco.

Historically, most Corps of Engineers dredging in San Francisco Bay has been undertaken with hopper dredges which produce a slurried disposal material. The substitution of clamshell dredging with barge transport for a significant portion of hopper dredging in San Francisco Bay and the evolution of larger clamshell equipment have resulted in denser, more consolidated material being discharged at the site and larger loads of dredged material per discharge event. Increased density and increased volume of material per discharge event both contribute to material retention at the site and will hasten eventual filling of the site to its capacity. To reduce dredged material retention at the site, the San Francisco District of the Corps of Engineers proposed a slurry requirement on dredging in 1986. The slurry requirement was not effectively applied until mid-1987 and never became truly operational. Clamshell dredging equipment could not produce a slurry without extensive modification of plant equipment and/or methods of operation. It has been alleged that this partially implemented requirement to slurry dredged material has contributed significantly to turbidity levels in San Francisco Bay during 1986 and 1987 and that high turbidity levels adversely affected selected fisheries in the Bay during the same period.

The first comments related to increased turbidity levels in San Francisco Bay attributed to dredged material disposal practices were advanced by representatives of clamshell dredging industry in July and August 1987 (Dredged Material Management Advisory Steering Committee Meetings #3 and #4, July 29, 1987 and August 18, 1987). Representatives of the charter boat sportsfishing industry followed with charges of unexpected "muddy water" and the sudden disappearance of Striped bass from the Central Bay in September, 1987 (Dredged

Material Management Advisory Steering Committee Meeting #5, September 11, 1987). California Department of Fish and Game (CDFG) accessed Secchi disc data from three Central Bay stations for a seven year period from 1980 through October, 1987 and "partyboat" catch log data for the same years (CDFG, unpublished data, 1987). At first glance, these data may lend to the plausibility of the charges advanced by the clamshell dredgers and sportsfishermen However, any objective examination of the data clearly shows that the charges are not credible.

First, there is no correlation between level of dredged material disposal at the Alcatraz site and turbidity in the Central Bay as measured by the Secchi discs. In fact, the May-October period with the highest turbidity coincided with the lowest level of dredged material disposal activity of several years. The highest annual turbidity was present in 1983, a fact not reported by CDFG, and dredging activity was below the seven year average. Dredged material disposal in 1987 was highest of several years, yet turbidity levels measured by Secchi disc were third highest of the seven year period, below turbidity levels in 1983 and 1986. In perspective, turbidity and suspended solids monitoring at the Alcatraz site during dredged material disposal, has shown that turbidity levels at the site are influenced more by tidal oscillation of waters of varying sediment load from beyond the site than the perturbations due to dredged material disposal.

Secondly, the correlation between the Secchi disc turbidity data and sportfishing catch reports is tenuous at best. Sportfishing log reports indicated above-average fishing in 1983, yet the highest levels of turbidity were indicated by the Secchi disc data for the same time period. Reports of the worst sportfishing in the seven year period occurred in 1987, but again, turbidity levels were only the third highest of the seven year period. Fishing success was better in 1986 than 1987, but turbidity was higher in 1986 versus 1987. Sportfishing boats leaving Central Bay in September, 1987, due to poor Striped bass fishing (alleged to be caused by elevated turbidity in Central Bay) moved to the more turbid waters of San Pablo Bay and Suisun Bay and were reported locally as catching the legal limits on numerous occasions. No mention of the typical variation in distribution of fish or presence and availability of food source as a result of salinity or temperature is furnished by CDFG, although these inconspicuous factors could contribute to "poor fishing conditions" in a particular geographic area. If Striped bass were being caught in more turbid waters, it is illogical to charge that too much turbidity was the driving influence in their migrating from the Central Bay. A historical, but much less exiguous, data set for California Department of Fish and Game block 488, North San Francisco Bay (section of Bay north of the San Francisco-Oakland Bay Bridge, south of the Richmond-San Rafael Bridge, and east of the Golden Gate) summarizes party boats logs collected over a twenty year period and summarizes the block as follows:

"The North Bay (Block 488) has been good on occasion but is highly variable. In 1944 this block accounted for 23 percent of all party boat days, in 1948 a mere one percent...Fishing is best during the summer months and almost at a standstill from September through April..."(Skinner, 1962).

It is misleading to attribute alleged September 1987 declines in the Striped bass fishery in the Central Bay to purported high turbidity in light of the above twenty years of data and events of 1987. It is even less valid to link the reputed declines in selected fisheries to dredged material disposal because of the poor correlation between turbidity measurements and disposal activity. Finally, it is highly questionable that an analysis of turbidity levels can be based on an exiguous set of Secchi disc data. The Secchi disc is a white, circular disc that is lowered into the water until it just disappears from sight. The measurement of Secchi depth is very subjective, and due to a number of extraneous influences (surface waves, atmospheric variations such as haze and clouds, and visual acuity of the observer), is little more than a qualitative estimate of water clarity (Stern and Stickle, 1978). Additionally, Secchi depth readings taken monthly, cannot gauge temporal changes such as turbidity from tidal oscillation or wind wave resuspension and limited geographic data sets cannot detect systemic changes.

There is no scientific data that supports the recent allegations of turbidity induced reduction in fisheries or of the dredged material disposal connection with purported high Central Bay turbidities. Alternately, there has been a study of disposal operations that demonstrates the short duration, limited extent increase of suspended sediments and turbidity in the immediate vicinity of the Alcatraz disposal site attributable to dredged material disposal, and that documents the back and forth, oscillation of sediment laden waters from the shallow areas of the Bay and relatively clean waters from the near ocean, across the disposal site that dominates turbidity and suspended sediment levels at the site.

3.3.5 Water Quality. The water quality in the Central Bay region is dominated by oceanic conditions. Semi-diurnal tidal exchange through the Golden Gate causes mixing of Bay and Pacific Ocean water twice daily. This oceanic modulation is illustrated by the stability of Central Bay water characteristics. Comparison of water parameter data including salinity, temperature, pH, dissolved oxygen, suspended solids and transparency between 1960-1964 and 1970-1970 for Central Bay indicate little change in its chemical and physical makeup (USACE, 1976, Appendix C).

Observations in the field and laboratory indicate that upon addition of organic-sulfide rich dredged material to the water column, the dissolved oxygen immediately drops to a lower level, more so than with sandy sediments (USACE, 1976, Appendix C; Chen et al. 1976). This reduction in the dissolved oxygen concentrations is a function of the level of oxygen-consuming materials in the sediments. The levels in navigation channel sediments are not typically sufficient to cause reductions in oxygen concentrations below the State and Federal recommended criteria level of 5 ppm. This is because of the turbulent nature of the disposal site, and the rapid dilution of the released materials. In some cases the dissolved oxygen level might drop below the 5 ppm criteria but the duration is not longer than several minutes (USACE, 1975, Appendix C). Reductions in the dissolved oxygen in correlation with increases in turbidity have been shown to cause synergistic effects resulting in greater mortalities of vertebrate and invertebrate species than typically expected when there is only a reduction in the oxygen concentration (USACE, 1975).

Laboratory studies have also shown a release of nutrients (nitrogen, phosphate and silica) upon the addition of dredged material to the water column (Chen et al., 1976). These studies have shown a sudden release followed by a slight decrease in nutrient concentration. The highest release of nutrients occurs under reducing conditions with agitation. Slightly oxidizing conditions result in a middle level of nutrient release while oxidizing conditions generally have releases at very low concentration levels. Silty clay sediment release comparatively more nutrients than do coarser sediment, mainly due to the finer particle size and higher organic matter content of silty clays.

Nitrogenous compounds are known to be released upon the addition of water-sediment mixtures to the water column. The amount and form of released compounds are controlled to a large extent by the oxygen concentration of the water mass. Under oxidizing conditions, the organic nitrogen as well as the ammonium ions are oxidized to nitrate and subsequently to nitrate ions. Under anaerobic conditions the Kjeldahl (soluble) nitrogen increases in the water column. Ammonia nitrogen was found to be released a maximum of ten times over ambient levels and organic nitrogen, a maximum of five times (Chen et al., 1976).

Upon introduction to the water column, phosphate has been observed to be released in large quantities under reducing conditions especially in organic-rich and sulfide-rich sediments. The initial release of dissolved phosphate originates from the interstitial waters as well as from sediment with top layer containing a high concentration of phosphate. The greatest release of phosphate occurs in oxygen-deficient waters.

Most inorganic aqueous chemical reactions are a function of oxygen concentration. As previously mentioned, water quality conditions in Central Bay are dominated by tidal exchange. Any water quality degradation in the mid and upper water column should be quickly ameliorated by tidal circulation and flushing. Furthermore, water quality changes at the Alcatraz disposal site should be minor because of the limited contact time between the released dredged material and the water column will limit depressions in oxygen concentration.

3.3.6 Sediment Quality. Four sediment core samples were obtained from each of four quadrants within the Alcatraz disposal area (See Figure 3.6) in November, 1987. These cores were taken with a vibracore unit to a depth of -72 feet, MLLW. The four core samples within each quadrant were composited for a total of four composited samples. The samples are as follows: Area A200 was the northwest quadrant; Area B200 was the northeast quadrant; Area C200 was the southeast quadrant; and Area D200 was the southwest quadrant. Reference sediment was collected from the vicinity of the proposed ocean disposal site located at 37° 41' 47" N; 122° 42' 16" W, approximately 29 km (16 nautical miles) southwest of the Golden Gate Bridge. Control sediment was clean, uncontaminated sand collected subtidally from West Beach, Whidbey Island, Washington.

Bulk sediment analyses were conducted on each of the four composite Alcatraz samples, the reference sediment and the control sediment. Selection of constituents for which the sediment samples were analyzed was based on results of previous chemical testing of Alcatraz sediment core samples (See Table 3.E), local concerns, and the requirements of the Ocean Dumping Act (40 CFR 227.13). The six sediment samples were analyzed for six trace metals (antimony, cadmium, copper, lead, mercury, and nickel), 18 chlorinated pesticides, seven PCB congeners, polycyclic aromatic hydrocarbons (PAH's), total organic carbon, and grain size (See Table 3.F). Concentrations of parameters which were detected in control, reference and four test sediments are summarized in Table 3.G. Several of the sediment samples from Alcatraz appear to have higher concentrations of trace metals, pesticides, PCB's and PAH's than the reference site. This is expected as a result of the disposal activities at the Alcatraz site. Of greatest concern is the concentrations of PAH's in samples B200 and C200. These samples have concentrations of total PAH's of 78.7 ug/g (dry weight) and 9.5 ug/g (dry weight), respectively. As discussed earlier in this appendix, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a result of dredging or disposal of this material. At present there are no numerical criteria for evaluating contaminant concentrations in dredged sediments. Consequently, further evaluation in the form of bioassay and bioaccumulation tests were conducted (See Appendix A for detailed discussion).

3.3.7 Biological Resources. The existing biological conditions at the Alcatraz disposal site were previously discussed in the FEIS's. Additional information is presented here based on a literature review and based on reconnaissance level site surveys performed during October 1984 (a typical time of low freshwater input from the Delta) and February 1985 (a typical time of high freshwater input from the Delta, but for the period was relatively low compared to prior years).

a. Benthic Environment. A moderately high number of benthic organisms were sampled at the Alcatraz site during October.

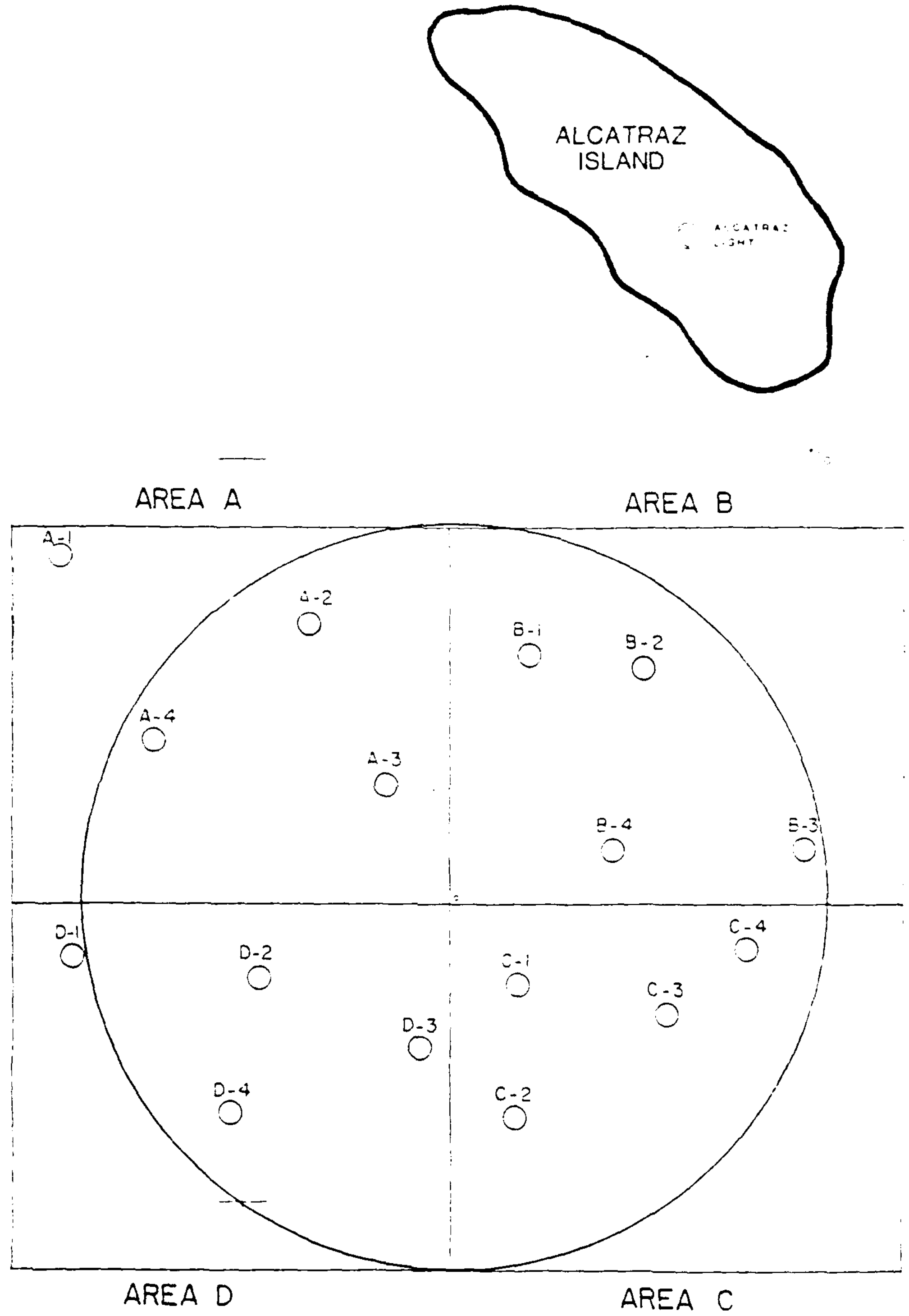


FIGURE 3.8: SEDIMENT CORE LOCATIONS ALCATRAZ DISPOSAL AREA

TABLE 3.E
Bulk Sediment Chemistry for Alcatraz
October 1985
(mg/kg wet weight)

Sample No.[1]	Lead	Zinc	Cadmium	Copper	Chromium	Silver	Mercury	Selenium	Arsenic	Pesticides[3] and PCB's	Petroleum Hydrocarbons	Oil and Grease
4-1-0	-.01[2]	2.1	.066	.14	.13	-.01	.44	-.01	-.01	ND[4]	99	849
2-10-26.5	-.01	2.43	.07	.3	.13	-.01	.82	-.01	-.01	ND	162	1659
7-9-24.5	.52	1.03	.99	.92	.95	-.01	.32	-.01	-.01	ND	53	694
7-3-7.5	-.01	1.61	.045	.08	.10	-.01	.93	-.01	-.01	ND	21	278
4-4-8.5	-.01	2.35	.079	.16	.10	-.01	.51	-.01	-.01	ND	149	623
7-12-33	-.01	2.46	.067	.13	.11	-.01	1.23	-.01	-.01	ND	86	216
7-18-5	.33	6.21	.071	.73	.28	-.01	1.03	-.01	-.01	ND	56	260
1-4-8.5	1.07	8.77	.098	1.05	.41	-.01	.41	-.01	-.01	ND	13	246
3-7-18	-.01	1.33	.053	.21	.9	-.01	1.15	-.01	-.01	ND	43	239
3-13-35	-.01	.80	.046	.06	.11	-.01	1.22	-.01	-.01	ND	76	502
3-4-9.5	-.01	3.86	.065	.12	.9	-.01	.33	-.01	-.01	ND	122	663
3-16-43	4.12	23.3	.225	3.30	1.22	.04	.44	-.01	-.01	ND	111	574
8-19-80.5	.44	11.02	.111	1.11	.24	-.01	.61	-.01	-.01	ND	141	715
4-13-63.5	-.01	2.60	.089	.154	.14	-.01	.30	.01	-.01	ND	108	616
7-15-41.5	-.01	3.09	.059	.12	.11	-.01	.41	-.01	-.01	ND	134	704

1 The first number is the core number, the second the tube number, and the third is the depth below the mudline.
2 Values reported with a minus sign after them are less than the reported value.
3 Includes Aldrin, Dieldrin, Chlordane and related compounds, DDT and derivatives, Endrin, HCH, and Toxaphene.
4 None detected (Detection Limit = 0.05 ug/kg)

TABLE 3.F
PARAMETERS FOR WHICH TISSUE AND SEDIMENT ANALYZED
AT ALCATRAZ DISPOSAL SITE

Parameter	Sediment	Tissue Clams	[illegible]
Antimony	x	x	x
Cadmium	x	x	x
Copper	x	x	x
Lead	x	x	x
Mercury	x	x	x
Nickel	x	x	x
Aldrin	x	x	x
a-BHC	x	x	x
b-BHC	x	x	x
g-BHC	x	x	x
y-BHC	x	x	x
Chlordane	x	x	x
4,4'-DDD	x	x	x
4,4'-DDE	x	x	x
4,4'-DDT	x	x	x
Dieldrin	x	x	x
Endosulfan I	x	x	x
Endosulfan II	x	x	x
Endosulfan Sulfate	x	x	x
Endrin	x	x	x
Endrin Aldehyde	x	x	x
Heptachlor	x	x	x
Heptachlor epoxide	x	x	x
Toxaphene	x	x	x
PCB-1016	x	x	x
PCB-1221	x	x	x
PCB-1232	x	x	x
PCB-1242	x	x	x
PCB-1248	x	x	x
PCB-1254	x	x	x
PCB-1260	x	x	x
Acenaphthene	x	x	
Acenaphthylene	x	x	
Anthracene	x	x	
Benzo(a)anthracene	x	x	
Benzo(a)pyrene	x	x	
Benzo(b)fluoranthene	x	x	
Benzo(ghi)perylene	x	x	
Benzo(k)fluoranthene	x	x	
Chrysene	x	x	
Dibenzo(a,h)anthracene	x	x	
Fluoranthene	x	x	
Fluorene	x	x	
Indeno (1,2,3 cd)pyrene	x	x	
Naphthalene	x	x	
Phenanthrene	x	x	
Pyrene	x	x	
Total Organic Carbon	x		
Grain Size	x		

TABLE 3.G

SUMMARY OF BULK SEDIMENT DATA*

ALCATRAZ DISPOSAL AREA (NOVEMBER, 1987)

	Concentration (ug/g dry weight)					
Parameter	Control	Reference	A200	B200	C200	D200
Antimony	0.18	0.23	0.26	0.34	0.28	0.26
Cadmium	0.65	0.92	1.05	1.61	1.27	1.30
Copper	7.81	7.43	35.2	47.2	40.9	42.7
Lead	6.54	9.00	29.6	38.3	32.7	39.5
Mercury	0.013	0.022	0.17	0.34	0.30	0.27
Nickel	37.9	41.3	86.3	95.9	86.5	88.9
Chlordane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.006
4,4'-DDD	<0.001	<0.001	0.095	0.005	0.003	0.008
4,4'-DDE	<0.001	<0.001	0.002	0.002	0.001	0.002
4.4'-DDT	<0.001	<0.001	0.082	0.011	0.004	<0.001
Dieldrin	<0.001	<0.001	0.004	<0.001	<0.001	<0.001
PCB-1260	<0.020	<0.020	0.025	0.054	0.12	0.053
Acenaphthene	<0.005	<0.005	0.046	0.27	0.017	0.013
Acenaphthylene	<0.005	<0.005	0.025	2.49	0.051	0.022
Anthracene	<0.005	<0.005	0.051	2.28	0.20	0.095
Benzo(a)anthracene	<0.010	<0.010	0.11	2.72	0.46	0.20
Benzo(a)pyrene	<0.020	<0.020	0.18	4.51	0.88	0.37
Benzo(b)fluoranthene	<0.020	<0.020	0.21	5.05	0.84	0.42
Benzo(ghi)perylene	<0.020	<0.020	0.16	3.97	0.82	0.30
Benzo(k)fluoranthene	<0.020	<0.020	0.076	1.33	0.28	0.13
Chrysene	<0.010	<0.010	0.12	2.95	0.57	0.23
Dibenzo(a,h)anthracene	<0.020	<0.020	0.039	0.44	0.09	0.062
Fluoranthene	<0.010	<0.010	0.21	13.0	1.70	0.49
Fluorene	<0.005	<0.005	0.019	0.85	0.062	0.040
Indeno(1,2,3-cd)pyrene	<0.020	<0.020	0.13	3.44	0.76	0.25
Napthalene	<0.020	<0.020	0.26	6.05	<0.020	<0.020
Phenanthrene	<0.005	0.008	0.14	14.2	0.81	0.26
Pyrene	<0.010	0.013	0.31	15.1	1.95	0.06
Total Organic Carbon (%)	0.11	0.25	0.68	0.99	0.73	0.73
Sand (%)	97.5	24.4	49.9	30.3	41.6	49.3
Silt (%)	0.6	21.9	22.4	32.0	25.5	21.1
Clay (%)	1.9	3.7	27.7	37.7	32.9	29.6

* This is a summary of detected values. All other parameters were undetected

A wide variance was noted when the taxonomic groups decreased by about one-half in the February sampling period. The abundance diminished by 99 percent. The five dominant groups by density sampled during October included the amphipods (Ampelisca abdita and Photis brevipes), nematodes (unidentified), Tellina clam (Tellina nuculoides), and the polychaete worm (Glycera capitata). The amphipod, A. abdita, was found in relatively high numbers (mean number/m^2 was over 10,000). The five dominant groups by density at the Alcatraz site identified during February included Tellina clam (T. nuculoides) and four polychaete worms (Armandia brevis, Glycinde polygnatha, Polydora brachycephala, and Heteromastus filiformis); all found in relatively low numbers (mean number/m^2 ranged from 8 to 25).

b. Pelagic Environment. Commercially and recreationally important fish species found in San Francisco Bay are numerous. Reconnaissance level mid-water and otter (bottom) trawls were performed at the Alcatraz disposal site during October 1984 and February 1985 (Kinnetics, 1985). Otter trawl sampling revealed presence of shiner perch (Cymatogaster aggregata), longfin smelt (Spirinchus thaleichthys), brown rockfish (Sebastes auriculatus), plainfin midshipman (Porichthys notatus), market crab (Cancer magister), and crangon shrimp (Crangon nigricauda) during October 1984. Herring (Clupea harengus pallasi), northern anchovy (Engraulis mordax), white croaker (Genyonemus lineatus), English sole (Parophrys vetulus), longfin smelt (S. thaleichthys), staghorn sculpin (Leptocottus armatus), market crab (C. magister), crangon shrimp (C. nigricauda and franciscorum), and big skate (Raja binoculata) during February 1985. Mid-water trawls during February revealed a paucity of finfish at the Alcatraz site.

Some of the significant fisheries that may be found in the vicinity of the Alcatraz disposal site are discussed below:

(1) Northern Anchovy (Engraulis mordax). The northern anchovy is typically abundant in the Bay during April through October. This forage fish for other larger fish is also occasionally found immediately outside of the Bay. Their presence at the site is incidental and when present would attract predators, such as striped bass.

(2) Herring (Clupea harrengus pallasi). The herring spawning season is especially important in the Bay due to the significant commercial harvesting of the roe. Spawning typically occurs between November through May. Spawning occurs in 4.6 m (15 ft) of water usually at night during the high tide. Spawning is also influenced by salinity with optimum conditions in the range of 13 to 19 parts per thousand. Herring harvesting occurs along the eastern San Francisco waterfront and other shallow areas along the shoreline. No herring spawning is known to occur at the disposal site. Migration would account for their presence in the vicinity of site.

(3) English Sole (Parophrys vetulus). This bottom fish has a preference for intertidal, shallow, relatively quiet waters. It is found associated with fine sandy sediments. This species appears to be influenced by Delta outflows. In general, young fish appear to be more abundant in the Bay during high Delta outflow (Herrgesell, 1983). Their presence at the site is transient.

(4) California Halibut (Paralichthys californicus). Halibut is a coastal species. Spawning typically occurs between 5.5 to 18.3 m (18 to 60 ft) depths between February and July. Little is known about its life history in San Francisco Bay. Large, mature individuals are taken occasionally in San Pablo Bay. Smaller and younger individuals are commonly collected in otter trawl surveys in the Bay, but do not account for a large proportion of the survey.

(5) Salmon (Oncorhynchus sp.). Salmon is an anadromous fish; it migrates to and spawns in upstream rivers and then migrates to the ocean for its adult life. There are three runs of fish through San Francisco Bay. The migration population varies through the year. Their presence at the site is transient.

(6) Striped Bass (Morone saxatilis). Striped bass is an eastern species introduced to San Francisco Bay in 1879 (Skinner, 1965). It is an anadromous fish that has become a popular sport fish in San Francisco Bay. However, it has also been intensively studied as a result of infestations and decline in catch. Spawning occurs above the confluence of the Sacramento-San Joaquin Rivers during spring. Young striped bass nursery in a nutrient rich area in the vicinity of Suisun Bay. First year fish enter the lower bays during the fall and winter seasons. They are known to be present in the vicinity of Alcatraz Island between June and November as their migration to the upper estuary begins. They tend to aggregate in areas of abrupt depth changes and high current velocities (e.g., the South Tower of the Golden Gate Bridge, the area northwest of Alcatraz Island, and Raccoon Shoal (Squire and Smith, 1975).

c. Marine Mammals/Rare and Endangered Species. Marine mammals that may be found in the vicinity of the site include the harbor porpoise (Phocoena phocoena) and the harbor seal (Phoca vitulina). As reported in the Final Composite EIS for Maintenance Dredging, San Francisco Region, December 1975, there are eleven known endangered vertebrate species that inhabit a portion of the Bay Area. Of the eleven species, seven are birds, two are mammals and two are reptiles. Of the bird species, only the Brown Pelican (Pelecanus occidentalis) may occasionally be found in the vicinity of the Alcatraz disposal site.

3.3.8 Socio-economic Environment.

a. Navigation. The San Francisco Bay Region has six public ports (Ports of Benicia, Oakland, Redwood City, Richmond, San Francisco, and Encinal Terminals), eleven navigable waterways, several military terminals, and a variety of proprietary maritime terminal facilities. Initially, the Port of San Francisco was the major port on the west coast and all other ports in the Bay were developed to provide service to San Francisco. The Port of San Francisco continued to be the major Bay area port until consolidation of cargo into containers revolutionized waterborne shipping in the 1960's. At that time the Port of Oakland modernized its facilities to handle containerized cargo and with the advantage of good rail service, Oakland has emerged as the major Bay area port (MTC and BCDC, 1982).

The ports within San Francisco Bay play an important role in the nation's waterborne commerce. In 1985, the San Francisco Bay and Delta areas handled about sixty-four million long tons (mlt) of waterborne commerce, of which 75 percent was domestic cargo and 25 percent foreign cargo. Foreign exports in 1985 were about 2.7 mlt more than imports. From 1980 to 1985 exports exceeded imports by about two to three mlt. From 1980 to 1984, total commerce ranged from about fifty-one to sixty mlt per year; from 1984 to 1985 there was an increase in waterborne commerce activity of about ten mlt. The ratio of foreign to domestic activity has remained relatively stable since 1980, from about 25-30 percent to 75-70 percent, respectively. In 1985, about forty-five mlt of waterborne commerce moved through the San Francisco Bay entrance (the Golden Gate); this figure has decreased since 1980 by about six mlt. (USACE, publ. data, 1980-1985).

The USACE collects data on the number of inbound and outbound (arrivals and departures) vessel trips for the San Francisco Bay and Delta areas (exclusive of domestic fishing craft). The data is collected for self-propelled vessels (i.e. passenger and dry cargo, tankers, and towboat/tugboat) and non-self propelled vessels (i.e. dry cargo and tanker). In 1985, there were a total of 71,839 vessel inbound trips for the San Francisco Bay and Delta areas of which 4,667 vessel trips came through the Golden Gate. Since 1980, vessel arrivals through the Golden Gate have remained relatively stable, although the total number of vessel trips within the Bay has increased substantially. Since 1980, intra-Bay trips have increased by about 214 percent, from about 22,000 trips to about 72,000 trips in 1985.

The San Francisco Vessel Traffic Service (VTS) was established in 1968 by the U.S. Coast Guard for the purpose of reducing Bay maritime accidents. The VTS is an advisory service which tracks and monitors Bay inbound, outbound, and intra-Bay vessel movements via a radio and radar network. Information collected and dispersed includes vessel identities, positions, weather, routes, cargo, and assistance to pilots and masters in situations such as entering/leaving port, reduced visibility, and "blind spots" in vessel precautionary traffic areas. An estimated 99 percent of all "public" (commercial and military) vessels report their activities to the VTS. A majority of private vessels do not report their activities.

Just south of Yerba Buena Island and extending eastward toward the Oakland Harbor area is a "Limited Traffic Area". Vessel traffic in this area is normally limited to one-way operation. The VTS closely coordinates inbound and outbound vessel traffic in this area since large vessels and dredge barges entering the Oakland Harbor use the outbound portion of the traffic lane for navigational convenience.

Records of the VTS indicate that total marine traffic in San Francisco Bay in 1982 was about 66,000 vessel movements (VTS, unpubl. data, 1987). Vessel movements increased by about 25 percent to approximately 82,000 in 1986. Most of this increased vessel activity was due to increased dredging and operation of a ferry service between Vallejo and San Francisco. In 1986, ferry vessel traffic represented 50 percent of all vessel movement in the Bay while cargo vessels, tankers, and tugs (which include towed dredge barges) represented about 36 percent of the vessel movements (VTS, unpubl. data, 1987). Self-propelled dredge vessel activity represented about 9 percent of the 1986 vessel movements. At least eleven of the twenty-five military installations within the Bay area make direct use of water transportation. The VTS tracks intra-Bay and inbound/outbound movements of both U.S. Naval vessels and submarines and foreign naval vessels. Over the last three years, U.S. Naval activity in the Bay area has averaged about 74 vessel movements per month, including an average of 9 submarine movements per month and an average of 2 foreign naval vessel movements per month. (Note: There is not a true correspondence between the data collected by the USACE and the data collected by the Coast Guard VTS due to different methods of data collection and different grouping of vessel types.)

At the request of the USACE, in March 1986 the VTS began to monitor dredged material disposal activity at the three Bay disposal sites. The VTS records all disposal activity daily and provides this data to the USACE on a monthly basis. The Alcatraz site receives the majority of the disposed dredged material in the Bay. During the period between April 1986 and March 1987, a total of 2,535 dredge barge trips were recorded for disposal at Alcatraz - 1,032 were self propelled vessels (hopper dredges) and 1,503 were non-self propelled (tug/barge) vessels. Based on this data, there was an average of seven dredge vessel trips per day for the twelve month period with the high average of 20 trips per day in March and the low average of 1.5 trips per day in August. Since dredging activity is sporadic and data is available for only the last twelve months, no trends can yet be discerned.

The VTS collects detailed reports of every vessel incident occurring in the Bay. Review of the VTS records indicates that there were 87 and 128 incidents in 1985 and 1986, respectively. The categories of incidents include the following: collisions; near-misses; vessel groundings; noncompliance (not listening to the VTS or acting contrary to their instructions); non-participation (turning the vessel radio off); hindering navigation (e.g. a sail boat passing in front of a commercial vessel); and loose barges (the tow line snaps and the barge is set adrift or the tug loses power). In 1986, there were five incidents involving dredge vessels (either self-propelled or non-self propelled vessels): one incident was a grounding; two incidents involved loose barges; another incident was unauthorized disposal at Alcatraz; and the last was spillage of dredged material due to hydraulic problems (VTS, unpubl. data, 1987).

b. Commercial Fishing. The primary species and the overall species composition of the commercial and sport fisheries in central San Francisco Bay has changed over time and can vary greatly from year to year, depending on numerous variables. It is estimated that the commercial fishery represents about 80 to 85 percent of the total fishing activity in the central Bay. Over the last two years, herring have been the primary commercial fish species. Other important commercial species include shark, perch, Jack smelt, shrimp, and crab (Beuttler, 1988).

Striped bass have been the primary sport fishing species in the central Bay in recent years. Other sport fishing species include sturgeon, perch, flounder, shark, rockfish, and halibut.

Although commercial fishing remains a multi-million dollar industry in the Bay Area, some commercial fishing interests have indicated that there have been ". . significant declines in harvest and revenues. . " in recent years (Beuttler, 1987). In examining potential causes in the decline that have been undergoing scientific scrutiny for several years, the following combination of major factors have been closely associated with possible adverse effects to the Bay fisheries: (1) massive water diversions in the Sacramento River and San Joaquin River drainage; (2) loss of upstream riverine spawning habitat; (3) significant meteorological changes; (4) exploitation of fishery resources; (5) substantial predation; and (6) environmental contamination.

Some members of the local fishing industry believe that siltation due to dredged material deposition in the Bay is a major factor in the decline of the industry (Ibid). There is, however, no scientific evidence that disposal operations are a factor. Two correlations would have to be quantitatively demonstrated before the decline in the industry could in any way be attributed to dredged material disposal operations. These are (1) that increased turbidity is a direct factor in the decline of the fishery, and (2) that specific dredged material disposal operations result in measurable increases in Bay turbidity, and also correlate to specific decreases in fish catch. Without additional information to the contrary, the available scientific evidence overwhelming suggests that the Bay is a naturally turbid environment and that the major sources of turbidity are naturally caused.

c. Other Uses of Area. The National Park Service informed the Corps by letter of November 12, 1987, that the boundary of their jurisdiction at Alcatraz extends from the island to 300 yards beyond the low-water line around the perimeter of the island. The northeastern end of the designated Alcatraz open-water disposal site extends approximately 300 feet into this boundary; however, the disposal area has been in use since 1894 and it has not been demonstrated that dredge disposal is prohibited within the Golden Gate National Recreation Area.

By letter of February 17, 1988 to the San Francisco Bay Conservation and Development Commission, the State Lands Commission has expressed concern for potential sloughing of the Alcatraz disposal site onto lands the State has leased for sand extraction.

d. Cultural Resources. Cultural resources within the Oakland Channel improvement areas and at the Alcatraz disposal site were discussed in prior Oakland harbor EIS'. It was determined that no significant historic resources were within the Channel or Alcatraz disposal area.

Prior to the establishment of the federal channels beginning in 1874, the harbors were part of the San Antonio Creek Estuary. Almost all of the area was continually under water. It is therefore unlikely that prehistoric resources are present in the project area.

During World War I, the Pier 2 area of the Inner Harbor was developed by the Moore Dry Dock Company, and became one of the principal ship building sites on the Pacific Coast of the United States. This role continued through World War II. Ship building and repair ceased at the site during the 1950's, the dry docks that had been based there were removed, and Pier 2 itself was replaced in the mid-1970's by the Schnitzer Steel Company. The new pier has been used for shipping scrap metal.

Archival and on-site research by Corps of Engineers cultural resource staff has determined that no physical structures or remains in the area of this project are eligible for inclusion in the National Register of Historic Places, nor would there be any indirect effects on such property.

3.4 OCEAN DISPOSAL SITE

3.4.1 Gulf of the Farallones. Directly off San Francisco, lies one of the broadest areas on the continental shelf along the Pacific coast of North America. Somewhat protected by the seaward extension of the Point Reyes Headlands and the submerged Cordell Bank, the near coastal water known as the Gulf of the Farallones supports a diverse and rich environment. Punctuating the center of the Gulf, are the Farallon Islands. Two thirds of the Gulf, has been demarcated as the Gulf of the Farallons National Marine Sanctuary (948 nmi^2) being a marine area of national significance to benefit the public and the oceans (NOAA, 1987).

3.4.2 Currents and Tides. The near coastal waters in the Gulf of the Farallones experience seasonal changes similar to those in the San Francisco Bay Estuary. In summer, the prevailing northwest winds help drive the diffuse California Current that flows southward at the surface, closer to shore. A countercurrent referred to as the California Countercurrent, flows northward at depth (200 m). Both the California Current and the California Countercurrent can meander and induce wide year-to-year changes. These same winds that drive the California Current onshore, induce surface waters offshore, to be replaced by deeper water upwelling to the surface. In winter, the northward flowing Davidson Current develops inshore of the California Current. The interstitial period generally September to December, where upwelling has subsided and the poleward flowing Davidson Current has not yet developed brings a distinct thermocline to the ocean waters. Highly varying eddies form between the major currents flowing equatorial or poleward and the shore due to the geometry of the Gulf of the Farallones and the tidal oscillation of flow from San Francisco Bay. Accordingly currents at any of the candidate sites may vary seasonally.

Additionally, proximity to the entrance of San Francisco Bay can dictate the direction and strength of currents. The tremendous tidal prism of San Francisco Bay oscillates through the Gulf twice a day. The major pulse on the ebb tide moves westward and southward to be replaced by nearshore waters from north and south of the entrance to the Bay when the tide changes to flooding (Brown and Caldwell, 1971). The addition of riverine outflow to the tidal constituent is normally minor. However, extreme meteorological events can play a role. In the great flood of 1862, water flowed for at least ten days through the Golden Gate in a steady torrent, blocking tidal reversal (Hedgpeth, 1979).

3.4.3 Sediment Transport. Historically, currents in the Gulf of the Farallones have been sufficiently strong to selectively transport fine grained sediments and leave well sorted sands. Some littoral drift of the remaining non cohesive sediments does occur. Major erosion of cohesive sediments from a dredged material disposal site and subsequent sediment transport on the continental shelf, is not expected.

3.4.4 Turbidity and Suspended Sediment. The major sources of suspended sediments in the Gulf of the Farallones are the ebbing tides and the riverine outflow from San Francisco Bay. While ocean waters are generally less turbid than waters of the Central Bay, visible turbidity plumes have been observed many miles from the Bay entrances. During most current and tidal conditions the tidal pulse or infusion of sediment laden water into the Gulf is dispersed and reduced to ambient background levels within twenty four hours (Brown and Caldwell, 1971). Greatest sediment infusions into the Gulf occur with seasonal high riverine flow from the Sacramento - San Joaquin River Delta and can persist for many days. Additional increases in turbidity occur during the upwelling season and the oceanic season of current flow, possibly due to a combination of lithogenous and biogenous suspended particulate matter. Dredged material disposal is not expected to measurably alter suspended sediment or turbidity levels in the Gulf of the Farallones.

3.4.5 Water Quality. Offshore water quality characteristics are dominated by the oceanographic season. The San Francisco Bureau of Water Pollution Control and CH2M Hill (1984 and 1985) conducted marine surveys at seven offshore sites. They monitored numerous parameters. Their results illustrate the variability of oceanic conditions as the coastal currents change between the California, Davidson and Upwelling periods. Furthermore, offshore water quality is influenced by fresh water discharge from the Bay during winter and spring as well as by the "El Nino" event that develops along the west coast periodically as a result of meteorological conditions.

For example, stratification of the offshore waters can be significantly different between the three oceanographic seasons (Ibid.) During the oceanic period of the California Current season in October 1983, the average density difference from the surface to bottom was 4.7 sigma units. In February 1984 (Davidson Current season), the average density difference was 2.8 sigma units, and in June 1984 it was 0.7 sigma units. The June 1984 data indicate strong upwelling. Furthermore the dissolved oxygen level was less than 4.0 mg/l at depths below 10 meters during this period at five stations. The average near-bottom oxygen concentration was 5.5 mg/l compared to 7.6 mg/l in October 1983 and 7.0 mg/l in February 1984.

Particulate loading also can be highly variable because of changes in water mass, circulation and freshwater outflow (Ibid). Primary productivity, as measured by chlorophyll a concentrations, was greatest during Upwelling periods. Suspended solids concentrations were greatest in February of the 1984 monitor period (during high Delta outflow). Other parameters such as nutrients levels are also correlated with oceanographic season (Brown and Caldwell, 1971).

3.4.6 Sediment Quality. Sediment quality parameters at Site 1M have been included in baseline surveys under contract by the Corps of Engineers. Sediment from the vicinity of Site 1M was collected for use as reference material in bioassay testing of the Alcatraz disposal sediments. Results of bulk analyses revealed that sediments contain low concentrations of contaminants (See Table 3.G). Sediment quality data from Site B1 has not been collected, although material from the vicinity was used as a reference for bioassay tests. Since both sites 1M and B1 have not been used previously for dredged material disposal, pollutant levels at the site are not expected to be elevated compared to concentrations from sediments at the Oakland Harbor projects or at the Alcatraz site. Disposal and deposition of dredged material will alter the chemical composition of the ocean bottom at the specific site. For this project, the substrate characteristics at the ocean site will also change.

3.4.7 Biological Resources. The major focus of the following description is the biological environment of the Pacific Ocean off the Central Coast of California in which the candidate ocean disposal sites are situated. The marine ecosystem has two major zones. These zones are referred to as benthic (sea floor) and pelagic (water column) zones. Diverse physical, biological, and chemical processes and many interactions occur within each of the zones and between the two. Biological communities vary spatially and temporally as a result of large-scale seasonal, hydrodynamic periodic factors and variations in local inputs and climatic phenomena (for example, upwelling, El Nino [the occurrence of unusually warm water by currents from the south], and proximity to sources of natural sedimentation). Man-induced disturbances in the marine environment can be difficult to discern from interactions due to natural physical forces.

Tidal currents emanating from the narrow entrance and fresh water outflow influence the currents and salinity regimes in the area near shore. Sediment plumes from San Francisco Bay can extend seaward up to 44 km (24 nautical miles). Such plumes are largest during the winter months when runoff of the Sacramento and San Joaquin Rivers are high.

a. Benthic Environment. Benthic organisms within the study area inhabit subtidal (below low-low water tides line) habitats. The offshore ocean bottom supports a diverse array of interactive invertebrate and fish communities. Population densities of demersal fish have been correlated to benthic invertebrate abundance. Community structure and stability is influenced by climatic regime, suitability of specific substrate qualities and successful development and growth. Seasonal studies of infaunal communities on the shelf have indicated significant seasonal and year-to-year variations in community composition. Areas near the shore and in proximity to San Francisco Bay are influenced by hydrodynamic conditions related to outflow and seasonally varying inputs of particulate material. Temporal variations in sediments immediately outside of the Golden Gate are likely seasonal phenomena in relation to variability, seasonality and year-to-year Bay flow.

Habitat types are defined by substratum and algae cover and these are further divided and refined by degree of consolidation, amount of algae cover, and size of component materials (sand, gravel, cobble, boulder) on the sea floor.

Local public awareness of the decline of the crab resource in the San Francisco Bay region has resulted in the intensification of fishery management efforts. Studies investigating reasons for the decline of the central California crab resource have indicated numerous causes including: regional climatic/oceanographic changes, degraded nursery habitat in San Francisco Bay, parasitism, and pollution. However, no specific or definitive cause has been identified. Because of its marked decline and potential for recovery, the Dungeness crab fishery for the San Francisco Bay Area is considered a significant resource.

b. Pelagic Environment. The pelagic zone is fluid with organisms moving through it both horizontally and vertically. The pelagic environment is further sub-divided into the euphotic zone (near surface where sun penetrates and photosynthesis occurs) and the aphotic zone (depths beyond solar light energy). Light penetration is a function of depth and turbidity, factors which are constantly changing in the marine environment.

Major biologic components within the pelagic community include plankton (organisms which drift) and nekton (swimming forms such as squid, fish and marine mammals). Energy flow in the pelagic environment from primary producers (e.g., phytoplankton) through consumers (e.g., zooplankton and fish) and ultimately to decomposers (bacteria and fungi) goes through a complex network known as a food web. In the pelagic environment, these are not well understood.

(1) Plankton. Within the water column are the phytoplankton (primary producers which use the sun's energy and zooplankton (secondary producers which feed on phytoplankton) as well as other small organisms which spend all or critical stages of their lives drifting on the ocean currents. Primary productivity and phytoplankton biomass generally increases near the shore and varies with the seasons.

The Gulf of the Farallones is an area of high planktonic productivity. This is largely due to the combination of the seasonal upwelling characteristics of the entire coast of California, and the local effect of large nutrient inputs from San Francisco Bay. In addition, smaller-scale oceanographic processes along with coastal and bottom topography enhance productivity and act to concentrate standing stocks of plankton.

(2) Nekton. Pelagic fish which dwell near the surface are typically fast swimming schooling fishes. Species such as anchovies, hake, saury and herring are abundant, widely distributed, have broad feeding habits and many predators. These are major contributors to the pelagic food web. Other fishes such as blue shark, salmon, albacore, and bonito are important migrating predators. Some pelagic fish remain at depth and others make vertical migrations to the surface layer at night in order to feed. Squids are important predators on zooplankton, fish and other squid, and in turn provide forage for marine fishes, sea birds and marine mammals.

Of the sites investigated, the Site 1M, with 39 m (25 fathoms) of depth, has relatively high infauna abundance. The populations of species were higher during early spring compared to early summer. Major commercial resources found at the site include: lingcod, flatfish and Dungeness crab. All three species are widely distributed along the Pacific Coast. The winter season is the major commercial fishing period along northern California.

c. Marine Mammals/Rare and Endangered Species. Marine mammals including seals, sea lions, whales and porpoises are common in the pelagic habitat. These marine species feed primarily on fish and cephalopods. Seven endangered whales and the endangered Guadalupe fur seals were identified by the National Marine Fisheries Service as species that may be found in the area of the proposed sites. Of the listed species, only the gray whale and humpback whale are likely to occur in the area on a seasonal basis. The other five species migrate out beyond the continental shelf break. The present distribution of the endangered Guadalupe fur seal is from Guadalupe Island, Mexico to Monterey Bay (BLM/POCS & USFWS, USDI, 1981) and is not expected to be found in the vicinity of the candidate disposal sites.

3.4.8. Socio-Economic Environment. The socio-economic environment of the Oakland Harbor projects was discussed in the FEIS's; only the ocean area offshore of San Francisco Bay is examined below.

a. Navigation. The value of commercial shipping to the Bay area is well known and has been been examined in prior EIS documents; therefore, this discussion is limited to vessel movement, navigation safety and military operating areas. The San Francisco Bay Region has six major commercial ports and at least eleven military facilities which depend on water transportation. Unpublished data for 1985 indicate the movement of 45 million long tons of cargo through the Golden Gate. Data on vessel movement for the same year shows that 4,667 vessels came through the Gate to call at Bay Area ports. Of this number, military movement accounts for less than one percent.

The San Francisco Vessel Traffic Service (VTS) was established by the U. S. Coast Guard (USCG) in 1968 to decrease maritime accidents in the Bay. The VTS is an advisory service which coordinates vessel movements and monitors vessel activities with the assistance of the Maritime Safety Office, which has the authority to ticket and fine commercial, recreational, and military vessels. VTS functions through a radio network to provide information to inbound, outbound, and intra-Bay vessels. This information, which includes other vessels' identities and positions, weather, routes, and cargoes, assists pilots and masters in situations such as entering or leaving port, in blind spots, in precautionary and limited traffic areas, and during restricted visibility. VTS records all inbound and outbound vessel movement through the Golden Gate.

In December 1986, the USCG monitored vessel movement by radar which has a range of 45 km (24 nautical miles) radius from Pt. Bonita; and by radio which has a 70 km (38 nautical miles) radius from Mt. Tamalpais through the Offshore Vessel Movement Reporting System (OVMRS). OVMRS is a voluntary information service for both large commercial and military vessels and small pleasure craft. The Maritime Traffic Separation Scheme for San Francisco Bay is comprised of traffic lanes and precautionary areas, and the OVMRS boundaries outside the Bay are shown in Figure 2.2. Traffic lanes range in width from 90 m (300 ft) to 1,610 m (one mile) in width; these are separated by zones which are 90 m (300 ft) in width. Precautionary areas are the hub of vessel activity where traffic lanes meet and vessels join, leave, or cross the traffic separation zones. The precautionary area outside the Golden Gate forms the intersection for three ocean traffic lanes which provide access to the San Francisco Bay Region. It is approximately 22 km (12 nautical miles) in diameter and 20 km (11 nautical miles) from the Gate.

VTS records show that total marine traffic in San Francisco Bay in 1986 was about 82,000 vessel movements. VTS indicates that actual vessel movements through the Golden Gate have probably decreased recently due to the larger average size of commercial vessels, which can carry more cargo per trip. VTS maintains reports of every accident, or "incident", that occurs in the San Francisco Bay region. Review of VTS records shows that there were 128 incidents in 1986. "Incidents" include: collisions/near-misses; vessel groundings; non-compliance (i.e., not listening to VTS or acting contrary to their instructions); non-participation (i.e., turning the vessel radio off); hindering navigation (i.e., navigating in front of a commercial vessel; and loose barges (i.e., tow-line breaks and barge is loose or tug has mechanical problems). In 1986, there were 27 such incidents.

Three U.S. Naval Submarine Operating Areas, identified as U1, U2, and U3 are also located offshore. These areas are not monitored by OVMRS. The areas are used by U.S. Navy submarines from three different facilities for training maneuvers and torpedo practice.

b. Commercial Fishing.

(1) Site 1M. The wide sedimentary shelf west of the Golden Gate, between Pt. Reyes and Pescadero Pt., supports a variety of commercial fish resources. This fishery region supports trap, trawl, hook and line and troll fisheries. Principal target species include Dungeness crab, flatfish, rockfish, and salmon (Tetra Tech, 1987). For commercial fishing the species emphasis is dictated by market value, regulations, and abundance. The principal fisheries within the region will, therefore, vary from month to month and annually.

The biological relationship between the Gulf of the Farallones and San Francisco Bay is important as salmon, several species of flatfish, the Pacific herring, and many other fish are dependent upon both the ocean and estuarine (bay) environment. The most productive areas for all commercially important fish (except salmon) are in the Gulf of the Farallones and South of the Farallon Islands at depths greater than 91 m (50 fathoms) (See Figure 2.4). Major fisheries, including the dungeness crab and salmon (see chart below) fisheries with an estimated total value of $23,665,000 for 1986, are located just offshore of San Francisco Bay. Both fisheries have significantly declined in recent years and management efforts have been intensified.

SAN FRANCISCO SALMON CATCH DATA
Average Number of Fish

Year	Commercial (King)	Commercial (Silver)	Sport Fishing (King)	Sport Fishing (Silver)
1971-75	188,200	35,500	140,900	8,700
1976-80	174,700	20,800	75,600	4,000
1981-86	197,500	7,200	84,800	400

Dungeness Crab (Cancer magister). The commercially most important fishery resource in this off-shore Golden Gate area is the dungeness crab representing an annual value of $3 million to the Bay area. Although widely distributed from California to Alaska, dungeness crab catch data indicates the resource is on a significant decline in the San Francisco/Bodega Bay area. In the San Francisco region, the catch reached a high of 8.9 million pounds in 1956-57. Over the last 35 years the pounds of crabs landed has dropped from an average of 5 million pounds (1950-1960) to about 700,000 pounds (1980-1985). Catch data is available for 1977-1985 (See Figure 3.9). This 85 percent decline in catch was termed as "severe and sustained" by the Department of Fish and Game (Tasto and Wild, 1983). Since pollution stress has been indicated in juvenile Dungeness crabs in San Francisco Bay, the Department of Fish and Game has indicated that monitoring and enforcing water quality standards both in the Bay and in ocean waters offshore and prohibiting loss of habitat are needed to protect the Dungeness crab resource (Ibid.). Based on a twenty year record of landings for central California, the annual landing averages 750,000 pounds.

The commercial fishing regulations for the important marine species of the region provide for the following open seasons:

Species	Open Season	Major Effort
King salmon	April 15 to Sept. 30	April - Sept.
Silver salmon	May 15 to Sept. 30	May - Sept.
Dungeness crab	2nd Tues Nov. to June 30	Dec.- Feb.

Site 1M is well within the range of productive Dungeness crab fishing. State Fish and Game records indicate that for the most recent records available (1977-1985) non-trawl commercial catches in the vicinity of B1 have were dominated by albacore (67,400 lbs.), chinook salmon (24,400 lbs.), and sea urchins (10,900 lbs.)(Tetra Tech, 1987). The other most common species caught in this area were rockfish, English sole, and sanddabs.

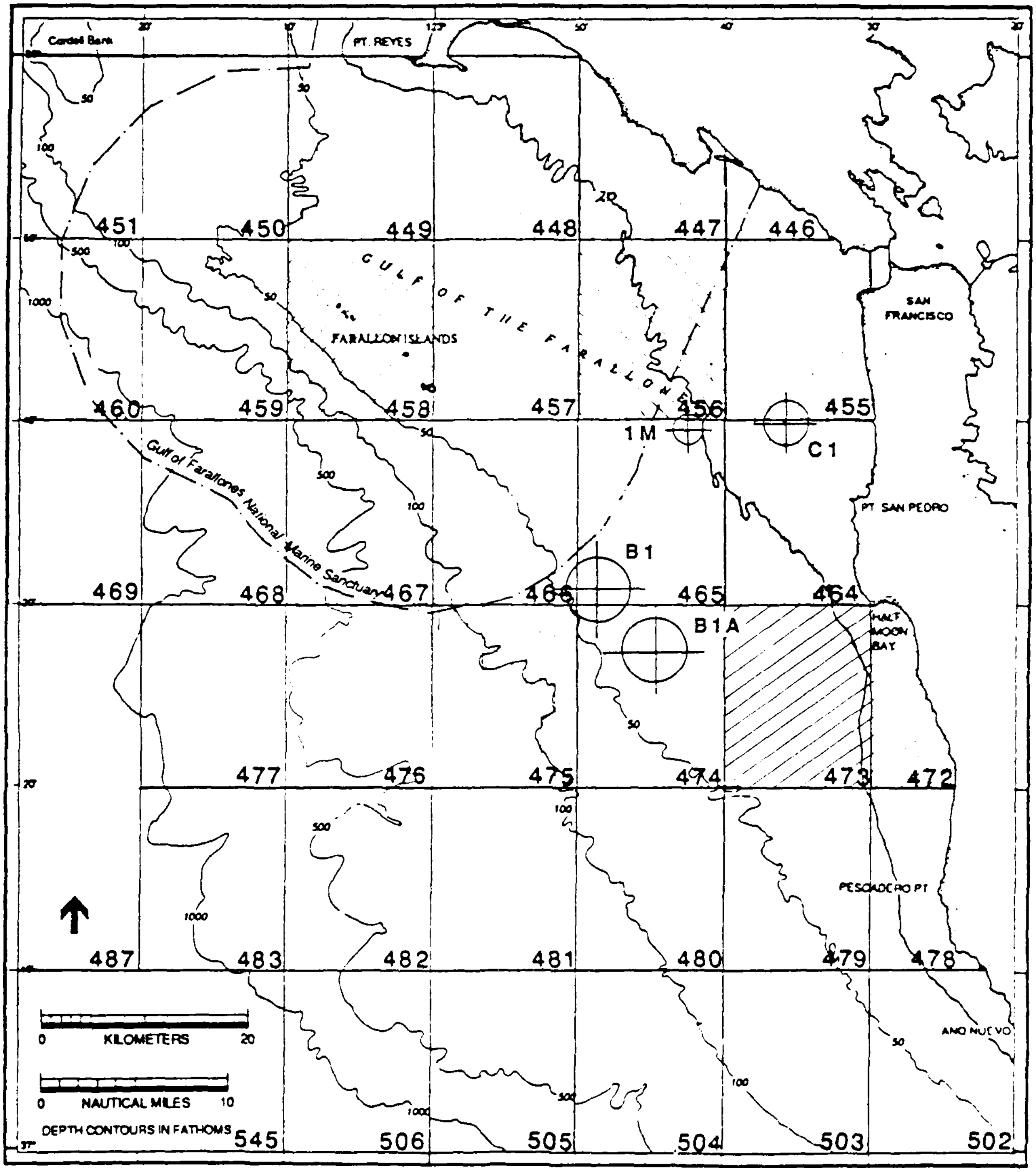


Figure 3-9 Dungeness crab catches from regional California Department of Fish and Game blocks (1977-1985).

Over 100,000 lbs of Dungeness Crab
50 - 100,000 lbs of Dungeness Crab
10 - 50,000 lbs of Dungeness Crab
Less than 10,000 lbs of Dungeness Crab

Recreational and sports fishing is popular year-round throughout the Gulf of the Farallones. Sports fishing in the region is estimated to be as high as 250,000 to 300,000 angler days annually from various northern California ports. Party boats fish primarily for rock cod, salmon, halibut, and albacore. In 1985, party boats from San Francisco Bay harvested over 83 percent of the State's sportfish salmon catch (Tetra Tech, 1987). For all these species except salmon, fishing is permitted year-round. The recreational salmon fishing season runs for nine months out of the year.

According to the latest data available (1986), it was estimated that 100 to 500 fish were caught annually by party boats and commercial fishing passengers inside Department of Fish and Game Fish Block No. 465, which contains Site 1M (Tetra Tech, 1987).

(2) Site B1. The general description of the fishery values provided in Section 3.4.8 b (1) for Site 1M also applies to the general vicinity of alternative Site B1. The principal commercial species found in the immediate vicinity of Site B1 include white croaker, chinook salmon, rockfish, northern anchovy, and albacore. Site B1 is located in the same Department of Fish and Game Fish Block (No. 465) as Site 1M and therefore shares most of the characteristics of 1M. The recreational and sports fishing estimates are, therefore, also the same as those for Site 1M. Site B1 is generally regarded as the outer limit of productive Dungeness crab fishing.

c. Oil and Gas Leasing. Exploration and development for oil and gas is regulated in areas beyond the three-mile limit of the territorial sea of the United States by the Minerals Management Service of the U.S. Department of the Interior. The ocean disposal site study area is located within the Pacific Outer Continental Shelf (OCS) Region, Central California Planning Area, Offshore San Mateo and Santa Cruz Counties. Lease sales within the Central California Planning area have produced approximately $2 billion for the Federal Treasury; however, no active production is in progress. Much of the gas and oil leasing within the California OCS has been suspended as a result of a congressional moratorium imposed in 1982. Though the moratorium was lifted in 1986, negotiations to resolve conflicts over California offshore leasing are on-going (Kinnetics, 1987). Basic leasing units are known as blocks and each encompasses 5,760 acres. Candidate ocean disposal sites are located in Block 332 (Site 1M), Block 463 (Site B1), Block 552 (Site B1A), Block 335 (Site C1). Mineral Management Service has stated that disposal of dredged material at Site 1M or B1 would not conflict with planned lease sales and the dredged material disposal at Site B1A and C1 would conflict with planned leasing.

d. Cultural Resources. A reconnaissance level report to determine the potential for submerged vessels to exist within the ocean disposal site areas has been conducted for the Ocean Disposal Site Selection Study. There are no historic resources within the ocean disposal study area listed in the National Register of Historic

Places or included in the California Inventory of Historic Resources. No survey of the area has been conducted to search for submerged maritime resources; however, the Bureau of Land Management has mapped known shipwrecks for the Gulf of the Farallones, and has delineated zones of high and low incidence of shipwrecks (See Figure 2.7). The zone of highest shipwrecks (i.e., a cluster of three or more within 9.3 km [5 nautical miles], or a single shipwreck within 1.9 km [one nautical mile]) includes an area within 9.3 km (5 nautical miles) of the coastal shoreline and also area immediately adjacent to the Farallon Islands. This is Zone 2. Zone 1 lies outside this area and is categorized as having a low incidence of shipwrecks (i.e., shipwrecks within 18.5 km [10 nautical miles]). The alternative disposal sites, 1M and B1, are within Zone 1.

In addition to the Bureau of Land Management, the Northwest Information Center for the California Archaeological Inventory, the National Maritime Museum, National Park Service, and the Minerals Management Service, U.S. Department of the Interior were consulted. No known shipwrecks are recorded in the vicinity of either of the alternative ocean disposal sites.

The disposal of dredged material at either Site 1M or B1 is not likely to affect submerged cultural resources. The State Historic Preservation Office has concurred in this determination. (See Appendix D).

SECTION 4.0 ENVIRONMENTAL EFFECTS

4.1 IMPACTS ADDRESSED IN THE FEIS

This discussion of impacts will focus on the differences between the revised and original project (as addressed in the Final EIS).

4.2 PHYSICAL IMPACTS

4.2.1 Hydrology. Dredging operations will temporarily increase turbidity or sediment load of nearby waters at both the dredging site and the disposal site. With a clamshell dredge, the bucket loses sediments as it is raised through the water column, breaks the surface, and is swung to the dump scow or barge. In contrast, the hopper dredge disrupts the bottom sediments as two trailing arms pass through the area to be dredged. The hydraulic or hopper dredge continually resuspends sediments as long as the cutterhead is crowding the sediment face. Surface turbidity occurs as supernatant water in the hopper or barge are allowed to overflow to create a more economical load.

Turbidity and suspension of sediments occur at the disposal site upon discharge of the dredged material. Sediments are discharged from the bottom of the hoppers or dump scows, several feet below the surface, and surface turbidity is minimized. A turbidity cloud forms around the discharge during the convective descent and dynamic collapse phases and is carried laterally by currents. Bulk density, particle size, and the height of the water column that material falls through determines the amount of turbidity at mid-water depth. The final phase, impact and distribution of material on the floor of the disposal site, can also impart large quantities of material to the lower water column.

At a completely dispersive disposal site, strong currents will erode or resuspend material deposited on the bottom and carry it from the disposal site. This process extends loading of the lower water column. Unfortunately, the factors that tend to limit or reduce turbidity at a aquatic disposal site also contribute to increased retention of dredged material. Deposition and accumulation of material on the bottom can range from negligible to almost total.

The hydrologic impacts; the turbidity sediment transport, and bathymetric changes on the bottom of the disposal site, are discussed for each alternative plan in the following sections.

a. Present Condition. The Alcatraz Disposal Site was selected for disposal operations because most of the material does enter into suspension during disposal or during the next surge of tidal currents and turbidity of the lower water column is expected to be high. Pulses of increased short term turbidity will occur throughout the duration of a dredging project upon discharge of disposal material. These temporary pulses or plumes, migrate east or west from the site, depending on tidal phase, and dissipate rapidly. Turbidity and sediment load in the Bay is increased only in a local area for a short period of time and overall effects are insignificant (see Section 3.3.4). The candidate ocean sites have fine to medium grained sandy bottom with little silty or clayey material and almost no cohesive properties. The major source of fine grained sediments is outflow and exchange with the tidal prism of San Francisco Bay. No previous dredged material disposal has occurred at either ocean site.

b. No-Action. No change in bottom conditions at either of the disposal sites in the Bay or in the ocean would occur from no-action.

c. Unrestricted at Alcatraz. Unrestricted clamshell dredging and disposal would have the least impact on suspended sediment load at the Alcatraz Disposal Site. Only twenty-five percent of the estimated 5.4 million m^3 (7.0 million yd^3) discharged at the site during the project would be transported from the site in the discharge plume or during subsequent erosion. The estimated 4 million m^3 (5 million yd^3) retained at the site will add to the existing disposal mound and and is estimated to bring the average depth within the site to less than -6 m (-20 ft) MLLW. Discharging the material from a hopper dredge, would increase suspended sediments carried from the site and decrease deposition. The average depth at the disposal site is estimated to be under 12.2 m (40 ft) after completion of the Oakland Harbor deepening. Turbidity and suspended sediment loads in San Francisco Bay and in the vicinity of the disposal site due to dredged material disposal at Alcatras are desribed in Section 3.4.4.

d. Pre-Dredging Alcatraz with Ocean Disposal. Under this alternative, the volume of material expected to accumulate at the Alcatraz disposal site as a result of the Oakland Harbor improvements, will be dredged from the Alcatraz site before disposal of Oakland material and transported to the preferred ocean disposal site for discharge. About 2.1 million m^3 (2.7 million yd^3) of material will be removed from Alcatraz by clamshell dredge and transported by barge to the ocean site for disposal. Alcatraz sediments are dense, highly consolidated clays and sands that have resisted resuspension and erosion in the site's high currents. Clamshell dredging with a 15 m^3 (20 yd^3) bucket will have little effect on the consistency of the material. Upon discharge at the ocean disposal site, diffential density between dredged material and ocean waters will enable rapid descent and convey lighter materials to the bottom The resulting deposite on the ocean floor and should remain highly resistant to resuspension and erosion. The minor turbidity plumes associated with disposal will travel primarily northeast or south, influenced by tidal flux from San Francisco Bay, and will dissipate quickly. Turbidity at Alcatraz from dredging will be minor. Disposal of the 5.4 million m^3 (7.0 million yd^3) of material from Oakland at Alcatraz from a hopper dredge will have the same effects as presented above for turbidity and resuspension. Total bathymetric impact at Alcatraz, with project material replacing pre-dredged material, will be negligible.

e. Direct Disposal at Ocean Site.

(1) Site 1M. Under this alternative, all 5.4 million m^3 (7.0 million yd^3) of sediments from the Oakland Harbor will be dredged by clamshell dredge from the channels, turning areas and berths in the harbor and transported by barge to the ocean dredged material disposal site 1M. Upon release at the disposal site, virtually all of the material will be transported to the bottom in the convective descent phase and will form a deposit thickest, and with the denser, more cohesive sediments in the center, and thinning, with softer material deposited, radially. Bottom area covered by the deposit is estimated to be about 4.1 km^2 (1.2 nmi^2) with the total deposit of sediments on the periphery of the site being less than 2 cm (0.8 in) after completion of the project. and thinning radially, collapse on the bottom. Turbidity plumes from sediment not transported to the bottom in the convective descent phase, will be minimal. The small amount of sediment suspended or descending slowly through the water column will be transported primarily either northeast or south, depending on the direction of seasonal currents, and shouls reach ambient levels before lateral transport beyond the site perimeter.

(2) Site B1. Utilization of candidate Site B1 for deposition of sediments dredged from the Oakland Harbors will be similar to use of Site 1M, described above. The 5.4 million m^3 (7.0 milliom yd^3) of sediment will be dredged by clamshell dredge and haul by barge to the site. Release of material from the bottom of the split hull vessels will initiate convective descent to the substrate. Because depths at the site are about twice that of Site 1M, 84 m (46 fm) versus 42 m (23 fm), there will be more entrainment of water during cenvective descent, more horizontal diffusion, and a radial spread of deposits slightly more than twice that of Site 1M. The radius of bottom impacts will be 3.1 km (1.7 nmi) and area covered will be 18.5 km^2 (5.4 nmi^2). The central area of the site will again have the thickess deposit, but because of increased lateral spreading, the thickness of the central deposit will be less than at Site 1M. The site size has been set so the deposit at the perimeter will be less than 2 cm (0.8 in). More sediment will be lost to the water due to increased depths and turbidity or suspended sediment plumes will be more prevalent in the lower water column. Seasonal currents, primarily northeast and south, are not expected to carry turbidity or suspended sediment load significantly above ambient levels, beyond site boundaries or into the nearby Gulf of the Farallones National Marine Sanctuary.

4.2.2. Water and Sediment Quality

a. Present Condition

(1) San Francisco Bay. The water quality of San Francisco Bay is characterized by a wide array of inputs. The Bay waters, being a part of a heavily urbanized region, are affected by local runoff, municipal and industrial effluent, tributary inflow and maritime usage. In addition, since the Bay is the major exit of surface waters of the Sacramento and San Joaquin Rivers, the Bay is subject to a large input from agricultural drainage and upstream municipalities. Trace amounts of heavy metals, hydrocarbons, pesticides and nutrients are associated with dredged sediments. When this material is resuspended in the water column, small amounts of these chemicals may be released into open waters of the Bay. On a large-scale, seasonal wind/wave action on the broad, shallow portions of the Bay generate mixing of Bay waters with attendant resuspension of sediments. Tidal influences also make water quality conditions highly dynamic. Controls on discharges of pollutants into San Francisco Bay are governed by the San Francisco Bay Regional Water Quality Control Board (RWQCB) and by EPA.

(2) Ocean Waters Offshore San Francisco. Coastal water quality in proximity to San Francisco Bay is also affected by numerous inputs. In addition to the seasonal outflow of San Francisco Bay, numerous ocean outfalls are located in the coastal environment. Infrequent incidents of oil spills as a result of transport of maritime trade also influence the water quality of the region. Human activity affecting water quality along the coast near San Francisco Bay is not uncommon.

b. No-Action. Conditions influencing water quality both in the Bay and in the ocean will not be affected by no-action related to the dredging of Oakland Harbor. Aquatic disposal of dredged material from deepening of the harbor will not occur.

c. Unrestricted at Alcatraz. This plan would allow disposal of material at the Alcatraz disposal site. Section 404 of the Clean Water Act requires that chemistry of sediments to be disposed in waters of the United States be compared to similar data from the disposal area. Bioassay and bioaccumulation testing were also conducted to evaluate the potential ecological effects. Material from the vicinity of the ocean disposal site (Reference site coordinates: 37° 29' 00"N; 122° 42' 30" W) was used as reference material to which these tests were compared. In these tests, the use of an offshore reference material is considered to be a more conservative test because the material is assumed to contain lower concentrations of contaminants than the Alcatraz disposal site. Based on the testing requirements for disposal at Alcatraz, the material from Oakland Inner and Outer Harbors has been found acceptable from a water quality perspective. As described below, testing of the channel sediment indicated that contaminant levels are elevated in comparison to Alcatraz data. As discussed in Appendix A to the SEIS, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a result of disposal of this material (Brannon et al., 1975; Bricker, 1974; Lee and Plumb, 1978; Neff et al., 1978). Only a very small fraction of the contaminants present may be available for uptake by an organism. For that reason, bioassay and bioaccumulation testing are conducted to evaluate the potential for significant ecological effects.

Elutriate tests, which are a simplified simulation of the dredging and disposal process, were conducted on sediment samples from eleven locations within Oakland Harbor to determine whether dissolved constituents would be released from the sediments into the water column by dredging or disposal activities. The results of this testing (see Table 4.A.) indicated that only one station (Oakland Inner 1cc) had copper and zinc concentrations exceeding the State Water Quality Objective by 1.5 times. The concentration of mercury at Station 3cc in Oakland Inner Harbor exceeded the State Water quality objective by 2.3 times. However, mixing zone calculations (see Appendix A) indicate that water quality standards would not be exceeded as a result of Oakland Harbor dredging. The results of this testing, taking into account the mixing that occurs at the dredging and disposal sites (because of the large volume of water and strong currents), indicate that water quality objectives contained in the Water Quality Control Plan for Ocean Waters and the San Francisco Bay Basin Plan would not be exceeded as a result of dredging the tested portions of Oakland Harbor or of disposing of material at Alcatraz for the parameters for which tests were performed.

The above mentioned chemical testing of the elutriate does not provide information about all harmful chemicals, nor does it provide information about possible synergistic effects of contaminants. To address these problems and to assess the potential environmental effect of suspended sediment on the water column, suspended particulate animal bioassays were conducted using mysid shrimp, speckled sanddab, and mussel larvae. The results of these tests are summarized in Table 4.B. Although toxicity (or abnormal development as in the mussel larvae bioassay) of the proposed dredged material was significantly greater than to the reference sediment, in no case was the sediment toxic to 50 percent of the test organisms (or cause abnormal development in 50 percent of the test larvae). As a result, the LC50 (or EC50) was greater than 100 percent concentration of the dredged material suspended particulate phase. Therefore, in accordance with the guidance suggested by EPA/USACE (1977), it was concluded that no unacceptable water column impacts would occur as a result of either dredging or disposal of material from the tested portions of Oakland Harbor at the Alcatraz site. Furthermore, the results of the suspended particulate phase bioassays support the conclusion that after considering initial mixing, State Water quality objectives would not be exceeded at the dredging and disposal area. A more complete analysis of the bioassay results is contained in Appendix A).

TABLE 4.A

ELUTRIATE CHEMISTRY FOR OAKLAND HARBOR

	OAKLAND INNER								OAKLAND OUTER			BACKGROUND	STATE* WATER Quality
	1aa	1cc	2cc	2dd	3aa	3cc	3dd	3ee	1bb	1cc	1ee	WATER	OBJECTIVES
Arsenic (ug/l)	5.0	5.0	-5.0	8.0	5.0	5.0	5.0	-5.0	30.0	5.0	-5.0	-5.0	80.0
Cadmium (ug/l)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	1.0	1.0	1.0	-1.0	-1.0	-1.0	30.0
Chromium (ug/l)	-3.0	3.0	10.0	4.0	5.0	4.0	3.0	-3.0	-3.0	4.0	5.0	-3.0	20.0
Copper (ug/l)	40.0	60.0	30.0	30.0	40.0	30.0	20.0	10.0	20.0	-10.0	-10.0	-10.0	50.0
Lead (ug/l)	-10.0	10.0	-10.0	10.0	-10.0	10.0	10.0	-10.0	10.0	-10.0	-10.0	-10.0	50.0
Mercury (ug/l)	.5	-.5	.5	.5	-.5	3.3	.5	.5	-.5	-.5	-.5	-.5	1.4
Nickel (ug/l)	6.0	-6.0	-6.0	-6.0	-6.0	-6.0	6.0	-6.0	-6.0	-6.0	20.0	-6.0	200.0
Silver (ug/l)	-5.0	5.0	-5.0	5.0	-5.0	5.0	5.0	-5.0	-5.0	-5.0	-5.0	-5.0	4.5
Selenium (ug/l)	20.0	-20.0	-20.0	20.0	-20.0	-20.0	20.0	-20.0	-20.0	-20.0	-20.0	-20.0	--
Zinc (ug/l)	100.0	300.0	90.0	30.0	50.0	50.0	60.0	20.0	10.0	2.0	3.0	-2.0	170.0
Oil and grease (mg/l)	1.0	1.0	-1.0	1.0	1.0	-1.0	2.6	1.0	1.0	1.0	-1.0	-1.0	--
Petroleum Hydro (mg/l)	.2	.2	.2	.2	.2	.2	.4	-.2	.2	.2	-.2	-.2	--
PCB's (ug/l)	-.06	.06	.06	.06	.06	-.06	-.06	.06	-.06	.06	-.06	-.06	.009**
Aldrin (ug/l)	-.004	.004	.004	.004	-.004	-.004	.004	.004	-.004	.004	-.004	-.004	.006***
Dieldrin (ug/l)	-.002	-.002	.002	.002	.002	.002	.002	-.002	.002	.002	-.002	.002	
Chlordane & related compounds (ug/l)	-.014	-.014	.014	.014	.014	.014	.014	.014	.014	-.014	-.014	-.014	.009**
DDT & Deriv (ug/l)	.012	-.012	.012	.012	.012	.012	-.012	.012	.012	-.012	-.012	-.012	.003**
Endrin (ug/l)	.006	-.006	.006	.006	.006	.006	.006	.006	.006	-.006	.006	-.006	.006
HCH & Toxaphene (ug/l)	.24	-.24	.24	.24	.24	-.24	.24	.24	.24	.24	.24	-.24	.033**

* Instantaneous **maximum** as contained in the State of California State Water Resources Control Board <u>1983 Water Quality Control Plan for Ocean Waters of California</u>. These 1983 maximums are based on effluent limitations after 100 to 1 initial dilution in the receiving water. It should be noted that this Ocean Plan excludes San Francisco Bay Waters and does not apply to dredged material disposal. The only exception is the objective for zinc which is the instantaneous maximum contained in the California Regional Water Quality Control Board, San Francisco Bay Region, <u>1986 Water Quality Control Plan, San Francisco Bay Region (2)</u>.

** The laboratory technical capabilities to detect these constituents to the level of the instantaneous maximum specified in the <u>Ocean Plan</u>, did not exist at the time these tests were conducted at the U.S. Army Corps of Engineers South Pacific Division Laboratory.

*** Instantaneous maximum for Aldrin & Dieldrin

TABLE 4.8
SUMMARY OF BIOASSAY RESULTS

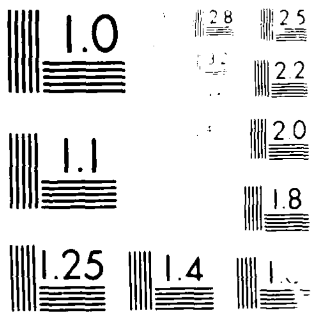
Technical Evaluation

TEST DESCRIPTION	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
SUSPENDED PARTICULATE PHASE BIOASSAYS					
Acanthomysis sculpta (mysid shrimp)	ns	ns	ns	ns	ns
Citharichthys stigmaeus (speckled sanddab)	ns	ns	*	*	*
Mytilus edulis (mussel [illegible])	*	ns	ns	ns	*
SOLID PHASE BIOASSAYS					
Acanthomysis sculpta (mysid shrimp)	ns	ns	ns	ns	ns
Macoma nasuta (bent-nose clam)	ns	ns	ns	ns	ns
Nephtys caecoides (polychaete worm)	*	*	*	*	*
SOLID PHASE BIOASSAYS (*Rhepoxynius* [illegible])					
Survival	*	*	*	*	*
Emergence	ns	ns	ns	ns	ns
Reburial	ns	ns	ns	ns	ns
BIOACCUMULATION (*Macoma nasuta* [illegible])					
Cadmium	ns	ns	ns	ns	ns
Chromium	*	*	*	*	*
Copper	ns	ns	ns	ns	ns
Lead	*	*	*	ns	*
Mercury	ns	ns	ns	ns	ns
Silver	ns	ns	ns	ns	ns
Zinc	*	ns	*	ns	*
Chlorinated Pesticides and PCBs	*	ns	ns	ns	ns
Petroleum Hydrocarbons	ns	ns	ns	ns	ns
BIOACCUMULATION (*Nephtys caecoides* (polychaete worm))					
Cadmium	ns	ns	ns	ns	ns
Chromium	ns	ns	ns	ns	ns
Copper	ns	ns	ns	ns	ns
Lead	ns	ns	ns	ns	ns
Mercury	ns	ns	ns	ns	ns
Silver	ns	ns	*	*	ns
Zinc	ns	ns	ns	ns	ns
Chlorinated Pesticides and PCBs	ns	ns	ns	ns	ns
Petroleum Hydrocarbons	ns	ns	ns	ns	ns

ns indicates statistically non-significant result (alpha = 0.05)
* indicates statistically significant results (alpha = 0.05)

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 4/11

UNCLASSIFIED F/G 13/2 NL


1.0
2.8
2.5
2.2
2.0
1.1
1.8
1.25
1.4

Several suspended particulate phase animal bioassays and several solid phase bioassay showed statistically greater toxicity in the test sediment as compared to the reference sediment from the offshore ocean environment. However, the statistical results do not necessarily indicate that adverse toxicity will occur in the field. Appendix A has been modified to include a more detailed description of the Corps' analysis and interpretation of these data. Statistical differences in these data are only used as a tool to evaluate the variation in the response of test organisms utilized in the bioassay test. The magnitude of the difference as well as the number of species to which the sediment is toxic must be considered to interpret the test results. The findings of the tests indicate that there is little potential that unacceptable adverse toxicity impacts will occur in the field.

Of greater environmental concern than water column impacts, is the affect of the material which settles to the bottom of the disposal site. This is because bottom-dwelling animals live and feed in and on the deposited dredged material for extended periods. In order to assess the environmental affect of deposited dredged material, solid phase animal bioassays were conducted using mysid shrimp, bent-nose clam, and a polychaete worm. These tests measure mortality as the end-point. At the end of the tests, the tissue of survivor clams and worms were analyzed for specified chemical constituents to assess the potential for long-term accumulation of contaminants in the food web. The objective of the bioaccumulation test is to identify levels of contaminants that might be harmful to the ultimate consumer, which is often man (EPA/USACE, 1977). A summary of the bioassay results is contained in Table 4.B. Of the three species tested only the polychaete worm demonstrated survival that was statistically lower in sediment from Oakland Harbor than survival in the reference sediment. However, further analysis of the data revealed that significant adverse effects would not occur in the field (A more complete analysis of the bioassay results is contained in Appendix A). Therefore, the solid phase bioassay results of the initial testing of Oakland Harbor material indicate that no unacceptable adverse impact to benthic organisms would occur as a result of the deposition of dredged material at Alcatraz.

The bioaccumulation results showed statistically higher concentrations of chromium, lead, and zinc in the tissue of clams exposed to sediment from several areas within Oakland Harbor than in tissues of clams exposed to a reference sediment from the offshore ocean environment. However, statistically significant bioaccumulation in organisms living in a test sediment as compared to organisms living in a reference sediment does not necessarily imply that an ecologically important effect will occur in the field. Statistical differences in test data are only used as a tool to evaluate the variation in the response of test organisms. For this reason, a number of factors must be evaluated, including the magnitude of the difference from the reference as well as the comparison of the actual tissue concentration to values reported in the literature and FDA type limits. Appendix A to the SEIS has been modified to include a more thorough discussion of the bioaccumulation data. Further examination of this data revealed that the tissue concentrations in the test organisms were low and did not exceed FDA-type limits (see Table 4.C). The bioaccumulation data was compared to FDA-type limits because this data can presently best be interpreted in relation to human health where as the evaluation of ecological impacts of bioaccumulation is much less certain (Peddicord, et al, 1986). The above mentioned metals are also not known to biomagnify in the marine environment (Kay, 1984). The Corps' evaluation of this data did not indicate that any of the metals were highly mobile (see Appendix A). In addition, the concentration of chlorinated pesticides in the tissue of clams exposed to sediment from one station within Oakland Inner Harbor was statistically higher than in clams exposed to the reference sediment. Again the tissue concentration in the test organisms was low and was far below FDA-type limits as compared to the reference level (only 0.5% of the FDA limit)(See Table 4.C). Finally, the concentration of silver in the polychaete worms was statistically higher in worms exposed to sediment from two areas within Oakland Harbor than in those exposed to reference sediment. The tissue concentration of silver was low and was only twice the tissue concentration of organisms in the reference sediment. However, there is no FDA-type limit with which to compare this data.

Another solid phase bioassay, using the amphipod, Rhepoxynius abronius, was performed to help determine whether sublethal effects would occur as a result of disposal of dredged material from Oakland Harbor at Alcatraz. The test was developed by EPA researchers for the Puget Sound area in Washington. These tests indicated that toxicity was greater in organisms exposed to sediment from Oakland Harbor than in the reference sediment (See Table 4.B.).

Although these results indicate that a statistically significant effect occurred, several factors, inherent in the test itself rather than the chemical nature of the dredged material, may have caused the effect. For example, grain size may have an effect on these amphipods at extremes of fine and coarse material because Rhepoxynius typically inhabits well sorted, fine sand (Tetra Tech, Inc. and EVS Consultants, LTD., 1986). The survival of test organisms exposed to sediments from Oakland Harbor was greatest in the coarse material sample, material from area #1, Oakland Inner (88% sand, see Appendix A). Furthermore, the reference sediment was a fine grained sand (99% sand) in which Rhepoxynius abronius reside in nature and were shipped. This is in accordance with protocols developed by Swartz et al (1985). A test in which the reference sediment is a sediment that the organisms are accustomed may only measure differences that are a reaction to a new environment or to fine grained sediments rather than toxicity caused only by contaminants associated with the sediment. In addition, Rhepoxynius abronius does not occur in San Francisco Bay. Rhepoxynius abronius may not be a suitable test organism for sediments from San Francisco Bay. Further

TABLE 4.C

ACTION LEVELS AND MAXIMUM CONCENTRATION OF CONTAMINANTS
IN AQUATIC ORGANISMS FOR HUMAN CONSUMPTION

Chemical	Food	Action level[1] mg/kg (wet weight edible portion)	Maximum Concentration[2] mg/kg (wet weight edible portion)
Aldrin	Fish and Shellfish	0.3	-[3]
Arsenic	Fish, Crustacea, molluscs	-	1.0
Cadmium	Molluscs	-	1.0
Chlordane	Fish	0.3	
Chromium		-	-
Copper	Molluscs	-	70.0
	All nonspecified foods	-	10.0
DDT, DDE, TDE	Fish	5.0	-
Dieldrin	Fish and Shellfish	0.3	-
Endrin	Fish and Shellfish	0.3	-
Heptachlor and Heptachlor epoxide	Fish and Shellfish	0.3	-
HCH	Frog legs	-	0.5
Lead	Molluscs	-	2.5
	All nonspecified foods	-	1.5
Mercury	Fish, Crustacea, molluscs	-	0.5
PCB (total)	Fish and Shellfish	2.0[4]	-
Toxaphene	Fish	5.0	-
Zinc	Oysters	-	1,000.0
	All nonspecified foods	-	150.0

1 United States Food and Drug Administration (FDA) Action levels for Poisonous and Deleterious Substances in Human Food.
2 Australian National Health and Medical Research Council Standards for Metals in Food, May 1980.
3 -- indicates that no action level or maximum concentration has been established.
4 This is not an action level but a tolerance limit established through the rule making process.

Source: Peddicord et al (1986).

research studies involving Rhepoxynius abronius and sediments from San Francisco Bay is necessary to determine the suitability of the test organism. This research must address the use of different reference sediments with grain size comparable to the test sediment. Furthermore, the use of another species of amphipod, such as Ampelisca, which is known to reside in San Francisco Bay should be investigated.

In summary, the results of the Rhepoxynius bioassays are difficult to interpret because of its sensitivity to fine grained sediments, the high variability of the data, and the relatively recent use of this test to measure pollutant effects of sediments from San Francisco Bay. The bioassay results required by Section 404 of the Clean Water Act should be carefully examined and the results of all tests analyzed collectively.

After evaluating the results of toxicity and bioaccumulation testing collectively, the material from Oakland Inner and Outer Harbors, with the exception of sediments from areas adjacent to Schnitzer Steel and Alameda Gateway (formerly Todd Shipyard), have been determined to be suitable for unrestricted disposal at Alcatraz pursuant to the requirements of Section 404 of the Clean Water Act in the Corps best professional judgement. As mentioned previously, a more complete discussion of all of the bioassay and bioaccumulation results is contained in Appendix A.

As stated earlier in the SEIS, additional testing was conducted on sediment within the proposed turning basin adjacent to Schnitzer Steel and the former Todd Shipyard. The results of the oyster larvae bioassays are difficult to interpret because it is impossible to separate effects of contaminants from sampling errors. The sediment was inadvertently frozen prior to testing. In addition, the water and sediment samples were stored in plastic containers after sampling. Toxicity and abnormal development may have been a result of contaminants such as pthalates leaching from the plastic containers. Furthermore, freezing the sediments may have resulted in increased contaminant mobility. The sediments from Schnitzer Steel and Todd Shipyard are very cohesive materials that are unlikely to mix with other material or to be mixed with water during dredging or disposal operations. Thus, water column impacts should be much less than observed in laboratory tests where total suspensions were prepared.

Results of the oyster larvae bioassays indicate that water from the Alcatraz disposal site was toxic to the larvae and resulted in only 20 percent survival as compared to 80 percent survival in the control water. In addition, only 65 percent of the larvae exposed to Alcatraz water developed normally. Exposure of larvae to sediment from Schnitzer Steel and Todd Shipyard also resulted in lower survival than for larvae exposed to control water. In addition, a higher percentage of oyster larvae exposed to sediment from the test sites developed abnormally than did those exposed to reference and control water. Calculated EC50 values ranged from 21.7 percent to 24.7 percent for the three stations at Schnitzer Steel and from approximately 0 percent (at two stations) to 17.3 percent for the four stations at the former Todd Shipyard.

In summary, sediments from areas adjacent to Todd Shipyard generally have higher concentrations of contaminants than the Alcatraz disposal site and Schnitzer Steel. Of greatest concern are the concentration of PAH's at Stations S2, S3, T5 and T6; the concentration of mercury at Stations T5, T6, and T7; the concentration of PCB's at Stations T6 and T7; and the concentration of tri-butyl tin at Stations T6 and T7. These contaminants can have an adverse impact on marine organisms. Consequently, further evaluation including toxicity and bioaccumulation testing is necessary to determine the potential biological impact of these contaminants. Without results of these tests, it must be assumed that these contaminants are potentially bioavailable. Hence, the unrestricted open-water disposal of this material would result in unacceptable adverse impacts on the marine environment. Covering the material from Schnitzer Steel and the former Todd Shipyard areas to isolate it from the aquatic environment would not be effective at the Alcatraz disposal site because of the existing high energy dispersive environment at Alcatraz. A low energy retentive site is required for the successful isolation of unacceptable material.

d. Pre-Dredging Alcatraz with Ocean Disposal. Sediment core samples (1987) were tested for chemical contaminants including heavy metals, pesticides and polynuclear aromatic hydrocarbons (PAH's). In order to evaluate water quality impacts on the marine environment, all tests pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act, must be assessed. Bioassay and bioaccumulation testing of sediment core samples from the Alcatraz disposal site (SF 11) indicated that disposal of material from the northeast quadrant (Area B200) at the appropriate ocean disposal site would have the potential for unacceptable adverse impact in the marine environment including bioaccumulation (Tables 4.D, 4.E, 4.F, and 4.G). Even though material from the southeast quadrant (Area C200) did not show significant bioaccumulation or toxicity in the solid phase, there is still reason for concern since the concentration of PAH's in the area was 9.5 ug/g dry weight and the total organic carbon content was relatively low. If ocean disposal of the material from the Alcatraz site is to be accomplished, special care must be taken to effectively reduce the potential for significant effects in the marine environment.

In order to be considered acceptable for open-water disposal, material from the northeast quadrant (Area B200) must be isolated from the marine environment. This may be achieved by covering this sediment with acceptable material to prevent bottom-dwelling organisms from living and feeding within and upon the unsuitable material. If these restrictions are followed for material from these two areas, unacceptable adverse impacts would not be expected to occur as a result of their disposal in the marine environment.

TABLE 4.D
SUMMARY OF SUSPENDED PARTICULATE PHASE BIOASSAY RESULTS
ALCATRAZ DISPOSAL AREA

		96-h Mean Percent Survival ± S.D.			48-h Mean Percent Normal ± S.D.	
Sample	Conc. (%)[a]	Mysids	Flatfish	96-h LC50[b] Flatfish	Oyster Larvae	48-h EC50[b] Oyster Larvae
A200	100	73.3±15.3*	0.0± 0.0		12.6± 3.3	
	50	66.7±25.2	96.7± 5.86	68.3	92.1± 3.0	78.2
	10	76.7± 5.8	100.0± 0.0		86.1± 4.4	
B200	100	70.0±10.0*	0.0± 0.0		0.0± 0.0	
	50	86.7±11.5	90.0±10.0	65.5	69.6± 7.5	60.4
	10	90.0±10.0	93.3± 5.8		83.3± 1.7	
C200	100	63.3±15.3*	20.0±10.0		16.8± 9.1	
	50	90.0±17.3	100.0± 0.0	80.7	91.5± 5.7	80.0
	10	76.7± 5.8	100.0± 0.0		87.4± 3.2	
D200	100	66.7±11.6*	0.0± 0.0		0.0± 0.0	
	50	70.0± 0.0	96.7± 5.8	68.3	26.3± 2.6	23.2
	10	73.3± 5.8	96.7± 5.8		68.4±21.7	
Reference	100	80.0± 0.0	100.0± 0.0		94.0± 1.1	
Sediment	50	90.0± 0.0	nt	>100%	93.3± 4.7	>100%
	10	76.7± 5.8	nt		94.6± 1.5	
Reference Water	100	93.3± 5.7	100.0± 0.0	n/a	95.6± 1.6	n/a
Control Water	100	90.0± 6.3	98.3± 4.1	n/a	92.3± 2.8	n/a

a. 3 replicates per concentration except control (n = 6)
b. LC50's and EC50's are expressed as % (vol/vol).
nt = not tested as 100% survival was observed at 100% concentration, n/a = not applicable
* = asterisks denote mysid survival rates in 100% concentration of test medium which were significantly lower than in the control, determined statistically using a t-test ($p<0.05$).

TABLE 4.E
SUMMARY OF SOLID PHASE BIOASSAY RESULTS
ALCATRAZ DISPOSAL AREA

	Mean Percent Survival ± S.D.[a]		
Sample	Amphipods[b]	Clams	Worms[b]
Control	19.2±0.4	19.4±0.5	19.0±0.7
Reference	18.2±0.8	17.8±1.1	17.8±1.9
A200	16.6±1.7	19.0±0.7	17.4±3.0
B200	15.0±2.9	18.6±1.5	17.2±1.1
C200	15.6±1.8	19.2±1.3	19.0±1.4
D200	16.0±1.6	18.6±1.3	19.0±0.7

a. n=5, a value of 20.0 = 100%.

b. Analyses of variance indicated no statistically significant (P<0.05) difference in survival between reference and test sediments for each species tested.

TABLE 4.F

RESULTS OF BIOACCUMULATION STUDY FOR CLAMS SURVIVING 10 DAY SEDIMENT EXPOSURE

ALCATRAZ DISPOSAL AREA

(Results expressed as wet weight with dry weight in parentheses below)

Parameter	Mean Tissue Concentration ± S.D. (ug/g of tissue) Control	Reference	A200	B200	C200	D200
Cadmium	0.015±0.002	0.015±0.0004	0.014±0.001	0.014±0.006	0.013±0.002	0.013±0.004
	(0.12±0.02)	(0.12±0.01)	(0.11±0.01)	(0.11±0.05)	(0.10±0.01)	(0.10±0.03)
Copper	1.64±0.39	1.38±0.11	1.49±0.34	1.28±0.17	1.32±0.31	1.43±0.22
	(12.8±3.2)	(11.2±0.2)	(12.0±2.6)	10.1±1.3)	(10.3±1.6)	(11.8±1.9)
Lead+	0.18±0.08	0.13±0.01	0.21±0.11	0.28±0.18 *	0.15±0.01	0.14±0.03
	(1.40±0.60)	(1.04±0.12)	(1.70±0.82)	(2.21±1.44)	(1.19±0.14)	(1.15±0.25)
Mercury	0.007±0.001	0.007±0.001	0.006±0.001	0.006±0.001	0.006±0.001	0.006±0.0004
	(0.054±0.004)	(0.055±0.002)	(0.052±0.004)	(0.047 0.006)	(0.049±0.005)	(0.051±0.004)
Nickel+	0.48±0.09	0.48±0.06	0.67±0.16	0.49±0.12	0.46±0.07	0.57±0.17
	(3.70±0.54)	(3.94±0.61)	(5.43±1.40)	(3.88±0.96)	(3.62±0.53)	(4.65±1.39)
Chlordane+	<0.001±0.00	<0.001±0.0	0.002±0.001	0.002±0.001	0.002±0.001	0.001±0.0004
	(ND)	<0.009±0.0	0.012±0.003	0.014±0.006	0.015±0.009	0.011±0.002
4,4'-DDD+	<0.001±0.0	<0.001±0.0	0.002±0.001*	<0.001±0.0	<0.001±0.0	<0.001±0.0
	(ND)	(ND)	0.016±0.005	(ND)	(ND)	0.009±0.001
4,4'-DDE+	<0.001±0.0	<0.001±0.0	0.001±0.0	0.001±0.001 *	0.001±0.0004	<0.001±0.0
	<0.010±0.0	<0.010±0.0	<0.010±0.0	<0.013±0.004	0.010±0.001	(ND)
Dieldrin+	<0.001±0.0	<0.001±0.0	<0.001±0.0	<0.001±0.0	0.001±0.001*	<0.001±0.0
	(ND)	(ND)	0.010±0.002	0.008±0.0004	0.011±0.004	(ND)
Endosulfan I+	<0.001±0.0	<0.001±0.0	<0.001±0.0	<0.001±0.0	<0.001±0.0	<0.001±0.0
	(ND)	(ND)	(ND)	<0.012±0.0	(ND)	(ND)
Heptachlor+ epoxide	<0.001±0.0	<0.001±0.0	<0.001±0.0	<0.001±0.0004	<0.001±0.0	<0.001±0.0
	(ND)	(ND)	(ND)	0.011±0.002	(ND)	(ND)

\+ Parameters with concentrations greater in the test sediments than in the control.

* significantly greater than control, as determined by Dunnett's procedure.

(ND) not detected

TABLE 4.F (CONTINUED)
RESULTS OF BIOACCUMULATION STUDY FOR CLAMS SURVIVING 10 DAY SEDIMENT EXPOSURE
ALCATRAZ DISPOSAL AREA
(Results expressed as wet weight with dry weight in parentheses below)

Parameter	Mean Tissue Concentration ± S.D. (ug/g of tissue)					
	Control	Reference	A200	B200	C200	D200
Acenapthene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.005±0.004 (0.035±0.032) *	<0.001±0.0 (ND)	<0.001±0.001 (0.010±0.007)
Acenaphthylene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.112±0.073 (0.877±0.556) *	0.002±0.001 (0.012±0.009)	0.003±0.002 (0.025±0.019)
Antracene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.032±0.025 (0.249±0.187) *	0.001±0.0 (ND)	0.001±0.004 (0.008±0.003)
Benzo(a) anthracene+	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.005±0.002 (0.035±0.015)	<0.004±0.0 (ND)	<0.004±0.0 (ND)
Benzo(b) fluoranthene	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (<0.034±0.0)	<0.004±0.0 (ND)	<0.004±0.0 (ND)
Benzo(k) fluoranthene	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (<0.036±0.0)	<0.004±0.0 (ND)	<0.004±0.0 (ND)
Chrysene+	<0.002±0.0 (ND)	<0.002±0.0 (ND)	<0.002±0.0 (ND)	0.006±0.006 (0.045±0.046)	0.002±0.0 (ND)	0.002±0.0 (ND)
Fluoranthene+	<0.002+0.0 (ND)	<0.002+0.0 (ND)	0.002±0.0004 (0.017±0.006)	0.150±0.082 (1.179±0.616) *	0.003±0.003 (0.023±0.021)	0.009±0.007 (0.075±0.058)
Fluorene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.01 (ND)	0.024±0.017 (0.189±0.131) *	0.001±0.0 (ND)	0.002±0.001 (0.016±0.010)
Naphthalene+	0.006±0.003 (0.036±0.011)	0.004±0.001 (0.032±0.008)	<0.004±0.0 (ND)	0.033±0.029 (0.254±0.224) *	0.006±0.004 (0.047±0.032)	0.007±0.003 (0.060±0.027)
Phenanthrene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.001 (0.011±0.009)	0.412±0.227* (3.14±1.79)	0.003±0.004 (0.02±0.029)	0.009±0.008 (0.074±0.068)
Pyrene+	<0.002±0.0 (ND)	<0.002±0.0 (ND)	0.003±0.001 (0.019±0.011)	0.149±0.078 (1.69±0.588) *	0.004±0.004 (0.025±0.025)	0.011±0.008 (0.089±0.070)

\+ Parameters with concentrations greater in the test sediments than in the control.
* significantly greater than control, as determined by Dunnett's procedure.
(ND) *not detected*

TABLE 4.G

RESULTS OF BIOACCUMULATION STUDY FOR WORMS SURVIVING 10 DAY SEDIMENT EXPOSURE

ALCATRAZ DISPOSAL AREA

(Results expressed as wet weight with dry weight in parentheses below)

Parameter	Mean Tissue Concentration ± S.D. (ug/g of tissue) Control	Reference	A200	B200	C200	D200
Cadmium+	0.019±0.004 (0.11±0.03)	0.016±0.0002 (0.10±0.02)	0.018±0.014 (0.11±0.09)	0.017±0.002 (0.11±0.01)	0.019±0.003 (0.13±0.02)	0.018±0.002 (0.10±0.04)
Copper	1.23±0.29 (7.55±1.85)	1.04±0.06 (6.60±0.28)	0.89±0.08 (5.50±0.51)	0.73±0.11 (4.92±0.62)	0.83±0.09 (5.65±0.53)	0.99±0.12 (6.06±0.73)
Lead+	0.015±0.009 (0.09±0.06)	0.024±0.008 (0.15±0.05)	0.050±0.021* (0.31±0.13)	0.042±0.006* (0.28±0.03)	0.036±0.007* (0.24±0.05)	0.067±0.005* (0.41±0.05)
Mercury+	0.004±0.0 (0.025±0.003)	0.004±0.001 (0.023±0.004)	0.004±0.0004 (0.027±0.002)	0.004±0.001 (0.028 0.006)	0.004±0.0 (0.027±0.001)	0.005±0.001 (0.029±0.005)
Nickel+	0.28±0.14 (1.71±0.77)	0.36±0.06 (2.264±0.33)	0.48±0.10 * (3.05±0.60)	0.25±0.07 (1.86±0.26)	0.33±0.06 (2.25±0.41)	0.32±0.09 (1.94±0.57)
Aldrin	0.001±0.0004 (0.007±0.002)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.0 (<0.010±0.0)	<0.001±0.0 (ND)	<0.001±0.0 (ND)
Chlordane+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.0 (ND)	0.001±0.0 (0.008±0.001)	<0.001±0.0 (ND)	0.001±0.0004 (0.008±0.004)
4,4'-DDD+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.005±0.002 * (0.028±0.015)	0.001±0.0 (0.007±0.0)	<0.001±0.0 (ND)	<0.001±0.0 (ND)
4,4'-DDE+	0.001±0.0 (0.007±0.0)	0.002±0.001 (0.010±0.002)	0.002±0.0004 * (0.011±0.002)	0.001±0.001 (0.008±0.004)	0.001±0.0 (0.007±0.0004)	0.001±0.0004 (0.008±0.003)
Dieldrin+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.0004 * (0.008±0.001)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)
Heptachlor	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)

+ Parameters with concentrations greater in the test sediments than in the control.

* significantly greater than control, as determined by Dunnett's procedure.

(ND) not detected

Data analysis, as presented in paragraph c. above, apply for slurry disposal of material from Oakland Harbor at the Alcatraz site (The disposal methodology was described in the FEIS for Oakland Inner Harbor.). As a result of the slurry disposal requirement, turbidity levels during disposal are expected to be greater than expected for unrestricted disposal at Alcatraz. A larger percentage of suspended material would move from the site.

e. Direct Ocean Disposal.

(1) Site 1M. The water quality tests and analysis performed on material from Oakland Harbor as described in paragraph c. also apply for disposal at Site 1M. No unacceptable adverse environmental effect from the disposal of dredged sediments from Oakland Harbor are expected at Site 1M, as the material from the Schnitzer Steel Company and the former Todd Shipyard areas will be isolated from the marine environment by capping with a sufficient amount of acceptable material.

(2) Site B1. The water quality tests and analysis performed on material from Oakland Harbor as described in paragraph c. also apply for disposal at Site B1. No unacceptable adverse environmental effect from the disposal of dredged sediment from Oakland Harbor at Site B1, as the material from Schnitzer Steel and the former Todd Shipyard would be isolated from the aquatic environment by capping procedure. It is noted, however, that the thickness of the cap will be less than at Site 1M with the same amount of acceptable material since the material to cover would tend to spread further at the deeper site. As discussed in section 3.16 of the General Design Memorandum, the cap at Site B1 is expected to effectively isolate the unacceptable material from the aquatic environment.

4.3 BIOLOGICAL IMPACTS

4.3.1 Benthos

a. Present Condition.

(1) San Francisco Bay. The Alcatraz disposal site has been impacted from perennial disposal. Bottom conditions are subject to change from the deposition on the bottom and erosion and movement of material from the bottom. This constant alteration of substrate subjects the bottom at the site to highly varying benthic community structure. As indicated in section 3.3.5.2, reconnaissance level surveys at the site show that species composition and abundance varies greatly (Liu, 1975; Kinnetics, 1985).

(2) Ocean Waters Offshore San Francisco. In contrast to the Alcatraz disposal site, the bottom at the ocean disposal site has not been disturbed. The ocean bottom at the site supports a variety of invertebrate and fish communities commonly

found in fine sand substrate. Population densities of demersal fish have been correlated to benthic invertebrate abundance. Community stability is governed by oceanographic conditions, suitability of specific substrate qualities and successful development and growth. Infaunal communities on the shelf have significant seasonal and year-to-year variations in community composition.

b. No-Action. No change in bottom conditions at either the Alcatraz disposal site or at the ocean disposal site would occur as a result of this no-action.

c. Unrestricted Disposal at Alcatraz. Historic use of the Alcatraz disposal site has been described. The consequences of this action at the Alcatraz site include burial of existing bottom and a spread of material along the base of the accumulated material. The physical changes to bottom topography have been discussed under physical impacts. Burial at the Alcatraz site is not significant to the benthic organisms found there as variation of species composition results from continued disposal. The bottom as was sampled during 1973 and 1974 indicated that biological communities were characteristic of shifting substrate and that fluctuation in the community structure was obvious (Liu 1975). These trends were generally confirmed in the 1984 and 1985 reconnaissance surveys (Kinnetics, 1985). In addition to the frequency of disposal activities at the Alcatraz site, the tidal influences at the site have contributed to the dynamic physical changes there. The variety of sediment types composing the substrate would make establishment of a stable population difficult. If disposal activities cease, recolonization would be probable with recruitment of a diverse group of opportunistic bottom species. However, disposal activities are frequent and changes to benthos at the site have been the norm.

The amount of material to be disposed during the construction season is expected to impact the already disturbed bottom communities adjacent to the Alcatraz site. A bottom area approximately 610 m (2,000 ft) outside the perimeter of the existing 610 m (2,000 ft) diameter (surface) disposal site would be affected. Because of the present accumulation of material, this bottom area has already been disturbed. With the amount of consolidated sediments from Oakland Harbor, material accumulation is expected to be localized in the area already mounded.

d. Pre-Dredging Alcatraz with Ocean Disposal. Accumulation of material at the Alcatraz site is expected with disposal of material from the Oakland project. However, accumulation would be minimized by slurry disposal. The potential for dispersion, resuspension and transport from the Alcatraz site will be optimized. Bottom impacts at Alcatraz will occur, but these effects have been occurring throughout its use. The disturbances from disposal of material would have minimal biological effect at the Alcatraz site.

Even with the dredging at the Alcatraz site, the biological effects from the excavation of material and removal of benthic organisms at the Alcatraz site will not be significant as other maintenance projects will be disposed there.

With this alternative, bottom impacts are also expected at the ocean disposal site. The material from the Alcatraz site will be a variety of sands and consolidated clays/silts. This will be a change to the fine sand bottom found at the Site 1M. The amount of material from the Alcatraz site to be placed there is about forty percent of the amount from Oakland Harbor (See discussion in e. below). Burial of the existing non-mobile bottom community is expected. The bottom would be replaced with a different substrate and would be available for colonization by opportunistic species after disposal. Other species may be attracted by the introduction of new food source. Diversification of the offshore bottom habitat may occur. Conversely, the preferred environment of existing, established bottom communities would be eliminated. However, the area eliminated represents a small portion of the available habitat type in the region.

e. Direct Ocean Disposal.

(1) Site 1M. Disposal of dredged material from the Oakland Harbor project totals 5.4 million m^3 (7.0 million yd^3) and is expected to establish a bottom substrate at the ocean disposal site that does not resemble the existing bottom sediments. Disposal impacts would include smothering and burial of the existing sedentary infaunal communities. Benthic organisms that can escape burial or smothering would escape to adjacent areas. Some established benthic organisms at Site 1M may be eliminated due to inability to adapt to the changed conditions. Material is expected to remain in place over several years. Abundance and diversity of existing benthic communities would likely be reduced. Marine benthic organisms that can withstand changing conditions would be more suited for the area after disposal activities occur. Obviously, species that can recover after impact would re-establish; those that can not would be eliminated. This would alter the infauna composition at the area affected by material deposition. The newly deposited material will recruit species which can colonize or establish in the fine-grained sediment environment. In addition, opportunistic marine benthic species which are not necessarily the dominant species present at the site before disposal may become dominant after disposal occurs.

Adult crabs occupying the sandy environment would be displaced to other suitable bottom areas. Recovery of the site would depend upon the life histories of the opportunistic species that may occupy the substrate and the frequency of disruption by disposal.

(2) Site B1. Disposal impacts that are expected to occur with this alternative are identical to those described for Site 1M. In the deeper waters of Site B1, however, a larger bottom area would be covered by the newly deposited material from the Oakland project. The bottom area to be affected is approximately four times larger, estimated to be 19 km^2 (5 nmi^2).

Adult crabs also occupy the environment at Site B1 and would be affected during those seasons where the population can expand to suitable bottom areas from closer to shore.

4.3.2. Pelagic Impacts.

a. Present Conditions.

(1) San Francisco Bay. The water column environment in the vicinity of the Alcatraz site is subject to physical and hydrodynamic changes due to its proximity to the Golden Gate and utility as a dredged material disposal site. Commercial ship traffic and a plethora of recreation craft also frequent the area of the disposal site. Finfish and other marine organisms typically found in the area are, for the most part, transient in nature. As indicated in section 3.3.5.1, a number of commercially and recreationally important fish species may be found in the vicinity of the Alcatraz site.

(2) Ocean Waters Offshore San Francisco. The oceanic waters offshore of San Francisco are also well populated by fish, with both commercially and recreationally important species. In general, the continental shelf region along the west coast is highly productive. The closer to shore along the shelf is also considered to be more productive than in deeper waters. For example, the Dungeness crab resource is distributed over the continental shelf typically in depths up to 90 (50 fm). Breeding can also occur in depths greater than 90 m (50 fm), as brooding female crabs have been found at areas with such depths. Their presence at these depths in October 1986 (Kinnetics, 1987a) appears to be the result of an expanded year-class (Tasto, personal communication, 1987), since spawning crabs are typically known to occur in shallower coastal waters. This points out the spatial and temporal variability in living marine resources that may occur in the oceanic environment.

b. No-Action. No change in the open water environments at either the Alcatraz, Site 1M or Site B1 would occur.

c. Unrestricted Disposal at Alcatraz. The amount of dredging to be accomplished has been reduced from the authorized 7.0 million m^3 (9.1 million yd^3) to 5.4 million m^3 (7.0 million yd^3) for design efficiency. This reduction would also lessen the amount of material to be disposed. If disposal of consolidated material is allowed, material dispersion from the Alcatraz site would follow based on site characteristics; however, it would be less than with slurry disposal. The extent of consolidated sediments and/or sand would determine the amount of material that could be readily dispersed in the current regime at the Alcatraz site. It was discussed previously that waters of the Bay have a relatively high suspended sediment load (seasonally high). This plan would have a lesser degree of effects on the open water pelagic environment compared to the Alcatraz with pre-dredging alternative since site disturbance would only occur during disposal. Suspended sediment disturbances at the Alcatraz site have been continual with dredged material disposal permitted at the site. However, potential material accumulation would alter the open water environment at the Alcatraz site.

d. Pre-Dredging Alcatraz with Ocean Disposal. The Oakland Harbor channels, while frequented by a variety of fish species, contains no significant fishery since they are relatively disturbed waterways for transiting commercial vessels and recreation craft. Four major potential impact categories at both the Alcatraz disposal site and at the ocean site have been identified: (1) increased turbidity, (2) habitat loss, (3) potential cumulative contamination of marine resources, and (4) conflict with fisheries utilization.

The scheduled construction during the year is expected to have minimal effect on finfish species occupying open waters in the vicinity of the Alcatraz site and, in general, of the Bay as the portion of resuspended sediments would become a part of the sediment dynamics of the system. Disposal activity will increase at the Alcatraz site that will cause a prolonged series of discrete discharges at the Alcatraz site. Fish would tend to avoid the disturbed area. In order to minimize the amount of material to be taken to an ocean site from Alcatraz, slurrying would be required for the material from Oakland to optimize dispersion. It is understood that the distribution of fish is influenced by physical parameters, such as freshwater flow, salinity, temperature, and suspended sediment. The Alcatraz disposal site is not conducive for fish during disposal when suspended sediment levels are elevated. Fish would move to areas where more tolerable conditions exist. In any given year, fishing may be active in certain areas and less active elsewhere. For example, striped bass fishing in 1987 was not considered good in central bay. However, in San Pablo and Suisun Bays close to certain food source, striped bass fishing was relatively active. Factors that may influence the variation in the distribution of striped bass in such a manner include salinity (which is influenced by freshwater outflow from the Delta) and the presence of nutrient enriched waters in the vicinity of the Delta. It is also noteworthy that later in the same season, the commercial harvesting effort for herring roe in the Bay was reported as "excellent" (Thurman, 1988).

(1) Turbidity. The turbidity resulting from the dredging and disposal activity is temporal and local. The Alcatraz site, though a known popular fishing locale, is used frequently during the year for the majority of dredging/disposal needs. The relationship between turbidity and angling success can be linked to the ability of fish to sense bait (e.g., dimming the visual or olfactory cues of fish to find bait) or to the avoidance by species of a disturbed area which may be fished. Finfish would be still be available to be caught, but would not be caught in the vicinity of the disposal site. Fish resources are not directly lost by the temporal nature of turbidity or suspended sediments during disposal at the Alcatraz site.

(2) Suspended Sediment. The disposal of dredged sediments in slurry at Alcatraz from Oakland Harbor would have the greatest suspended sediment component of the disposal plans. The amount and the slurry requirement would optimize the dispersion, resuspension and erosion of material at the Alcatraz site. Although the dispersion of sediments is optimized, the disposal activity would consist of frequent discrete dumps which would lessen the duration of elevated suspended sediment concentrations at the site. The high currents at the site would facilitate suspended sediment movement.

The concern of suffocation (e.g., clogged respiratory organs) from high suspended sediments levels relates to a prolonged condition where fish are not able to escape massive dosage or are not acclimated to elevated suspended sediment levels. For the duration in which the Alcatraz site has been used for dredged material disposal, there has been no evidence of any fish kills during disposal. No direct mortalities of fish as a result of increased suspended sediments from disposal at the Alcatraz site have been documented.

e. Direct Ocean Disposal.

(1) Site 1M. The use of Site 1M will result in impacts to the bottom and to fishing activity at the site. Impacts to pelagic species would be minimal due to discrete dumping and the material type that would tend to fall quickly through the water column within the disposal area. Although disposal is presently scheduled for a 16-month period, water column impacts would be small since the material to be disposed would be fine-grained clays and a mixture of silts, clays and sand that would tend to fall in mass to the bottom. Increased turbidity caused by dispersion of sediments in the water column are expected to be localized and rapidly returned to ambient conditions. Disposal as presently scheduled will coincide with the likely presence of larval stages of Dungeness crab at the site during December through April.

Disposal of dredged material will not eliminate marine resources in the impacted area. Fish distributions extend over the entire continental shelf area. Although principal coastal fishing grounds do exist closer to the Golden Gate, numerous fish species occupy the region between the coastline of California and deep ocean with depths greater than 100 fathoms. The area to be affected by disposal is small when compared to the breadth of the resource base itself, from which recruitment of the resource can be replenished. For example, the value of marine resources within the Marine Sanctuary has been established by protection from human activities other than fishing. The Gulf of the Farallones National Marine Sanctuary, which has been designated to preserve marine resources, occupies 948 square nautical miles of offshore area. A few of the marine resources within the sanctuary includes salmonid species, northern anchovy, rockfish and flatfish stocks, market squid, Pacific mackerel, Pacific hake, and dungeness crab. In comparison, the area of the disposal site at Site 1M is less than two square nautical miles, or approximately 0.1 percent, of the sanctuary area and considerably less when compared to the intrinsic value of the sanctuary habitats or the larger area of the shelf in the region. Impact to fisheries would be related to the area that could be fished during the disposal activity. Productivity of the ocean fisheries would not be significantly affected as many species have wide distribution throughout the continental shelf.

With the exception of the initial bottom habitat lost at the ocean site, no significant loss in the fishery resource is anticipated from the resuspension of material at the ocean disposal site. It is expected that fish will initially be deterred from the area. The presence of nutrients in association with dredged material may attract finfish to the extent of their individual tolerance to elevated suspended sediments in the water column. Use of the open ocean site would result in changes to the bottom. Existing utilization by pelagic species would be altered. Since benthic species normally associated with the existing substrate serving as food sources would be displaced. Site 1M is not located in a critical habitat area. If the area were crucial to a particular species or was a special habitat type, such consideration would have been given to include it within the marine sanctuary.

Use of the sites by the two endangered whales would occur only during their migration either to the north or to the south. The humpback whale migration occurs between September and April and the gray whale migration occurs between October and June. Since the migratory corridor offshore of San Francisco is broad, the areal significance of the proposed disposal sites is negligible. Any disposal could be easily avoided by the mobile whales. Use of areas for purposes of dredged material disposal is not expected to result in adverse effects to the species.

(2) Site B1. Site B1 will experience similar impacts to the bottom and to fishing activity at the site. Disposal as presently scheduled will coincide with the likely presence of larval stages of Dungeness crab at the site to a lesser degree than at Site 1M.

As described above, since fish distributions extend over the entire continental shelf area, disposal will not eliminate marine resources from the site. Since Site B1 is situated further offshore than Site 1M, the intensity of fishing activity may be smaller. However, numerous demersal or bottom fish species occupy the coastal region offshore of the coast with depths greater than 183 m (100 fm).

The area to be affected by disposal is much larger when compared to the area of Site 1M, by approximately four times. As also previously described, the breadth of the resource base itself is quite large and the resource can be replenished. In comparison to the National Marine Sanctuary, the area of the disposal site at Site 1M is less than six square nautical miles, or approximately 0.6 percent, of the sanctuary area and considerably less when compared to the larger area of the shelf in the region. Since the area that could be fished at Site B1 is relatively large, but its productivity may be relatively small for certain species, the impact during the disposal activity would not be unacceptable.

As with Site 1M, the initial bottom habitat lost at the ocean site would be unavoidable. However, no significant loss in the fishery resource is anticipated from the resuspension of material at the ocean disposal site. Use of the open ocean site would result in changes to the bottom. Pelagic as well as benthic species would be altered. The Site B1 is also not located in a critical habitat area.

Use of the site by the two endangered whales would occur only during their migration either to the north or to the south. The humpback whale migration occurs between September and April and the gray whale migration occurs between October and June. Since the migratory corridor offshore of San Francisco is broad, the areal significance of the proposed disposal sites is negligible. Anv disposal could be easily avoided by the mobile whales. Use of areas for purposes of dredged material disposal is not expected to result in adverse effects to the species.

4.4 SOCIO-ECONOMIC IMPACTS

4.4.1 Navigation Safety.

a. Present Condition. The Oakland Harbor is presently maintained at a depth of -35 ft MLLW. The new vessels scheduled to call at the Oakland Harbor terminal facilities will range from the third generation containerships known as "Panamax" (overall length of 869 m [950 ft] with a loaded draft of 12 m [38 ft]) which are presently in service to fourth generation containerships, known as "C-10's" (overall length of 823 to 960 m [900 to 1,050 ft] with a loaded draft of up to 13 m [41 ft]). Presently ship delays have become common as third generation containerships have increased in size and draft. Increasingly, these ships need to wait for high tides in order to achieve sufficient depths for safe navigation to the Oakland Harbor terminal facilities. With the introduction of the fourth generation containerships, these delays threaten to cause waits of up to nine hours for high tide navigation.

The Coast Guard's VTS including the OVMRS operates on the basis that all dredge vessel operators would be licensed masters, thoroughly familiar with dredged material disposal activities in accordance with the Navigational Rules, International-Inland, especially Rule 10 which specifies behavior for operating vessels within or in proximity to Traffic Separation Schemes. The conduct of mariners is also governed by agreements between communicating vessels, good judgment, and good seamanship. Each vessel, including towed dredge vessels must report its type, name, position, route, speed, and estimated time of arrival at various points within the tracking net.

According to the Coast Guard, both self-propelled and non-self propelled (towed) vessels would be required to transit from the Golden Gate Bridge to the end of the Main Ship Channel after which point they could transit directly to the ocean disposal site. Once outside the Main Ship Channel, dredge vessels would not be required to transit within the traffic separation scheme, if it was not directly in route to the disposal site. When transiting within the traffic lanes, dredge vessels must exit with the least amount of interruption to other traffic and must cross traffic lanes at a right angle. Dredge vessels could also transit within the separation lane between the traffic lanes. The U.S. Navy has indicated they do not want dredge vessels transiting over the submerged submarine operating areas for reasons of safety.

b. No Action. The commercial shipping industry is highly competitive and is very sensitive to operational efficiencies. The Oakland Harbor and more broadly, the San Francisco Bay Region's competitive position in relation to other Pacific coast ports will be adversely affected if adequate navigational channel depth is not maintained.

c. Unrestricted At Alcatraz. Navigation improvements to the Oakland Harbor would result in an estimated increase of 3,000 dredge (both self-propelled and non-self propelled) vessel round trips to the Alcatraz disposal site during dredging of an estimated 7,000,000 yd^3. These dredge vessel trips would occur over an estimated 10.5 months for an average of less than 10 vessel round trips per day. In 1985, there were 14,388 vessel round trips from Oakland Harbor. Deepening of the Oakland Harbor channels would temporarily increase Oakland Harbor vessel round trip traffic by about 21 percent.

Unrestricted disposal at Alcatraz would at some point reduce channel depths in the immediate area. In order to maintain a safe navigable channel through the Alcatraz disposal site area either dredging of the Alcatraz site or routing vessel traffic around the area would be needed.

d. Alcatraz With Pre-Dredging. In addition to the impacts discussed in 4.4.1.a., pre-dredging Alcatraz of 2,700,000 yd^3. with disposal in the ocean would result in a temporary dredge vessel round trip increase ranging from about 400 to 1,060, depending on the size of dump scow and whether dump scows are towed singly or in tandem. In 1985, vessel inbound/outbound trips through the Golden Gate numbered 9,337. The temporary increase (over an estimated dredging period of seven to eight months or 13 to 35 round trips per day) in dredge vessel round trip traffic to the ocean would range from 4 to 11 percent.

Currently, the VTS monitors dredged material disposal activity at the Alcatraz site as a courtesy to the USACE. If the USACE requested that the Coast Guard monitor every disposal of dredged material at an ocean site, then a more formal arrangement between the USACE and Coast Guard would be required. The Coast Guard has indicated informally that some arrangement could be reached. The VTS would have the ability to monitor ocean disposal by radar. This temporary dredge vessel increase should not interfere with existing traffic patterns or activity.

e. Direct Ocean Disposal

(1) Site 1M. Direct ocean disposal of 7,000,000 yd^3 of dredged material from Oakland Harbor would result in a temporary dredge vessel round trip increase ranging from 1,030 to 2,745 depending upon the size dump scows used and whether single or tandem tows are used. This represents a temporary increase over 1985 Golden Gate inbound/outbound vessel traffic of from 11 to 29 percent. Site 1M would not pose a navigational hazard to other maritime traffic operating within the traffic separation scheme lanes.

(2) Site B1. Everything stated in Section 4.4.1.e.(1) applies to direct ocean disposal at B1 in addition to the fact that the dredge vessel would need to circumvent the Navy's submerged submarine operating area.

4.4.2 Commercial and Sport Fisheries.

a. Present Condition. The local commercial and recreational fishing industries are highly variable both in the Bay and in the ocean. Natural seasonal and year-to-year conditions would affect the numerous fishery resources available both in the Bay and in offshore waters. Meteorological influences and associated oceanic processes exert severe consequences on the marine environment. For example, the fish population distribution may shift from a typical geographical range northward or southward due to increased water temperature or current flow. In addition, living mari- e resources are influenced by man-related activities, including effluent discharges, disturbances from recreational cruises or maritime traffic, and loss of habitat. The presence of warm water currents from the south, commonly referred to El Nino can also alter the fishing patterns and species caught. Such variation and wide distribution of fish resources along the continental shelf are factors that should be considered in the impact assessment.

b. No Action. Without the project, commercial and recreational fishing would remain subject to the same fluctuations as is characteristic of the resources; however, no new potential impacts on the commercial and sport fishing resources would be incurred.

c. Unrestricted at Alcatraz. The increased accumulation of material in the vicinity of the Alcatraz site and at the site from the deposition of material from Oakland Harbor would affect bottom areas at the disposal site. The use of the Alcatraz site for disposal of dredged material has been on-going for a period of years (e.g., formally since 1973). Disturbances to fishing in the vicinity of the Alcatraz site has occurred previously. As typically occurs due to perennial disposal there, certain marine species frequenting the vicinity of the site would be less accustomed to the fine grained substrate and would be diverted to other areas. The increased suspended sediment levels resulting from this alternative would change the fishing characteristics at the disposal site.

d. Pre-dredging at Alcatraz. Suspended sediment concentrations would be increased at the Alcatraz site due to the dredging. The requirement for slurried material would also affect suspended sediment levels in the water column, though the duration would be short and effects temporary at the disposal site. Fishing at the vicinity of the site would be limited during the period of dredging and disposal as fish would be discouraged from entering the area of the site.

e. Direct to Ocean:

(1) Site 1M. Although direct ocean disposal would eliminate disturbances at the Alcatraz site, fishing activities would be diverted from the given location at the ocean site because of the disposal activities. Fishing that may occur at Site 1M would be limited during disposal operations. Since the disposal area represents a very small increment of the total habitat and fishery resource available, the disposal operation would have only short-term and temporary impact on the commercial and sport fishing industries.

(2) Site B1. The impact from disposal at Site B1 would be very similar to the impact on Site 1M. The two proposed sites are in close proximity in terms of the fishery habitat and essentially provide the same fishery resources. The direct impact on B1 would only be greater than that on 1M in terms of the bottom area covered by disposed material. This would result from the greater depth at B1 and the resultant greater dispersal of the material as it moves downward through the water column. As with 1M, the disposal operation would have only short-term and temporary impact on the commercial and sport fishing industries.

4.5 CUMULATIVE IMPACTS

4.5.1 Physical Effects.

a. Present Condition. Roughly three million cubic yards of dredged sediments are discharged at the Alcatraz site from current Federal (civil and military) maintenance dredging annually. Permitted dredging/disposal activities account for at least one million cubic yards, but not greater than two million cubic yards annually.

b. No-Action. Recent completion of several navigation improvement projects in San Francisco Bay included disposal at the Alcatraz site. The Phase 2, John F. Baldwin Ship Channel project resulted in dredging about 4 to 5 million cubic yards and disposal at the Alcatraz site over a two-year period. The Port of San Francisco Container Modernization project involved the dredging of one million cubic yards with disposal at the Alcatraz site during September-November 1987. Permitted activities will continue to be discharged at the in-Bay disposal sites. Several new major dredging projects are scheduled to begin construction over the next five years:

(1) U.S.S. Missouri Homeporting. The homeporting of the U.S.S. Missouri at Hunter's Point in San Francisco requires the dredging of approximately one million cubic yards. Disposal of the material has been proposed for the Alcatraz disposal site. Funding for the dredging project at Hunter's Point by Congress is to be reviewed this year in order that construction can begin in 1989. Prior to construction, however, the implementation of the project must comply with regulatory proceedings. Since the regulatory process has not been initiated and alternative siting is presently under consideration, scheduled construction may be delayed.

(2) Richmond Harbor Improvements. Navigation improvements to increase channel depth from 35 feet, MLLW to 42 feet, MLLW and to widen the channel as appropriate for the Richmond Inner Harbor channel have been authorized and construction is presently scheduled to also begin in 1989. Initial dredging of approximately one-and-one-half million cubic yards over two years is proposed.

This initial dredging represents the first of two phases of channel deepening and will bring the authorized channel depth to 38 feet, MLLW. The second phase of dredging approximately 2.4 million cubic yards is presently unscheduled. The local sponsor has requested this phased construction as a result of the local cost-sharing requirements of the Water Resources Development Act of 1986. the preliminary analysis of disposal options indicate that ocean disposal of the material may likely be recommended for the Richmond project based on data presently available.

(3) Authorized Phase 3, John F. Baldwin Ship Channel Project. Phase 3 of the authorized John F. Baldwin Ship Channel project (from the West Richmond Channel, Pinole Shoal Channel, and Carquinez Straits to Avon) is also being studied. Construction could begin within approximately five years. Disposal alternatives presently to be considered include ocean disposal, the Alcatraz disposal site, and land disposal.

(4) Summary. The scheduling of the potential new work projects as described above is tenuous. In addition, the evaluation of alternative disposal plans has not been completed for any of the new work projects. Thus, no specific disposal alternatives has been identified. The future implementation of the new dredging projects should be viewed based on a number of factors including availability of funding appropriations, cost-sharing responsibilities, and completion of environmental reviews such as being conducted for the Oakland project.

Future New Projects (Preliminary quantity estimates and schedules)

	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
Hunter's Point			0.9					
Richmond Harbor				1.3				
John F. Baldwin 3				1.3	1.3	1.3	1.3	1.3
TOTAL			0.9	2.6	1.3	1.3	1.3	1.3

c. Unrestricted at Alcatraz. The dredging operation for the Oakland Inner Harbor Channels will ensure the disruption of consolidated sediments, and, in turn, will facilitate dispersion. Other studies are on-going in conjunction with long-term management of the Alcatraz disposal area.

The Oakland Harbor project will increase the amount of material disposed at the Alcatraz site. With the construction start scheduled to begin in 1988, the amount of material to be disposed at the site represents about a 30 percent increase above the annual average quantity. The maximum increase in the amount of material to be disposed at Alcatraz would occur in 1989 and would double the average level. A forecasted schedule of the Oakland Harbor project assuming no scheduling or tidal constraints with disposal at Alcatraz is shown below:

	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
Current*	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Oakland Harbor		1.6	4.4	1.1	0.1	0.1	0.1	0.1
TOTAL	5.0	6.6	9.4	6.1	5.1	5.1	5.1	5.1

*Includes O & M and permits

Over the three year period of construction for the Oakland project, the Bay sediment regime is capable of assimilating these quantities. Material movement is not limited to redistribution within the Bay. Sediments in suspension do move out of the Golden Gate and although the actual interplay of sediment and tidal current influences are not fully understood, there is a net outflow of sediments from the Bay system of approximately 3 to 5 million cubic yards depending on the reference. It should be noted that the disposal activity does not add sediments to the reservoir of sediments within the system, but recycles and distributes them, and conceptually allows for the movement of some fraction of dredged sediments to the ocean.

Although the average annual amount of material disposed at the Alcatraz site is approximately five million cubic yards, the total quantity of material to be disposed in a given year is relatively variable. The impact to the annual disposal burden at the Alcatraz site that may result from the new projects would be predicated upon the start of project construction. If all three projects were dredged on schedule and Alcatraz was selected as the appropriate disposal site for each of the projects, the annual amount of material to be disposed would increase at least 25 percent for several consecutive years and as much as 50 percent in one year. This condition, however, is not likely to occur due to the uncertainties associated with the individual projects and potential availability of alternative disposal sites other than Alcatraz.

d. Pre-Dredging Alcatraz with Ocean Disposal. Concerns were expressed in comments on the Draft Supplemental EIS on the material dispersion characteristics of the slurry requirement, even though the Alcatraz site was intended to be a dispersive disposal site at the outset of its designated use. The following discussion addresses the major concerns related to potential cumulative effects of the dispersion of material from disposal at the Alcatraz disposal site in conjunction with the Oakland project.

(1) Physical Impacts to Bottom. Disposal of dredged material from the Oakland project will not contribute to bathymetric changes at the disposal site. Removing the material to be retained at the site, or predredging, mitigates any potential for cumulative

bathymetric impacts. Because the Alcatraz disposal site is filling, similar dredging of retained material for future use of the site may be warranted to avoid impacts. Cumulative impacts on the substrate away from the vicinity of the disposal site are minimal.

(2) Dispersion of Suspended Particulates. Any suspended particulates remaining in the water column following disposal operations at the Alcatraz site will disperse rapidly and are expected to remain suspended for a considerable time due to the water currents existing within the Bay. Field studies have observed reductions of suspended solids to approximately 30-40 mg/l at a short distance from the disposal operation and rapidly decreasing to unmeasurable and undetectable levels as dispersion continues (SAIC, 1987; Johnson and Trawle, 1986).

As the sediment dispersed from the site may contribute up to two percent of the suspended sediment in the overall Bay sediment regime, it follows that two percent of maintenance dredging each year may be attributable to disposal activity at Alcatraz. But because the amount of suspended sediment in the Bay regime is dependent upon currents and meteorological conditions and the bank of sediment available for resuspension surpasses tens of billions of m^3, no appreciable reduction in resuspension and subsequent maintenance dredging will occur if disposal is terminated.

(3) Potential for Redeposition of Sediments onto Wetland Habitat. Habitat losses are unlikely. that may possibly be attributed to the redeposition of dredged material onto shallow areas are considered negligible. San Francisco Bay, for the most part, is a relatively shallow bay. The sediment regime and dynamics of the Bay involve the interplay and interaction of input, resuspension, recirculation, and outflow. Deposition of resuspended Bay sediments in shallow areas of the bay is a natural occurrence. Such deposition, however, can rapidly change on a windy day when wind-wave generated energy can put sediments back into suspension.

e. Direct Ocean Disposal.

(1) Site 1M. This alternative relates to the proposed use of the site specifically for the Oakland project. The proposed project would not have cumulative effects at the site, since the site has not been used. The potential for cumulative effects at the site would depend upon the need for ocean disposal of other projects. The evaluation of ocean disposal sites for other projects would be based on the availability of other appropriate disposal sites at the time of evaluation. Regulations governing ocean disposal require that historically used sites, whenever feasible, be considered. No EPA designated ocean disposal site presently exists for dredged material. The potential for cumulative effects at Site 1M would be assessed during the consideration of the site for disposal of material from the other specified project.

(2) Site B1. This alternative also involves the proposed specific use for the Oakland project. Similar potential for cumulative effects at this site as for Site 1M would apply.

4.5.2 Chemical/Biological Effects.

a. Present Condition. San Francisco Bay is subject to numerous overlays of natural, physical processes involving sediment transport, meteorological and hydrodynamic conditions and human activities including maritime trade, maintenance and new work dredging and disposal, municipal and industrial effluent, commercial and sportsfishing pressure, agricultural and urban runoff. It is within this complex that the amount of disposal activity must be viewed. The aquatic ecosystem of San Francisco Bay has long sustained the abuses of natural processes and human activities for over a hundred years. As such, many changes to the system have already occurred and will continue to occur. Wind-wave action on shallow areas and high currents in deep waters of the Bay present a hostile environment to which most established organisms have been acclimated. However, there is much debate related to the health of the Bay ecosystem. Although the well-being of the Bay has not returned to its historic prosperity, the exact cause(s) of its apparent stress has not been identified and is presently beyond scientific understanding. Pollution has been identified as a major contributing factor to the demise of the Bay's ecosystem. However, pollution is a necessary detriment in estuaries where human activities are widespread. "Acceptable" levels of specific contaminants to receiving waters are necessary and tolerated. It is reasonable to include as sources of contaminants: urban runoff, agricultural runoff, effluent discharges (both industrial and municipal), sewage spills, chemical spills, and atmospheric fallout (e.g., lead from automotive exhaust). These sources require adequate control in order to assign or define acceptable quality standards for sediments in the aquatic environment of a turbulent Bay.

b. No-Action. Much study and research level effort to examine the intricacies of the Bay system and influencing forces upon the system is yet to be undertaken. The National Estuary Program recently added San Francisco Bay as well as other estuarine systems to its study areas. EPA has been mandated to provide the lead in the San Francisco Estuary Project and has developed several committees to identify major issues. The studies emanating from this effort as well as other investigations will continue to shed light on the complex estuarine system and potential cumulative ecological effects.

c. Unrestricted at Alcatraz. The ecological effect of a large mound of material at the Alcatraz site from the deposition of the Oakland project and other projects may attract pelagic marine life by providing an additional shelter in a normally open water portion of the Bay. The bottom area affected by the mounding would be spread over a greater area than the presently specified disposal site dimensions, altering the structure of benthic communities in the vicinity of the disposal site. The natural sandy bottom would be replaced by a layering of fine-grained sediments (a combination or mixture of fine sand and clays and silts).

d. Pre-Dredging Alcatraz with Ocean Disposal. Suspended sediments are a part of the variable nature of the Bay and the continuous influence upon the ecosystem. The disposal of 5.4×10^6 m^3 (7.0×10^6 yd^3) at the Alcatraz disposal site over a two year period will increase the amount of material expected to be disposed at the Alcatraz site by approximately 30 percent in 1988 and 100 percent in 1989. Assuming that the material complies with water quality criteria, the resuspended and redistributed material resulting from disposal at the Alcatraz site will become a part of the immense sediment regime and will be insignificant to the aquatic ecosystem.

All dredged material disposed at Alcatraz will have been tested prior to disposal and will have been approved for aquatic disposal based on test results indicating that there is no reason to believe that potential unacceptable adverse ecological impacts would occur. As these low levels of suspended solids mix with existing suspended particulates from other sources within the Bay, any contaminants adsorbed to the suspended solids from disposal activities at Alcatraz will be mixed with existing suspended particulates decreasing their overall concentration in the water column and reducing their effective potential exposure to and bioaccumulation by aquatic animals present in the Bay.

The contribution of low level contaminants associated with dredged material from the Oakland Harbor project is a small one when viewed in light of the continuous influx of true source contaminants. Contaminants associated with dredged sediments that may be distributed throughout the Bay as a result of disposal from the Oakland Harbor project may be fractionally available to the array of marine organisms inhabiting the Bay. However, this is also applicable to all dredged material allowed to be disposed at the Alcatraz disposal site and for all marine sediments of the Bay that are naturally resuspended, redistributed, recirculated and redeposited in the system.

The contribution of suspended solids from disposal operations at Alcatraz has been estimated to be small in comparison to other discharges of suspended particulates into the Bay (Gunther et al., 1987). Consequently, the impact of dispersed suspended solids from disposal operations at Alcatraz would be so slight as to be undetectable.

e. Direct Ocean Disposal.

(1) Site 1M. This alternative relates to the proposed use of the site specifically for the Oakland project. The proposed project would not have cumulative effects at the site, since the site has not been used. The potential for cumulative effects at the site would depend upon the need for ocean disposal of other projects. The evaluation of ocean disposal sites for other projects would be based on the availability of other appropriate disposal

sites at the time of evaluation. Regulations governing ocean disposal require that historically used sites, whenever feasible, be considered. No EPA designated ocean disposal site presently exists for dredged material. The potential for cumulative effects at Site 1M would be assessed during the consideration of the site for disposal of material from the other specified project.

(2) Site B1. This alternative also involves the proposed specific use for the Oakland project. Similar potential for cumulative effects at this site as for Site 1M would apply.

4.5.3 Socio-economic Effects.

a. Present Condition. San Francisco Bay is a major west coast port center with the primary commercial ports of Oakland, Richmond, and San Francisco, contributing substantially to the local economy. Commercial and sport fishing are important elements of the local marine-oriented economy. The fishing industry is based on the fisheries both in the Bay and offshore in the Pacific Ocean. The fishing industry is highly variable due to natural seasonal and year-to-year natural conditions which effect the availability of the fishery resources both in the Bay and offshore.

b. No Action. Even without the project, other ports in the Bay would likely continue efforts to expand the marine economy. Unless navigation channel improvement became totally infeasible due to dredged material disposal restrictions, vessel traffic throughout the Bay could be expected to gradually increase in both size of vessel and number. The growth in the remainder of the local port economy would likely have little impact on the commercial and sport fishing industries.

c. Unrestricted at Alcatraz. The physical cumulative effects that the Oakland project may have on the Alcatraz disposal site in section 4.5.1. The continued unrestricted disposal of material from San Francisco Bay maintenance dredging projects would allow navigation in San Francisco Bay to continue for a limited time. All civilian and military marine navigation is dependent on maintenance of navigation channels. Unrestricted disposal at Alcatraz would allow all current port and marina operations to continue operating without additional cost for maintenance of marine navigation until additional measures can be implemented - the designation of either new aquatic disposal sites (in-Bay or in the ocean) or identification of an appropriate in-Bay disposal site (including the continued use of Alcatraz). With the addition of alternative disposal sites, channel availability may decrease, primarily due to the fiscal impact on smaller harbor operations (i.e., frequency of maintenance work). These smaller operators may not all afford to pay the increased cost of dredging and disposal, and would therefore have to eliminate some channel maintenance work.

Overall disposal operations would continue as under existing conditions. The increased accumulation of material in the vicinity of the Alcatraz site and at the site from the deposition of material from San Francisco Bay projects would continue to affect bottom areas at the disposal site with some resultant localized impact on the fishery resource.

d. Pre-dredging at Alcatraz. Although the increased cost, as compared to unrestricted disposal at the Alcatraz site, would not be as great as that for direct ocean disposal, the additional cost would nevertheless have some minor adverse economic impact on the Port of Oakland and the maritime economy. Overall disposal operations would also continue as under existing conditions. The increased accumulation of material in the vicinity of the Alcatraz site and at the site from the deposition of material from San Francisco Bay projects would continue to affect bottom areas at the disposal site with some resultant localized impact on the fishery resource.

The requirement for slurried material would also affect suspended sediment levels in the water column, although the duration would be short and effects temporary at the disposal site. Fishing at the vicinity of the site would be limited during the period of dredging and disposal as fish would be deterred from entering the area of the site. This would likely have localized, short-term impacts on the commercial and sport fishing industry. Sport and partyboat fishing may be compelled to temporarily seek fishing areas elsewhere within San Francisco Bay to secure resource goals.

e. Direct to Ocean.

(1) Site 1M. Since the ocean site has not been used previously, the potential for cumulative effects at the site would depend upon the need for ocean disposal of other projects. The potential for cumulative effects at Site 1M would be assessed during the consideration of the site for disposal of material from the other specified project, if Site 1M is considered to be appropriate. Since no EPA designated ocean disposal site presently exists for dredged material, regulations governing ocean disposal require that historically used sites, whenever feasible, be considered. The determination of appropriateness of use would be based on the availability of other appropriate disposal sites at the time of evaluation. The most substantial impact on navigation and navigation safety would be the fiscal impact. The substantial increased cost of ocean disposal versus in-Bay disposal would significantly impact navigation maintenance operations in the Bay. The increased cost would likely result in closure of many smaller harbors and marinas and would greatly increase berthing costs for those remaining. Some existing navigation channels would be closed while marine navigation opportunities throughout the Bay would be decreased.

Although direct ocean disposal would eliminate disturbances at the Alcatraz site, fishing activities would be temporarily diverted from the given location at the ocean site because of Oakland project disposal activities. Fishing that may occur at Site 1M would be limited during disposal operations. Since the disposal area represents a very small increment of the total habitat and fishery resource available, disposal operations of the Oakland project would have only short-term and temporary impact on the commercial and sport fishing industries.

(2) Site B1. As with disposal at Site 1M, the cumulative impact on navigation and navigation safety resulting from the increased cost of disposing all San Francisco Bay dredged material at Site B1 would be substantial. The adverse impact on in-Bay navigation would be similar to that described above for Site 1M, but would be greater in proportion to the increased cost above disposal at 1M.

The cumulative impact on the commercial and sport fishing industries would be similar to that with disposal at Site 1M. The two proposed sites are in close proximity in terms of the fishery habitat and essentially provide the same fishery resources.

4.6 SITE MANAGEMENT AND MONITORING

This section outlines the management and monitoring plan for ocean disposal based on presently available information and may be modified based on information from surveys prior to the actual use of the site or requirements of EPA for the use of the selected site.

4.6.1. Permissible Material Loadings. Since the use of the site will be for material from the Alcatraz site (or the Oakland Harbor project), an upper limit on volumes to be disposed at the site will depend on the production rate of the dredging operation. Bathymetric surveys of any buildup of material at the selected site will allow an accurate assessment of future mounding potential.

4.6.2. Disposal Methods. Presently, material is expected to be removed by clamshell dredge, transported to the site by barge, and discharged under the water surface by bottom doors while the barges area are under way within the disposal site boundaries.

4.6.3. Disposal Schedule. Scheduling of dredging and disposal operations is dependent upon weather conditions. The dredging operation is presently scheduled to last approximately 16 months.

4.6.4. Monitoring the Disposal Site. Section 228.9 of the Ocean Dumping Regulations (40 CFR) establishes that "if deemed necessary" the COE's District Engineer or the EPA's Regional Administrator may establish a monitoring program to supplement the historical site data (40 CFR 228.9). The monitoring plan will be developed by determining the appropriate monitoring parameters, the frequency of sampling, and the areal extent of the survey. The factors considered in making this determination include the frequency and volumes of disposal, the physical and chemical nature of the dredged material the dynamics of the site physical processes, and the life histories of any marine species to be monitored.

The primary purpose of the monitoring program is to determine whether disposal at the site is significantly affecting areas outside the site and to detect long term effects. Consequently, monitoring must include surveys of the site and surrounding areas, including appropriate reference sites and areas which are likely to be affected (as indicated by environmental factors, e.g., prevailing currents and sediment transport). The results of an adequate monitoring will provide early indication of potential adverse effects radiating from the site. Knowledge of the gradients facilitates predictions of future impacts on areas surrounding the disposal site and provides direction for management of future disposal activities.

4.6.5. Guidelines for the Monitoring Plan. The following sections outline monitoring requirements for the selected site. As discussed above, these monitoring requirements will be included in a management plan.

a. Potential monitoring requirements for the ocean disposal site are formulated by following general process:

(1) State purpose of monitoring

(2) Specify the objectives

(3) State hypotheses

(4) Design statistically sound sampling and monitoring activities

(5) Test hypotheses

b. Requirements of the monitoring plan for the site can be determined by examining the considerations presented below.

(1) Purpose of Monitoring. The purpose of the monitoring plan is to substantiate the hypotheses related to the anticipated effects of dredged material disposal in the open ocean. Of concern to the Oakland project is the potential for movement of contaminants into the marine environment.

(2) Specific Objectives of Monitoring. The objectives as identified by the Corps of Engineers are as follow:

(a) To measure the integrity of the material covering the potentially unsuitable sediments

(b) To determine change in concentrations of contaminants of concern in the farfield are of the disposal site

(c) To determine the movement of contaminants of concern from the material to benthic marine organisms

(3) Hypotheses.

(a) The sequence of disposal, positioning of the discharge, and ratio of cover material to potentially unsuitable sediments will adequately isolate contaminants of concern

(b) There will be no significant migration of these contaminants of concern outside of the ocean disposal site

(c) There will be no significant bioaccumulation of those contaminants of concern by marine organisms

(4) Monitoring Design.

Physical Compartment

(a) Bathymetric surveys will be conducted prior to, during, and after the construction period to determine bottom topography changes within and outside of the immediate disposal site boundaries.

(b) Bottom sampling will be conducted. The following objectives would define the sampling program:

- Material characterization of the site

- Sediment core samples will be taken in the disposal site to determine cover thickness

(c) Current meters will be installed to collect prototype current data for additional modeling inputs.

Chemical Compartment

(d) Bulk sediment analyses of core samples for contaminants of concern

(e) Water quality measurements of contaminants of concern and physical parameters

Biological Compartment

(f) Bioaccumulation analyses of appropriate marine organisms for contaminants of concern

(g) Trawling in the vicinity of the disposal site (bottom and mid-water) to determine the presence/absence of commercial species

(h) Bottom sampling for potential species diversification or introduction of nuisance species

(5) Statistical Analyses. Appropriate reference and/or control stations will be determined. The number of sampling locations, samples and frequency of appropriate testing, in conjunction with technical input, will be coordinated with EPA.

SECTION 5.0 LIST OF PREPARERS

The following people were primarily responsible for preparing the Supplemental Environmental Impact Statement:

Name	Discipline/Expertise	Experience	Role in Preparing EIS
W. C. Angeloni	Chief, Planning/Engineering Div	25 years Water Resources Planner	Report Review
R. R. Mooney	Asst. Chief, Plng/Engrng. Div	17 years Water Resources Planner	Report Review
R. A. Chisholm	Chief, Environmental Branch	17 years Water Resources Project Planning (Environmental)	Report Review
P. J. Duff	Archaeologist	4 years General Environmental Planning and Cultural Resources Studies	SEIS Manager, Report Writing
D. W. Thuet	Civil Engineer Project Manager, Oakland Harbors Deepening	7 years in Water Resources Planning/Plan Formulation, 2 years in Construction	Oakland Outer and Inner Harbor Project Manager
L. Tong	Biologist Project Manager, Disposal Management Program	15 years, Water Resources Project Planning (Environmental)	Effects on Marine Life;
B. Walls	Civil Engineer, Study Manager, Alcatraz Disposal/Sediment Transport Study/Ocean Disposal Site Designation	2 years Water Resources Construction and Planning (Environmental)	Assessment of Alcatraz and S.F. Bay Physical Environment; Assessment of Ocean Disposal Site. Appendix F
S. K. Lemlich	Environmental Engineering; Environmental Toxicology	8 years, General Environmental Planning and Water Quality Studies	Effects on Water Quality; Appendix A
T. H. Wakeman	Chief, S.F. Bay Model Branch Civil Engineer	10 years Regulatory, Dredging and Physical modeling	Sediment Transport; Effects on Water Quality Comment Summary
G. Davis	Secretary	2 years secretarial	Report Preparation
B. Opton	Env. Resources Planner/ Air Quality	15 years, Water Resources Planning	Air Quality; Commercial Fisheries.
R. Golden	Env. Resources Planner/ Agency Coordination	17 years, Economics and Water Resources Planner	Navigation; Appendices B and C

SECTION 5.0 LIST OF PREPARERS (CONTINUED)

The Following Contractors provided technical input for report preparation:

Name	Type of Study
Kinnetic Laboratories Incorporated	Characterization of Ocean Disposal Sites
Tetra Tech, Incorporated	Disperson Modeling - Ocean Sites
Waterways Experiment Station, USACE	Dispersion Modeling - Alcatraz
Toxscan	Bioassay and Bioaccumulation Testing - Oakland Harbor
EVS Consultants	Bioassay and Bioaccumulation Testing - Alcatraz
Battelle Pacific Northwest Laboratory	Bulk Sediment Analyses and Bivalue Larve Bioassay - Schnitzer Steel and Todd Shipyard

SECTION 6.0 PUBLIC INVOLVEMENT

6.1 REQUIRED COORDINATION

6.1.1 Environmental Protection Agency. The Public Notice for the Notice of Intent to Use an Ocean Disposal Site under Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) and the Draft Supplemental Environmental Impact Statement for the Oakland Inner and Outer Harbor Deep-Draft Navigation Improvement Project was issued October 20, 1987 and submitted to Region 9, EPA. Additionally, under 40 CFR 225.2(a), the District Engineer formally requested concurrence of EPA in designation of candidate ocean dredged material disposal site (ODMDS), Site 1M, to receive dredged material under the project.

Under 40 CFR 228.2(b), the Administrator of EPA has 15 days to request additional information or make his determination. The Administrator may also request an additional 15 days for a total of 30 days. If additional information is requested, the review period of 15 days begins upon receipt of the requested information.

On November 5, 1987, EPA requested a 30 day extension to the 45 day comment period for the Draft Supplemental EIS for the Oakland Harbor project. Several concerns related to sediment testing and associated toxicity and disposal alternatives were expressed in general terms. EPA did not specifically request additional information within the statutory time period. On November 24, 1987, EPA notified the Corps of Engineers that additional information was needed and that without the information could not concur on the use of the preferred site. EPA also provided comments on the Draft Supplemental EIS and additional description of the additional information it needed for concurrence with the proposed ocean disposal in correspondence dated December 7, 1987. By letter dated December 30, 1987, the Corps of Engineers provided EPA with additional information related to its comments and the requested information. Informal discussions between the EPA and the Corps of Engineers were initiated. On February 17, 1988, EPA indicated that several issues needed resolution before concurrence on the acceptability of Site 1M could be determined. Because of the policy issues related to ocean disposal site designation and the need and use of an ocean site specifically for dredged material that exist between EPA and the Corps of Engineers, a technical panel comprised of the two agencies was convened to review the issues. Refer to Appendix D for the correspondence referenced above.

6.1.2 Bay Conservation and Development Commission. Ongoing coordination with the San Francisco Bay Conservation and Development Commission has been undertaken. Initially, a consistency determination related to disposal at the Alcatraz site was prepared and submitted by letter dated February 1, 1988. However, because of the concerns as perceived by the public and resource agencies as indicated in the comments on the Draft SEIS, the ocean disposal alternative has become a propitious choice among opponents and proponents alike. Since the technical merits of ocean disposal of dredged material are being intensively reviewed, the Corps of

Engineers has modified its consistency determination to involve only the dredging aspect of the project and not the disposal, since the candidate ocean disposal sites are situated in waters beyond the State's coastal zone responsibilities.

6.1.3 U.S. Fish and Wildlife Service. The Corps has considered the views of the Service throughout project development as indicated by the Coordination Act Reports submitted for the Oakland Outer Harbor (September 1, 1976) initially recommending ocean disposal at a 100-fathom site for all "highly polluted" sediments (based on criteria in effect at the time) and subsequent monitoring; and for the Oakland Inner Harbor (April 18, 1984) recommending additional Fish and Wildlife studies as appropriate after project authorization, deposition of dredge material at the Alcatraz site on the "ebb flow of the tide", and a least tern foraging study. Each of the FWS recommendations were addressed in the Final EIS for Oakland Inner Harbor project. By letter of May 22, 1985 the Department of Interior found that the project was not in conflict with any of their programs or missions.

Section 2.4 fully discusses all of the alternative disposal sites considered. A discussion of ebb-tide disposal may be found in Section 2.6.1. As part of the in Bay Dredge Material Disposal Study, additional studies of demersal fish are proposed. These studies include a reconnaissance level survey of existing populations and distribution, identification of potential impacts, and later field surveys. A least tern study was conducted and it was determined that there would be no impact on this endangered species. This determination was concurred upon by the Endangered Species Office (letter of November 12, 1987).

Funds were provided in November 1986 for additional planning assistance and a final Supplemental Coordination Act Report specifically addressing use of the proposed ocean disposal site. The Service provided two planning aid letters for the draft SEIS (February 24, 1987 and August 18, 1987), and at the Corps' request (by letter of August 6, 1987) agreed to provide the Supplemental Coordination Act Report by November 15, 1987. Once the results of biological surveys were available, this information was provided to the Service to assist in their consultation with the Corps. These reports were received by the Service along with the Draft SEIS on October 5, 1987; however, the Service stated that they would be unable to furnish a Supplemental Coordination Act Report until January 15, 1988. On January 15, 1988 the Service provided a letter indicating that no Supplemental Coordination Act Report would be provided and that additional studies were required.

The Corps has considered the comments of the Service received to date. The Service's primary concern has been on the perceived decline in fisheries resulting from dredge material disposal; however, it has not been demonstrated that historic use of the Alcatraz disposal site is attributable to this decline. A discussion of these and other concerns expressed during the draft SEIS public review are found in Section 6.3 of this document. The concerns and recommendations of the Service are discussed in the final SEIS.

The Service has not fully addressed the studies already conducted (Nybakken, et al. 1984; Kinnetics, 1987a and 1987b), nor have they provided the Corps with the rationale, objectives, scope or detail of proposed new studies. The Corps has provided the Service with all available data and reports, necessary funding and a schedule for the Supplemental Coordination Act Report submission; however, the Service has not fulfilled the Corps' request to provide the report even though contractural funds were provided for this service. Relevant correspondence is contained in Appendix D.

6.1.4 Regional Water Quality Control Board. In conjunction with the circulation of the Draft Supplemental EIS for the Oakland Harbor project, the Corps of Engineers requested that certification pursuant to Section 404(b) of the Clean Water Act be granted by the Regional Board. On 9 October 1987, the Regional Board indicated that additional information was needed including a final environmental document and filing fees. Other concerns included water and sediment quality testing and the potential for groundwater impacts.

By letter dated 4 December 1987, the Corps of Engineers responded to the Federal concerns related to the State's filing fee requirement. On 12 January 1988, the Corps of Engineers submitted responses to specific concerns of the Regional Board and provided the Section 404(b) evaluation related to the proposed disposal at the Alcatraz disposal site as described in the Draft Supplemental EIS. On 29 January 1988, the Regional Board stated that a filing fee was still required. Due to the likelihood of the direct ocean disposal alternative, the Corps of Engineers requested a continuance (from March to April) on the proposal before the Board related with the Section 404(b) certification for dredged material disposal at the Alcatraz site on 3 March 1988. On the same date, Regional Board indicated that the proposed groundwater monitoring program was "adequate and acceptable."

6.2 PRIOR COORDINATION

Public meetings and conferences were held throughout the initial study phase of the project. Associated reports were circulated for review in order to obtain input and maintain coordination with the public and private sector. A Notice of Intent to prepare a Supplemental Environmental (Impact) Statement (SEIS) for the Oakland Outer Harbor project was published in the Federal Register on January 13, 1987. The Notice of Intent for the Oakland Inner Harbor project was published in the Federal Register on April 23, 1987. Subsequently, it was determined that a single SEIS would be prepared for the two projects.

The notice of availability for the Draft Supplemental Environmental Impact Statement (SEIS) was filed with the Environmental Protection Agency and published in the Federal Register on September 25, 1987. A Public Notice announcing the availability of the document and the Public Meeting on November 5, 1987 was mailed to over 260 agencies, businesses, groups, and individuals. The SEIS was circulated for a 30-day review to federal, state, and local review agencies; to county libraries, businesses, environmental groups, commercial and sport fishing organizations and individuals upon request. At the request of the Environmental Protection Agency, the comment period was extended to December 7, 1987 in order accommodate their review of the draft SEIS.

6.2.1 List of Parties Receiving Draft SEIS. Among those receiving copies of the Draft SEIS were the following agencies, and groups:

FEDERAL AGENCIES

Federal Maritime Commission

U.S. Department of Commerce
- National Oceanic and Atmospheric Administration,
  - Office of Ecology & Conservation
- Pt. Reyes-Farallon Islands National Marine Sanctuary (NOAA)
- National Marine Fisheries Services (NMFS)
  - Southwest Region
  - Habitat Conservation Branch
  - Economic Development Administration

U.S. Department of Agriculture
- Agriculture Stabilization & Conservation Service
- Forest Service, Region 5
- Soil Conservation Service, Regional Ofc.

U.S. Department of Interior
- Office of Environmental Project Review
- Fish and Wildlife Service
  - Division of Ecological Services, Sacramento
  - Endangered Species Office, Sacramento
- National Park Service
  - Resource Management, Western Region
  - Interagency Archaeological Services, Western Region

Advisory Council on Historic Preservation

U.S. Department of Transportation
- Coast Guard, Pacific Area
- Coast Guard, San Francisco Bay

U.S. Environmental Protection Agency
Office of Federal Activities
Regional Administrator
Regional Library

U.S. Department of Energy
Division of NEPA Affairs

Federal Emergency Management Administration

Federal Highway Administration
Regional Administrator

U.S. Department of Housing & Urban Development
Regional Environmental Officer

U.S. Department of Health & Human Services
Center for Environmental Health

U.S. Representatives in Congress
Hon. Ronald V. Dellums
Hon. George Miller

CALIFORNIA STATE AGENCIES

State Clearinghouse, Office of Planning and Research
Air Resources Board, Evaluation and Planning Branch
Department of Conservation
Department of Fish and Game
Director
Region 3
Marine Research Branch
Department of Boating and Waterways
Regional Water Quality Control Board
Regional Water Quality Board, San Francisco Bay Region
Department of Transportation (CALTRANS)
Department of Transportation Planning, San Francisco
Department of Water Resources
State Lands Commission
Public Utilities Commission
Energy Commission
Department of Health
Department of Parks & Recreation
San Francisco Bay Conservation and Development Commission
State Historic Preservation Officer
Hon. Nicholas Petris, California State Senate
Hon. Elihu Harris, California State Assembly
Speaker's Office, California State Assembly

REGIONAL, COUNTY AND CITY AGENCIES

Association of Bay Area Governments
- Plan and Project Review Division (Areawide Clearinghouse)
- ABAG/MTC Library

AC Transit, Research & Planning Department

BART, Director of Planning

Bay Area Air Quality Management District

Metropolitan Transportation Commission

City of Alameda
- Mayor
- City Manager
- Planning Department
- Public Works
- Library

City of Oakland
- Mayor
- Director of Planning
- Main Library

INTEREST GROUPS

San Francisco Bar Pilots Association
Bendix Environmental Research Co.
Citizens for a Better Environment
Entrix Inc.
Great Lakes Dredge & Dock Co.
Kinnetic Laboratories, Inc.
League of Women Voters
Northwest Information Center, Sonoma State University
Oceanic Society
- San Francisco Bay Chapter
- National Office

Port of Oakland
Pacific Bell Co., Public Works Coordinator
Pacific Coast Federation of Fishery Associations
Save San Francisco Bay Association
Sequoia Audubon Society
Smith-Rice Co.
Stauffer Chemical Co.
Tiburon Center for Environmental Studies
United Anglers

6.2.2 List of Parties Commenting on Draft SEIS. The Corps received approximately 40 letters commenting on the draft SEIS. The comments and responses are located in Appendix E and discussed in summary form in Section 6.3. The final SEIS document will be distributed to all required review agencies as well as to the commenting entities and individuals listed below:

FEDERAL AGENCIES

United States Department of Commerce
- National Marine Fisheries Services (NMFS) 10-28-87
- National Office of Ocean and Coastal Resource Management (OCRM) 11-9-87
- Office of Charting and Geodetic Services (OCGS) 10-30-87

United States Department of Interior
- Environmental Project Review (INTEPR) 11-5-87
- National Park Service (NPS) 11-12-87

United States Environmental Protection Agency
- Region IX (EPA) 12-7-87

STATE AGENCIES

California Coastal Commission (CCC) 10-7-87

California Regional Water Quality Control Board (RWQCB) 11-25-87

California Resources Agency
- California Department of Fish and Game (CDFG) 11-2-87
- California Department of Transportation (CALTRANS), District 4 11-3-87
- California Department of Transportation (CALTRANS), District 4, Transportation Studies Branch 10-9-87
- California Department of Water Resources (DWR) 11-13-87

San Francisco Bay Conservation and Development Commission (BCDC) 11-16-87

State Historic Preservation Office (SHPO) 10-6-87

State Lands Commission (SLC) 11-2-87

COUNTY/CITY AGENCIES

Association of Bay Area Governments (ABAG) 12-21-87
Bay Area Rapid Transit District (BART) 7-20-87
County of Alameda, Public Works Agency (Alameda, PWA) 11-6-87
City and County of San Francisco, Clean Water Program (San Francisco, CWP) 11-9-87

PUBLIC INTEREST GROUPS

Bielen and Peterson, Law Office of - petition with 100 signatures (BP) 11-5-87
California Natural Resources Federation (CNRF) 11-23-87
California Striped Bass Association (CSBA) 11-17-87
California Voters - petition with 25 signatures (CV) 11-5-87
Citizens for a Better Environment (CBE) 11-20-87
Commercial Fisherman's Association (CFA) 11-6-87
Golden Gate Audubon Society (GGAS) 11-18-87
Golden Gate Fishermen's Association (GGFA) 11-9-87
Golden Gate Port's Association (GGPA) 12-8-87
Heller, Ehrman, White and McAuliffe, Attorneys (HEW) 11-20-87
Marin Audubon Society (MAS) 11-19-87
Oceanic Society, S.F. Bay Chapter (SOS) 11-19-87
Oceanic Society, Washington Executive Office (OS) 11-24-87
Pacific Coast Federation of Fishermen's Association, Inc. (PCFFA) 11-18-87
United Anglers (UA) 10-19-87
Ventana Aluminum (VA) 12-11-87

INDIVIDUALS

Larry Allen Bonds n.d.
Ronald Burch 11-13-87
Christine Conceicao 11-23-87
G. Gasper 11-19-87
Sam Lackey 11-5-87
Pat Osborne 11-5-87
Raymond Wanser 11-18-87
Elizabeth Walsh (+ 8 identical letters signed by other individuals) 11-18-87
Frank Yakushi 11-27-87

LETTERS RECEIVED AFTER CLOSE OF COMMENT PERIOD

League of Women Voters 1-11-88
Peninsula Conservation Center Foundation 1-20-88

6.3 SUMMARY OF DRAFT SEIS COMMENTS AND RESPONSES

The Oakland Outer and Oakland Inner Harbor Deep-draft Navigation Improvements project has been reviewed by interested Federal, state and local agencies as well as interested groups and individuals. Over forty letters and some 450 comments were received discussing the project and its documentation (i.e., the General Design Memorandum and Supplement to the Environmental Impact Statement). Individual responses have been prepared to each of the submitted comments. The comments and responses are presented in Appendix E of this document.

The comments on the project and the GDM/SEIS covered a wide array of issues from aquifers to turbidity. However, there were several specific issues that were repeated by many of the commenters. A summary has been prepared to assist interested parties in their review of the Corps' position on these specific issues. The issues are: (6.3.1) the environmental consequences of Alcatraz disposal, (6.3.2) the selection of an ocean disposal site, and (6.3.3) compliance with statutory laws and regulations. These three issues are further broken down into sub-topics in the summary that follows.

6.3.1 Environmental Consequences of Alcatraz Disposal. Concerns were raised with respect to the pre-dredging and slurry disposal of Oakland Harbor material at the Alcatraz disposal site. These concerns focussed around the perception of the Bay as a "stressed estuary" and the purported decline in Bay fisheries. The broader issue being implied by the comments is " To what extent does disposal at the Alcatraz site contribute to the overall stress being applied to the estuary?" This is a very difficult question to exactly answer. Indeed, the San Francisco estuary has been subjected to drastic (i.e., stressful) alterations over the last 125 years. Its surface area has been reduced 40 percent with a corresponding reduction in the tidal prism. Its pristine fresh water inflows have been decreased by 60 percent and replaced by a lesser amount of contaminated water from municipal, industrial, and non-point source discharges. Its native species populations have declined either because of increased stress associated with the just mentioned physical/chemical changes or because of displacement/elimination resulting from competition with introduced, exotic species. In sum, the ecosystem has been and is being stressed by the continually expanding human population and its activities. In this context, it is almost impossible to sort out the relative contribution that disposal at Alcatraz makes to the overall "stress" of the estuary. On the other hand, it is obvious that disposal activities at Alcatraz are insignificant when compared to the magnitude of the previously mentioned modifications to the estuary.

Several commenters suggested that the Corps reconsider its position on both pre-dredging and "slurry" disposal citing California Department of Fish and Game's data indicating increased turbidity in Central Bay (following the assumed implementation of slurry disposal at Alcatraz) and alleging that it is responsible for a recent decline in Central Bay fisheries. Unlike the stress issue, this is a far more addressable concern. The actual factors that must be evaluated with respect to pre-dredging and slurry disposal are: (a) material distribution in the water column, (b) long term dispersion, (c) biological effects of turbidity and (d) contaminants associated with dredged material.

a. Material Distribution at Alcatraz. During dredging and disposal activities, most of the influence is in the lower water column at or near the bed. Regardless of the type of equipment that is used for the pre-dredging excavation, it is the cutting operation that disrupts the bed and causes increased solids levels. Of course, a clamshell bucket will introduce more solids into the water column as it is hoisted to the water's surface than a lifting technique using a pipe (e.g., cutterhead or hopper dredge). However, the suspended solids levels caused by either type of dredging operation are typically low (100 to 400 mg/l). This level is no greater than the concentrations measured in the water column in San Pablo Bay on a windy day. Furthermore, the plume that is created by the cutting operation is limited to the localized area of the excavation. The water rapidly clears because the resuspended material only has to fall a meter or two before it redeposits on the bottom and because the Alcatraz site is constantly being flushed by tidal currents. These tidal currents also insure that any oxygen depression caused by the resuspension of anaerobic sediments is rapidly satisfied. Reaeration of the water column to 90 percent saturation levels for dissolved oxygen requires less than a minute under most conditions. Thus the physical and chemical impacts of the pre-dredging operations as discussed in the Draft SEIS are considered to be minor in the context of the dynamic Alcatraz environment.

In a similar manner to dredging operations, disposal operations conducted by either barge or hopper dredge have their greatest impact in the lower water column at or near the bottom. In the upper water column, increases in suspended solids concentration are typically in the range of 200 to 300 mg/l representing only from 5 to 10 percent of the total amount being discharged. In fact, plume monitoring at the Alcatraz site measured concentrations of suspended solids no higher than 120 mg/l in the water column. This material is quickly swept from the site by tidal currents and dispersed such that the suspended solids levels return to ambient concentrations within about fifteen minutes.

Most of the solids from the discharge are concentrated at the bottom. After the mass of the disposed material impacts the bed, the material either accumulates as a mound at the point of impact or flows outward as a fluid mud layer. Clamshelled material (which is extracted by a bucket in clumps) tends to mound. This is because the excavated material generally has a low water content and near _in situ_ density; thus it is rather stiff. Hydraulically dredged material, on the other hand, has a much higher water content and the cohesiveness of the material has been destroyed during pumping; thus it tends to act as a slurry. This slurried material spreads on the bottom more presenting a greater surface area for erosion than material that mounds. In addition, it is generally more erodible (i.e., has a lower shear strength) than material that retains its cohesion. It was this increased erodibility of slurried material over clumped material that was the guiding principle for the initiation of the slurry requirement at the Alcatraz site.

The Alcatraz disposal site has been in use since 1894. The volume of discharged dredged material at the site has steady increased since the early 1970's. At that time the number of dredged material disposal sites in the Bay was reduced from eleven to five and then to three sites. The selection of these sites was based upon each's dispersive nature and desire to achieve the conveyance of some portion of the discharged material out of the Bay by the tidal currents. The employment of a slurry requirement was put into effect after unforeseen material accumulation at the Alcatraz site was identified. The intent was to enable a greater portion of the discharged material to be dispersed from the site in concert with the natural sediment movement in the Bay.

When a slurry is discharged from a hopper dredge or barge, it descends as a jet to the bottom (convective descent). As previously mentioned, only a small portion of the total discharged mass enters the upper water column. Some sediment is entrained into the lower water column as this material collapses (dynamic collapse) and flows along the bottom (passive transport). The solids concentration in the fluid mud layer is on the order of grams per liter. The suspended solids concentration of the water directly above this layer is approximately one gram per liter. Lateral movement of this material is a function of the amount discharged and the material's inertia in the horizontal direction. As long as the mass maintains its integrity and energy is available from the initial release period or from gravity during movement down slope, the flow will spread. Consolidation of this material is slow because the particle concentration is sufficiently high to inhibit the escape of interstitial water. During the consolidation period, which may take more than an hour, material is easily eroded by tidal currents. Thereafter, deposited material is only eroded when the current velocity exceeds the critical shear strength of the bed.

b. Long-term Dispersion. Following the initial deposition of sediments suspended either during pre-dredging or subsequent to material discharge, a portion of the material is again resuspended and carried from the site by tidal currents. Dredged material retained at the site, based on monthly bathymetric surveys and logs of disposal quantities, is calculated to be 20 percent within 305 m (1000 ft) of site center and 30 percent within a 610 m (2000 ft) radius of site center. An additional 5 to 10 percent (7.5% is used for subsequent calculations) is estimated to have been deposited in the bathymetric depression on the east and south perimeter of the site. This material accumulated through gravity induced flow of the fluid mud fraction of material deposited during the passive transport phase.

It follows that slightly more than half (52.5%) of the total material discharged at the site is resuspended and transported from the vicinity after initial deposition by the strong currents. The erosional capacity of the site for the high water content, fluid material (1.3 g/cc or less) is much higher than the amount of material deposited (Teeter, 1987). Thus, combined with the ten percent lost to the water column during the convective descent phase, approximately five-eighths (62.5%) of the material discharged at the site is dispersed and transported from the site. In light of the above, it is estimated that annually five-eighths (62.5%) of the 3.8 million m^3 (5.0 million yd^3) of dredged material discharged at the site, or 2.4 million m^3 (3.1 million yd^3) is added to the Bay's suspended and surficial sediment regime.

The ultimate fate of this eroded material must be estimated from circumstantial evidence because quantitative data are lacking. Useful information is available from previously conducted field work looking at Central Bay water quality and geomorphic conditions. First, all suspended sediment plumes tracked during recent field investigations (SAIC, 1987a and 1987b) at Alcatraz moved in an east-west direction. The suspended material did not disperse significantly in a north-south direction. Second, geomorphic evidence that is useful includes an investigation of erosion and accretion patterns gleamed from historic surveys (Smith, 1963) and studies of the movement of bedforms in Central Bay (Rubin and McCulloch, 1979).

Smith (1963) developed estimates of historic sedimentation patterns for the years 1855-1948. His data indicate that the highest shoaling rates have occurred along the flanks of the deep water channels in water depths of 3 to 9 m (10 to 30 ft). These areas are located along the fringes of Berkeley Flats on the east side of Central Bay and along the fringes of San Rafael and Corte Madera Flats on the western side. Intermediate shoal areas are adjacent the high shoaling areas in water depths of 1.2 to 3 m (4 to 10 ft). Large intermediate shoal areas are located in northern Berkeley Flats, San Rafael and Corte Madera Flats, Richardson Bay and along the San Francisco waterfront. The deep water channels of Central Bay including Richmond and West Richmond Channels, Raccoon Strait and the Golden Gate have shown little or no shoaling. The southern portion of Berkeley Flats has experienced moderate to high scouring.

The channel margins in Central Bay have experienced the highest rates of shoaling as a result of diminishing current and wave action. These deposition zones are too far away from the channel axis to be affected by current generated erosion and too deep to be affected by wave generated erosion. The deep water channels of Central Bay appear to be in approximate dynamic equilibrium as a result of scouring action of currents. The shallow sub-tidal flats such as Berkeley Flats also appear to be in approximate dynamic equilibrium as a result of scouring by wind-wave action.

Rubin and McCulloch (1979) investigated bedform movement in Central Bay. They found that many of the bedforms are very active under normal tidal conditions. Bedforms asymmetry was used to deduce the net direction of bottom sediment transport. In general, the transport of bed material was determined to parallel with the circulation and velocity characteristics of tidal flows. The narrow stricture at the Golden Gate produces ebb and flood jets as tidal flow accelerates to pass through the opening. These jets tend to move sediment away from the Golden Gate portal. Lower velocity flows occurring between the jets and shore were ebb dominant within the Bay and flood dominant outside. These flows tend to move sediment toward the Gate. There are boundaries between these mobile zones that form ridge lines, and one of these lines is in the area of Alcatraz Island. The asymmetrical sand waves at that location indicate that the bed is moving east to the north of the island and to the west on the south side of the island (Figure 10, Rubin and McCulloch, 1979).

Extrapolating from the findings of these three studies, it appears that the dominant direction of sediment transport, whether suspended or surficial load, under normal tidal circulation is in an east-west alignment in Central Bay. Of course, under extreme events, such as high freshet conditions or coastal storm episodes, tidal circulation patterns may not dominate in determining predominate accretion and erosion patterns. However, during normal periods, sediment transport in the northern part of Central Bay appears to be oriented to the east and transport in the southern part oriented towards the west. This conclusion is supported by the reported accretion and erosion patterns of San Pablo Bay and South Bay. Movement of sediment at the bed appears to occur under conditions of flood predominance into San Pablo Bay and upstream (Conomos et al., 1979). Movement of sediment out of South Bay has been suggested by Krone (1979) and Conomos et al. (1979).

Thus, returning to the fate of material discharge at Alcatraz, the ten percent in the water column is probably about equally divided between being carried out the Gate and farther into the Bay. The portion moving into the Bay probably settles in an accretion zone near one of the channel margins. The material that is subsequential eroded from the settled deposit at the Alcatraz site and in the depression to the southeast probably moves toward the Gate with a portion shunted back into the Bay as it approaches the Gate. Using the San Francisco Bay-Delta hydraulic model studies of dredged material disposal (Schutz, 1965) to estimate movement of this transient material, those studies indicate about 47% of the material discharged at Alcatraz moves out the Gate and about 53 percent moves back into the Bay. The portion that moved into the Bay was distributed with 2 percent moving into San Pablo Bay, 28 percent remaining in Central Bay, 22 percent into upper South Bay and one percent into lower South Bay. The 47 percent actually equates to about 25 percent of the initial deposit that moved from the site, and the 53 percent equates to 27.8 percent of transient deposit.

In summary, the percentage of discharged material that is retained in Central Bay is approximately 50 percent -- 37.5 percent retained at Alcatraz and 12.8 percent (7.8% from the bed and 5% in the water column) being widely distributed over the Bay. Upper South Bay (the area encompassing the Port of Oakland, Alameda and south to the San Mateo Bridge) receives approximately 6.1 percent of the transient deposit and possible some small percentage (less than 1%) of material suspended in the water column. The amount of material that is lost from the Bay environment to the ocean is approximately 30 percent (24.7% from the transient deposit and 5% in the water column).

c. Biological Effects of Turbidity. With respect to the recently reported fisheries declines in Central Bay being an outgrowth of the slurry requirement, history at the Alcatraz site suggests otherwise. Historically, most of the Corps of Engineers dredging in San Francisco Bay has been accomplished with hopper dredges which produce a slurried discharge. This practice has continued for many decades. To this point, there have been no fish kills reported or declines correlated with this ongoing disposal activity at the site. Turbidity resulting from disposal operations is a short-term phenomena, especially when compared with wind wave and run-off caused turbidity. Also, recent attempts to have clamshell dredgers slurry their dredged material before disposal have not been completely successful. The equipment is not capable of producing a homogeneous slurry. Therefore, there has been no significant change in historic operational procedures at Alcatraz or in local water quality.

With respect to the alleged fisheries decline, available data do not correlate well with the reported turbidity levels. Sport fishing log entries indicated above-average fishing in 1983, yet the highest levels of turbidity were indicated by the Secchi disc data for the same time period. Reports of the worst sportfishing in the seven year period from 1980 to 1987 occurred in 1987, but turbidity levels were third highest of the seven year period. Fishing success was better in 1986 than 1987; but turbidity was reportedly higher in 1986 versus the 1987 period. Sport fishing boats leaving Central Bay in September 1987, due to poor Striped bass fishing (alleged to be caused by elevated turbidity in Central Bay), moved to the more turbid waters of San Pablo Bay and Suisun Bay. Thereafter, it was reported in local papers that individuals were catching their legal limit on numerous occasions. If Striped bass were being caught in more turbid waters in San Pablo Bay to the legal limit, it is illogical to charge that too much turbidity was the driving influence in their migration from Central Bay.

As noted, high turbidities at sampling stations in the vicinity of Alcatraz have been reported (CDFG, unpublished data) over the last two years. It is alleged that disposal at Alcatraz is responsible for these reported high levels. However, the levels and the timing of the "high" conditions are not consistent with the actual operational implementation of the slurry requirement nor commensurate with the intensity of disposal activities at the site.

Procedures for implementing the slurry requirement (which only relate to clamshell dredging activities) had to be developed, and slurry disposal was not truly operational until September 1987. During the late summer and fall of 1986, when the highest level of turbidity was reported, disposal activity was lower than it had been for several years. Moreover, during the same period, turbidity monitoring of the site was being undertaken as part of the Alcatraz Dredged Material Disposal Monitoring Study. It was found during this study that the influence of tidal circulation in the Bay was the most important factor determining turbidity at the disposal site. Measurements of percent light transmission in the mid-water column was shown to be correlated with tidal stage and not with current velocity. The highest turbidity levels were measured immediately after slack low water; whereas the lowest turbidity levels occurred immediately after slack high water. Thus the highest levels were recorded after the sediment laden waters from the shallow areas of the Bay had moved across the site on ebb tide; and the lowest levels followed the flooding of relatively clear waters from beyond the Golden Gate. This pattern moved back and forth across the disposal site with the change in tide. The intensity of disposal activity and the speed of the currents at Alcatraz did not significantly alter suspended sediment levels in the mid and upper water column.

Therefore, it is extremely unlikely that the on-going disposal activities at Alcatraz exerted a measurable influence on the turbidity levels in the mid and upper water column in Central Bay. Since San Francisco Bay is naturally turbid, the data collected from the overall CDFG sampling program must be considered with respect to turbidity conditions throughout the Bay. To establish a direct cause/effect relationship by examining an exiguous data set from stations in the vicinity of the Alcatraz site only and relating the findings to disposal activities at the Alcatraz site is problematic. This approach does not reflect the activity and condition of the Bay-wide sediment regime outside of Central Bay during the sampling period. As an example, the storms of 1986 caused large quantities of suspended solids to be flushed into the upper Bay system, and their distribution continued into 1987.

In view of the above information, it does not seem reasonable to believe that recent attempts to have all materials disposed at Alcatraz in a slurried form is an important contributing factor in Central Bay's declining fish harvests.

On the other hand, turbidity levels at the bed associated with fluid mud movement may have been quite high. As the discharge spreads along the bed, non-motile benthic organisms will be blanketed the flow. Furthermore, the dissolved oxygen level an area being influenced by the fluid mud spreading will be depressed. In the flow itself, the oxygen level can be less than ten percent of saturation as the oxygen demand of organic-sulfide rich material is exerted. The dissolved oxygen concentration in the overlying water at the interface with the mud may be depressed 50 percent, but tidal mixing in the area will cause reaeration within minutes. The ramifications of fluid mud spreading are limited to the immediate benthic zone being covered. The pelagic zone is not impacted by this phenomena.

In summary, the potential adverse physical or chemical effects associated with either pre-dredging or slurry disposal are limited to the bed and near-bed area. The bed area influenced by the discharge of clumped or slurried material includes all of the Alcatraz disposal site. The slurried material may effect areas outside of the site if a fluid mud flow spreads beyond the boundary of the site. The overlying waters at the site are not influenced physically or chemically in a manner that is potentially hazardous to pelagic species.

d. Contaminants. The potential for contaminant release following the discharge of dredged sediments at Alcatraz is an legitimate concern. However, ambient concentrations of contaminants found in San Francisco Bay waters are also potentially accessible to marine organisms. The degree of accessibility will vary depending upon the particular contaminant and its available chemical form, the individual organism, and the environmental conditions (i.e., water temperature, salinity, pH, etc.). These released contaminants are more readily available to marine organisms through respiratory exchange than similar constituents associated with sediment particles. This conceptual potential for impacts due to release of contaminants during disposal has been realized for years. The elutriate test was created to measure this potential. This test has been required for regulatory approval, as contained in national statutory water quality regulations, of dredged material disposal since the late 1970's. Potential for dredged material to release pollutants to the water column in significant amounts has been shown to be small based on the historic data base derived during this testing.

Beyond the laboratory findings, numerous field studies have been performed investigating the discharge of dredged material containing high concentrations of a wide variety of metals and organic contaminants from hoppers, barges and pipelines. The overwhelming preponderance of evidence from these studies demonstrates no unacceptable adverse impacts on the water column from contaminants in dredged material (see Appendix A for a more detailed discussion).

Contaminants associated with sediments have the potential to cause an adverse biological impact following their accumulation by organisms. However, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a result of disposal of this material (Brannon et al. 1975; Bricker, 1974; Lee and Plumb, 1978). Only a very small fraction of the contaminants present may be available for uptake by an organism. In addition, there are no numerical criteria to identify the level at which a contaminant associated with marine sediments may cause a significant ecological effect. For that reason, bioassay and bioaccumulation testing are conducted.

The bioaccumulation results from initial testing of Oakland Harbor sediments showed statistically higher concentrations of chromium, lead, and zinc in the tissue of clams exposed to sediment from several areas within Oakland Harbor than in tissues of clams exposed to a reference sediment. However, a statistically significant bioaccumulation in organisms living in a test sediment as compared to organisms living in a reference sediment does not necessarily imply that an ecologically important effect will occur in the field.

Statistical differences in test data are only used as a tool to evaluate the variation in the response of test organisms. For this reason, a number of factors must be evaluated including the magnitude of the difference from the reference as well as the comparison of the actual tissue concentration to values reported in the literature and FDA type limits.

Elutriate testing of material from Oakland Harbor indicated that the concentration of copper and zinc at one station (Oakland Inner 1cc) exceeded the State Water Quality objective by 1.5 times without considering mixing. The mercury concentration at Station 3cc in the Inner Harbor was approximately 2.3 times the State Water Quality objective without considering mixing. However, mixing zone calculations indicate that water quality standards would not be exceeded as a result of Oakland Harbor dredging, Alcatraz disposal or ocean disposal of project material for any of the parameters or the sites for which testing has been performed.

Although several suspended particulate phase animal bioassays and several solid phase bioassay showed statistically greater toxicity in the test sediment as compared to the reference sediment, this does not necessarily indicate that adverse toxicity will occur in the field. The bioassay and bioaccumulation data were analyzed with the assistance of personnel from Waterways Experiment Station (WES). WES is a research facility of the Corps of Engineers that studies dredged material disposal and environmental effects nationwide. Its initial 5-year program, the Dredged Material Research Program, began in 1973 and expended $33 million in dredged material research. Under the advisement of WES personnel and after evaluating the results of toxicity and bioaccumulation testing collectively, it is the Corps best professional judgement that the material from Oakland Inner and Outer Harbors, with the exception of sediments from areas adjacent to Schnitzer Steel and Alameda Gateway (formerly Todd Shipyard), are suitable for unrestricted disposal at Alcatraz or an ocean site. Material from Schnitzer Steel and Alameda Gateway are suitable for disposal at an ocean site provided that it is isolated from the marine environment by capping with an acceptably clean material.

6.3.2 Selection of an Ocean Disposal Site. There were numerous comments concerning the selection of an appropriate ocean site to receive the proposed discharge of the Alcatraz pre-dredging. The U. S. Environmental Protection Agency and the U.S. Army Corps of Engineers have developed the concept of delineating the area in which it would be operationally and economically feasible to transport and discharge dredged material prior to locating candidate ocean disposal sites. Candidate sites are then chosen from within the bounds determined and evaluated for suitability as dredged material disposal sites. The demarcated area is called the Zone of Siting Feasibility (ZSF). A Zone of Siting Feasibility Analysis has been prepared for dredged material disposal in the Gulf of the Farallones off San Francisco. The ZSF has been determined to be the area included by a 24 nmi radius drawn from Pt. Bonita.

40 CFR 228.5 (e) requires, "whenever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used." The requirement is satisfied in this case because any site beyond the edge of the continental shelf lies outside of the determined Zone of Siting Feasibility (ZSF). Almost anywhere along the west coast of the United States, a ZSF extending 24 nmi off coast would include several potential sites of depth greater than 100 fathoms. Because the continental shelf is relatively wide off San Francisco in the Gulf of the Farallones, the designated ZSF does not include a deeper site. Depth however, is not a factor that determines operational or economic feasibility. Because use of any hypothetical site outside of the ZSF has been determined to be impracticable using the ZSF analysis, study and sampling of such a site was not performed.

Present navigation in the Gulf of the Farallones by commercial, military, fishing, and recreation vessels presents a potential danger. The U.S. Coast Guard has established the OVMRS radar to monitor vessel movement. To this traffic, disposal operations could add several round trips each day of tugs with one or two barges in tow. Vessels will depart from established traffic lanes and operations will continue at night and during periods of inclement weather or reduced visibility. Not all smaller vessels are equipped with radar or are easily visible on the radar screens of larger vessels. Operating under the umbrella of safety provided by the OVMRS radar will provide a greater degree of protection for both the barge operators and the pilots of other vessels in the Gulf. The Corps of Engineers has determined that an area within the radar range of the U. S. Coast Guard is an appropriate area in which a dredged material disposal site can be located. Navigation safety of a dredged material disposal operation within a heavily used traffic zone can and should be effectively tracked. The breadth of fishery resources off the coast of San Francisco is quite sizable. A vast area of significant marine resources have been granted protection from undue human disturbance, with the exception of fishing, in the Gulf of the Farallones' Marine Sanctuary. The Corps of Engineers has received the comments from the referenced resource agencies and fishing interests and acknowledges the call for transporting and disposing material in water as deep as possible as a factor that must be considered. However, the selection of a suitable location for dredged material is made after considering many factors besides fishery resources.

6.3.3 Compliance with Statutory Laws.

a. National Environmental Policy Act. Some commenters challenged the adequacy of the draft SEIS under NEPA, citing the need for more information or for consideration of other alternatives. The final SEIS, in response to comments of agencies and the general public, expands the information on environmental conditions and effects and modifies slightly the alternatives discussed in the draft SEIS. The process and procedures mandated by NEPA have worked well in the development of information on the alternatives on which to select a plan.

b. Clean Water Act. Some commenters questioned whether there was enough information to make an adequate evaluation as required under Section 404(b)(1), and stated that in-Bay disposal would violate the Act and its implementing regulations. The SEIS provides additional information to demonstrate compliance. See 6.3.1.d. above for a general discussion on water quality. (Disposal at ocean sites is exempt from the requirements of the Clean Water Act, but comes under the Marine Protection, Research, and Sanctuaries Act.)

c. Marine Protection, Research, and Sanctuaries Act (or "Ocean Dumping Act." Concerns were raised that there was insufficient testing to demonstrate that dredged material was suitable for ocean disposal, that those data available showed that the materials were contaminated, and that other ocean disposal sites should be considered. The SEIS provides additional information on all of these issues and establishes that the work will be in compliance with this Act. See the summaries at 6.3.1.d. and 6.3.2. above for a summary.

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SECTION 4.6 APPENDICES

APPENDIX A

WATER QUALITY AND SEDIMENT ANALYSES

APPENDIX A
WATER AND SEDIMENT QUALITY

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BACKGROUND

Introduction to Testing Requirements

The Environmental Protection Agency's (EPA) regulations implementing the Marine Protection Research and Sanctuaries Act (MPRSA) (40 CFR 220 et seq) describes the testing procedures required to evaluate the ecological impact of the discharge of dredged material into ocean waters. Under this regulation, animal bioassays must be conducted on the proposed dredged material unless the material meets specific exclusion criteria (40 CFR 227.13). All tests of sediment from Oakland Harbor and Alcatraz were conducted in accordance with procedures described in the EPA/USACE joint implementation manual for MPRSA (EPA/USACE 1977). The results were interpreted according to guidance described by Peddicord et al. (1986) which presents a systematic approach for evaluation of these data. This guidance is based on more than 15 years and 100 million dollars of research. It was developed after considerable consultation and peer review by numerous scientists and technical experts in the field of aquatic toxicology and contaminant mobility.

In 1987, the U.S. Army Corps of Engineers, EPA, and the California Regional Water Quality Control Board, San Francisco Region determined that the water column testing (elutriate testing) that was being conducted on dredged material to be disposed of in San Francisco Bay was not adequate to determine potential benthic impacts. Therefore, new testing procedures were selected for evaluating the discharges of dredged material within San Francisco Bay in accordance with EPA's regulations implementing Section 404 of the Clean Water Act (CWA) (40 CFR 230 et seq). These procedures follow a tiered testing approach, including chemical analyses of sediment which replaces the chemical analyses of the elutriate of the sediment sample as required by PN 78-1. In the initial evaluation, dredged material is determined to be suitable for disposal within San Francisco Bay without testing if it meets specific exclusion criteria (40 CFR 230.60). If material does not meet the exclusion criteria, chemical analyses are then conducted on the proposed dredged material with the results compared to similar testing performed on material from the disposal site environs. In addition to chemical analyses of the proposed dredged material, a bivalve larval bioassay is required in order to obtain water quality certification under Section 401 of the CWA. If the concentration of contaminants in the dredged material is substantially greater than in material from the disposal site, additional testing, which may include bioassay and bioaccumulation testing, is then required.

Water Column Impacts

When dredged material is placed in an aquatic environment, there is a conceptual potential for impacts due to release of contaminants into the water column during disposal, although this potential has rarely been realized in the field. The potential for water-column impacts due to contaminants released by dredged material disposal has been recognized and intensively studied for years. These studies have included dredged material containing high concentrations of a wide variety of metals and organic contaminants discharged from hoppers, barges, and pipelines, and have included both laboratory and field investigations. The overwhelming preponderance of evidence from these studies demonstrates no unacceptable adverse impacts on the water column from contaminants in dredged material (Arimoto and Feng, 1983; Brannon, 1978; Burks and Engler, 1978; DeLoach and Waring, 1984; Hirsch et al., 1978; Stewart, 1984; Sullivan and Hancock, 1977; Tatem and Johnson, 1977; Tramontano and Bohlen, 1984; Wright, 1977 and 1984).

The standard elutriate test (Keeley and Engler, 1974; Engler, 1976; EPA/USACE, 1977), which is a simplified simulation of the dredging (hydraulic) and disposal process, approximates the fraction of chemical constituents that are potentially available for release to the water column when sediments are dredged and disposed through the water column (Peddicord et al., 1986). The results of the chemical analyses of the elutriate are usually compared to the appropriate water-quality criteria. It is the Corps of Engineers best professional judgement that elutriate data should be compared to acute toxicity (short-term) criteria rather than chronic toxicity (long-term) criteria because dredging is a short term discharge rather than a continuous discharge. Furthermore, dredged material suspended in the water column as well as dissolved constituents will be rapidly mixed with the receiving water at the disposal site. All chemical analyses as well as bioassays of the elutriate must also be interpreted in light of the mixing that will occur at the disposal site (40 CFR 227.13, 40 CFR 227.27 and 40CFR 230.61). This is necessary since biological effects (which are the basis for water quality criteria) are a function of biologically available contaminant concentration and exposure time of the organism. Both concentration and time of exposure to a particular concentration change continuously in the field. Since both factors will influence the degree of biological impact, it is necessary to incorporate the mixing expected at the disposal site in the interpretation of chemical and biological data. Disregarding mixing zone considerations, which ignores the assimilative capacity of the receiving water, will result in increased disposal cost with little concomitant reduction in potential adverse impacts for most discharge operations (Peddicord, et al., 1986).

Chemical testing of the elutriate does not provide information about all potentially harmful chemicals, nor does it provide information about possible synergistic effects of contaminants. To address these concerns and to assess the potential environmental effect of suspended sediment in the water column, suspended particulate animal bioassays are conducted. In order to interpret this data, it is necessary to first determine whether toxicity of the test medium (suspended particulate phase) is statistically greater than that of the reference water. Statistical significance is used only as a measure of the degree of variability of the data and to determine if differences in the means of the reference and test are real. It is not used as an interpretive end point. If there is a statistically significant (real) difference in means, then professional judgement is used to determine the environmental significance of the difference. First, it is necessary to determine the LC50 (or EC50) which is the concentration that is toxic to 50 percent of the organisms. If the LC50 (or EC50) is greater than 100 percent of the test medium, it is obvious that the dredged material is not toxic in this phase. If the LC50 (or EC50) is less than 100 percent of the test medium it is necessary to determine whether the Limiting Permissible Concentration (defined as .01 LC50 or .01 EC50) would be exceeded at the disposal site when mixing is taken into account (EPA/USACE, 1977). The use of the LC50 (or EC50) in determining whether dredged material is acutely toxic in the liquid and suspended particulate phase is based on established standard procedures in the field of aquatic toxicology for assessing the toxicity of wastewater effluents as well as most chemicals of concern.

Benthic Impacts

Background. Of greater environmental concern than water column impacts, is the effect of the material which settles to the bottom of the disposal site. This is because bottom dwelling animals live and feed in and on the deposited dredged material for extended periods. No chemical procedures exist that will determine the environmental activity of any contaminants or combination of contaminants present in the solid phase of dredged material. Studies conducted by the Corps of Engineers indicate that very little of the contaminants contained in dredged material is available to organisms (Engler, 1981). The percent varies from sediment to sediment and is difficult to measure. The contaminants are distributed in the dredged material between the water soluble phase (pore water or interstitial water) and the sediment solid phase. Contaminants in the interstitial water are biologically available although this represents only a small fraction of the total contaminant concentration in the dredged material (Brannon, 19878). The concentration of trace metals in the interstitial water of sediment from San Francisco Bay ranged from 0 to 1.6 percent of the total concentration of metal in the sediment (Serne and Mercer, 1975). Extensive research has been conducted in partitioning of the sediment solid phase to evaluate the potential mobility of contaminants.

Brannon et al. (1976) reviewed the existing literature and described five sediment solid phases (chemical contaminant locations) that regulate the mobility and potential bioavailability of trace metals. Gambrell and Patrick (1988) described similar sediment phases. These are:

1. Adsorbed on the surface of charged mineral and organic surfaces. This location is predominated by cations that are sorbed onto negatively charged ion-exchange sites on clays, onto Fe and Mn oxide phases, and onto negatively charged organic particulates. This phase is in equilibrium with the water-soluble phase

(Jackson, 1958). And the ions are readily sorbed or desorbed when the salinity changes or when the concentration of the respective cations changes in the water-soluble phase (DeGroot, 1973). The chemical forms found in this location may affect water quality during dredging and disposal operations because they can mobilize to some extent when the dredged material is mixed with water (Lee and Plumb, 1974).

2. Oxides, hydroxides, and hydrous oxides of Mn and Fe that exist as particulate coatings or discrete particles. This sediment phase, commonly known as the reducible phase, will dissolve to some extent under reducing (anaerobic) conditions or form relatively insoluble precipitates in the form of insoluble hydrous oxide precipitates under oxidizing (aerobic) conditions (Gotoh and Patrick, 1972; Gotoh and Patrick, 1974; Jenne, 1968). These hydrous oxides have a high surface area and readily scavenge trace metals and phosphate by coprecipitation or sorption (Bray, Bricker, and Troup, 1973; Goldberg, 1954; Krauskopf, 1956; Jenne, 1968; Lee and Plumb, 1974).

3. Chemical bound in organic matter. This phase contains many chemical compounds and complexes that vary in stability from immediately mobile, easily decomposable, moderately decomposable, to resistant to decomposition (Jackson, 1958). Potential release from this phase into dredging and/or disposal site water would depend on the portion of the organic phase that could be leached. The rate of decomposition and subsequent release of dissolved species at the disposal site depends upon the composition of the organic matter and the intensity of bacterial activity (Ponnamperuma, 1972).

4. Chemicals bound with sulfides. This phase is usually extracted concurrently with the organic phase. In marine sediments this phase may tie up a substantial amount of contaminants such as iron, zinc, copper, lead, mercury, and cadmium that form highly insoluble and relatively stable sulfide compounds in soils and sediments where reducing conditions are intense and sulfide is present (Holmes et al., 1974; Ponnamperuma, 1972; Lindberg et al., 1975; Lisk, 1972; Connel and Patrick, 1968; Garrels and Christ, 1965). Some oxidation of metal sulfides will occur during dredging and disposal operations, releasing trace metals that will be rapidly removed from solution by sorption on charged particles, organic matter, hydrous metal oxides, and precipitation reactions (Goldberg, 1954; Krauskopf, 1956; Jenne, 1968; Gardiner, 1974). At the disposal site, reduction will rapidly reestablish a stable, unavailable sulfide phase.

5. Residual phase (bound within the crystalline lattice of sediment particles). This phase is the major location of a great number of chemical species in the sediment (Presley et al., 1972; Chen et al., 1976; Serne and Mercer, 1975). These constituents can be released to solution only under chemical conditions vigorous enough to destroy the crystalline structure of the mineral lattice. These constituents are essentially unavailable in the

sedimentary environment (Bricker, 1975).

Bioavailability of Contaminants. Bioavailable contaminants can be found usually in sediment pore water as discussed above and the exchangeable fraction (phase 1). The bioavailability of contaminants in phases 2, 3, and 4 is rather limited and can be influenced by oxidation reduction conditions in the environment (Gambrell and Patrick, 1988). The residual phase (phase 5) is not available to organisms.

Organic compounds such as PCB's and chlorinated pesticides and hydrocarbons are strongly adsorbed and associated with silts, clays, and organic matter in sediments thus limiting their availability (Gambrell et al., 1984; Chen et al., 1976). These compounds also can become adsorbed to the large surface area of any hydrous oxides of iron and manganese formed under aerobic conditions and are essentially not readily available to organism (Gambrell and Patrick, 1988; Pionke and Chesters, 1973).

Based on the above discussion, it is apparent that a large fraction of contaminants present in dredged material is not readily bioavailable. However, at present it is not possible to accurately predict what fraction will be bioavailable. In order to assess the environmental effects of deposited dredged material, solid phase bioassays are performed with appropriate sensitive organisms.

Rubinstein et al. (1983), at EPA's Environmental Research laboratory of Gulf Breeze, Florida, conducted bioaccumulation studies on sediment containing elevated concentrations of Cadmium, Mercury, and PCB's. They stated that results of this study support the contention that sediment concentration alone does not reflect bioavailability. In fact, the most highly contaminated sediment in that study produced the lowest PCB bioaccumulation factor and did not result in measurable uptake of Mercury and Cadmium. These results reaffirm the earlier findings of DiSalvo and Hirsh (1978) that there is no relationship between bulk sediment concentrations and bioaccumulation by aquatic organisms. It was concluded by Lee and Plumb (1974) that a bulk sediment analysis was not adequate to assess water quality effects and would not result in any level of environmental protection. Numerous other reviewers and investigators have come to the same conclusion (Brannon, 1978; Jones and Lee, 1978; Brannon, et al., 1976; DiSalvo and Hirsh, 1978; Brannon, et al., 1978). Brannon et al. (1978) and Jones and Lee (1978) have shown conclusively that bulk sediment analyses cannot predict long-or short-term release of contaminants. Other investigations (DiSalvo and Hirsh, 1978) have shown no relationship between bulk sediment concentration and bioaccumulation by aquatic organisms.

Aquatic bioassays do not precisely predict environmental effects in the field but do provide a qualitative estimation of those effects. Consequently, the interpretation of bioassay data is somewhat subjective (Peddicord et al., 1986). Bioaccumulation data is even more difficult to interpret than bioassays because in many cases it is impossible to quantify either the ecological consequences of a given tissue concentration of a constituent that is bioaccumulated or even the consequence of that body burden to the animal whose tissues contain it (Ibid.). Recognizing the difficulty in interpreting bioassay and bioaccumulation data, a working group consisting of scientists from EPA and the Corps as well as recognized scientific experts in a wide variety of relevant disciplines was convened at Waterways Experiment Station to address this problem (Ibid). At the end of the meetings, consensus was reached on the following two points related to the regulatory interpretation of properly conducted aquatic bioassays and bioaccumulation testing of dredged material:

a. There is a cause for concern about unacceptable adverse toxicity impacts in the field when laboratory tests result in greater than 50 percent toxicity attributable to the dredged material (i.e., toxicity of the test sediment greater than 50 percentage points above the control).

b. Bioaccumulation data can be interpreted in relation to human health, but evaluation of ecological impacts of bioaccumulation is much less certain at present. Tentative assessment of the potential for such impacts must consider concentration in tissues of reference animals and other effects of the sediments, such as degree of toxicity.

Bioassays. Toxicity of the test sediment (proposed dredged material) is statistically compared to the toxicity of the reference sediment. It should be noted that statistically greater toxicity in the test sediment as compared to the reference sediment does not necessarily indicate that adverse toxicity would occur in the field (EPA/USACE, 1977). Statistical differences in test data are only used as a tool to evaluate the variation in the response of test organisms utilized in the bioassay test. The magnitude of the difference as well as the number of species to which the sediment is toxic must be considered to interpret test results. For example, if the toxicity of any test sediment to any species is statistically greater than the reference sediment but less than 50 percentage points above the control, there is less concern about unacceptable adverse toxicity in the field than if the toxicity had been greater than 50 percentage points above the control.

A 50 percent mortality is used in the evaluation of dredged material because it is the accepted standard established and used extensively in the field of environmental toxicology. For many years, chemicals have been evaluated for their toxicological importance using a 50 percent mortality in bioassay tests as the accepted criteria. Consequently, there are tables of data for numerous chemicals which report the lethal dose (LD) of a chemical which was toxic to 50 percent of the test organisms (LD50). These values are used in risk assessments of potential environmental impacts. In fact LD50 values are currently being developed for new chemicals. Because using 50 percent mortality is a widely accepted and established procedure in toxicology for evaluating the toxicity of chemicals, the above mentioned working group determined that this was the most appropriate and scientifically justified approach for evaluating the toxicity of dredged material within a regulatory frame work. It should be noted that the percent level of toxicity in a laboratory test does not mean that the same percent toxicity would occur in the field to a specific species.

Bioaccumulation of Contaminants. Results of total or bulk chemical analyses of the proposed dredged material to identify contaminants present and solid phase toxicity tests to determine their bioavailability are then evaluated together to determine whether bioaccumulation testing should be performed to determine the potential for contaminants to accumulate in the tissues of animals exposed to the dredged material. This approach can also be used to determine the parameters for which tissue should be analyzed. It should be noted that the ecological consequences of the bioaccumulation of contaminants is not well understood and is currently under extensive study by EPA, the Corps, and others in the scientific community.

At present, bioaccumulation data can be interpreted only by comparison to levels in organisms exposed to reference sediment and levels determined to be safe for human consumption (see Table 1). There are no such levels for aquatic organisms not commonly consumed by man (Peddicord et al., 1986). However, there is a potential for contaminants in non-food organisms to reach some seafood organisms through predation. Although trophic transfer of contaminants from aquatic prey to aquatic predator is known to occur, foodweb biomagnification of contaminants to higher concentrations in the predator than in the prey has been established in aquatic systems for only a few contaminants, including polychlorinated biphenyls (PCB), DDT, and mercury (and possibly selenium, zinc, kepone, mirex, benzo(a) pyrene, and naphthalenes) (Biddinger and Gloss, 1984; Kay, 1984). The above considerations lead to the recommendation that, until tissue concentrations are established for ecological protection, FDA-type levels should be applied to aquatic species that are seldom directly consumed by man (Peddicord et al., 1986)

Again it should be noted that statistically significant bioaccumulation in organisms living in test sediment as compared to organisms living in reference sediment does not necessarily imply that an ecologically important effect will occur in the field (EPA/USACE, 1977). Statistical differences in test data are only used as a tool to evaluate the variation in the response of test organisms. If the concentration of any contaminant in the tissue of any species exposed to test sediment is equal to or greater than the FDA-type limits (see Table 1), unacceptable benthic impacts are likely to occur when conventional open-water disposal techniques are used. In these cases, restrictions on open-water disposal, such as capping of contaminated material with clean material may be considered to prevent adverse impacts in the field. If the concentration of any contaminant in the tissue of any organism exposed to test sediment is greater than the concentration in tissues of organisms exposed to reference material but less than FDA-type limits (or if there is no FDA-type limit for that parameter), Peddicord et al. (1986) recommends that the following eight factors be considered in order to determine if restrictions on disposal are required:

a. Number of contaminants of concern bioaccumulated to concentrations exceeding reference levels;

b. Number of phylogenetic groups of species showing bioaccumulation to concentrations exceeding reference levels;

c. Magnitude of contaminant concentrations in tissues of test organisms;

d. Magnitude of bioaccumulation above reference levels;

e. Toxicological importance of contaminants bioaccumulated to concentrations exceeding reference levels (Contaminants that can be objectively ranked in this manner are presented in Table 2);

f. Number of species showing toxicity when exposed to the same test sediment;

g. Magnitude of toxicity caused by the same test sediment; and

h. Proportion of sediment sampling sites in the area being evaluated that show toxicity exceeding reference levels or bioaccumulation to concentrations exceeding reference levels.

In certain cases, where the disposal site is characterized as dispersive, concern for sublethal effects of the suspended particulate phase may be of interest. Bioaccumulation tests from the suspended particulate phase can be conducted to evaluate potential bioaccumulation of contaminants with this phase. Current bioaccumulation tests of the suspended particulate phase are being conducted at a limited number of research facilities including the Corps' Waterways Experiment Station for a limited number of dredging projects. Other sublethal tests are being developed but are not ready for widespread application in a regulatory framework.

Contaminant Availability in Dispersed Material

Dispersion of dredged sediment from Oakland Harbor during and following disposal at Alcatraz will result in some oxidation of previously anaerobic sediments. Under anaerobic conditions, heavy metals normally are stabilized in anaerobic sediments as very poorly soluble sulfides and organic complexes (Burks and Engler, 1978). The metal sulfides for the most part are poorly soluble salts that metals form in soils and sediments and are common ore forms of the various metals (Engler and Patrick, 1975). When these sediments are mixed with oxygenated water the sulfides will tend to be slowly oxidized with subsequent oxidation of heavy metals. The oxidized forms of heavy metals, with the exception of iron and manganese, are somewhat more soluble than the sulfide compounds but are still relatively poorly soluble. However, the hydrous oxides of iron and manganese form colloidal particles that precipitate and exhibit a large, active surface area that scavenges more soluble trace metals from the water column (Brannon et al., 1976; Jenne, 1968; LaSalle, 1986). This scavenging process significantly restricts the availability of metals and tends to limit their impact on bottom sediments and benthic organisms (Burks and Engler, 1978; Chen et al., 1976; Nathans and Bechtel, 1977). Research conducted under the U.S. Army Corps of Engineers Waterways Experiment Station Dredged Material Research Program indicated that cadmium, mercury and zinc are not released under conditions present in San Francisco Bay (i.e., aerobic and neutral to alkaline pH) (Gambrell et al., 1977). These metal form poorly soluble precipitates resulting in very little soluble and thusly readily bioavailable forms of the metals in the aqueous environment (Brannon et al., 1976). Bioaccmumulation of trace metals in the suspended particulate phase should then be similar to that observed in the solid phase testing. Consequently, the solid phase testing should be an acceptable gauge as to the acceptability of dredged material for aquatic disposal.

Organic compounds such as PCB's and chlorinated pesticides and hydrocarbons also become strongly adsorbed and associate with silts, clays, and organic matter in sediments thus limiting their bioavailability (Chen et al., 1976; Gambrell et al., 1978). These compounds do not appear to under go the oxidation-reduction reactions that influence metal availability. While the rate of degradation of organic compounds can be influenced by oxidation-reduction conditions in the environment, their bioavailability will not be directly affected (Gambrell and Patrick, 1988). However, these compounds can become adsorbed to the large surface area of any hydrous oxides of iron and manganese formed during the passage of suspended sediments in oxygenated water (Gambrell et al., 1984; Pionke and Chesters, 1973). Consequently, organic compounds should be less bioavailable after dispersed sediment has undergone some degree of oxidation. Suspended particulate phase and solid phase bioassay tests are appropriate indicators of the potential toxicity and bioaccumulation of dispersed dredged material.

The joint Corps/EPA Field Verification Program evaluated bioaccumulation of contaminants from a highly contaminated estuarine dredged material in both the suspended particulate and solid phases (Lake et al., 1985; Gentile et al., 1987). The mussel, Mytilus edulis, as used in the suspended particulate phase test and a polychaete, Nereis virens, was used in the solid phase. Test results showed agreement in the bioaccumulation of selected metals, PCB's and PAH's for both test organisms. When test results were evaluated assuming that the total exposure concentration of PCB's resides on the particle or in the sediment phase, bioaccumulation factors were similar for both test animals even though two different phases were evaluated. These results suggest that solid phase bioaccumulation tests may identify potential for contamination of aquatic animals in both solid and suspended particulate phases. On a mass basis alone one would not expect any more bioaccumulation in the suspended particulate phase than that observed in the solid phase tests. The state of the art is such that additional research is required to better substantiate the interpretation of solid phase testing with reference to potential impacts of resuspended dredged material in dispersive disposal sites.

OAKLAND HARBOR

Initial Testing

Sediment Quality. Sediment core samples were collected from 3 reaches within Oakland Inner Harbor and from two reaches within Oakland Outer Harbor in December, 1986. Sample collection and composite sampling were made after consideration of the actual dredging operation, entire depth of dredging, whether the dredging activity was a deepening or a widening of the channel, the expected nature of the material, adjacent land use, and cost effectiveness. The three reaches within Oakland Inner Harbor was based on the overall long length of the harbor and adjacent land use. Oakland Outer Harbor is a shorter harbor and therefore was divided into channel widening (Oakland Outer Harbor Area #1) and channel deepening (Oakland Harbor Area #2) activities. Bulk sediment analyses, elutriate tests, and bioassay tests were then performed on these samples. The core locations are identified in Table 3 and Figures 1, 2, and 3. Seven (7) stations within the Alcatraz disposal site were sampled in March 1987. Bulk sediment analyses were conducted on these surface samples. A summary of results of the bulk analyses for Oakland Harbor and Alcatraz site are presented in Table 4. The sediments from several stations within Oakland Inner and Outer Harbor appear to contain higher concentrations of trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) than sediments from the Alcatraz disposal site. Oakland Inner Station 3dd appeared to have the highest concentration of contaminants of all of the stations tested. No statistics were performed on these data because the Oakland Harbor results are reported for individual sediment samples whereas the Alcatraz results are a range of seven values. In an urban estuary, elevated concentrations of these contaminants commonly occur. It is also noted that the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a result of dredging or disposal of this material (Bricker, 1975). At present there are no numerical criteria for evaluating contaminant concentrations in dredged sediments.

Water Column Impacts. Elutriate tests were conducted on sediment core samples from eleven locations within Oakland Harbor to determine whether excessive concentrations of dissolved contaminants would be released from the sediment into the water column by dredging and disposal activities. The concentrations of trace metals and organics at most of the stations were below the State of California Water Quality objectives without considering mixing at the disposal area (see Table 5). The concentration of copper and zinc at Station 1cc in Oakland Inner Harbor was approximately 1.5 times the State Water Quality objective without considering mixing; the concentration of mercury at Station 3cc in Oakland Inner Harbor was approximately 2.3

times the State Water Quality objective without considering mixing. The results of this testing, taking into account the mixing that occurs at the dredging and disposal sites (because of the large volume of water and strong currents), indicate that water quality standards would not be exceeded as a result of dredging Oakland Harbor or of disposing of material at Alcatraz or in the ocean for the parameters for which tests were performed. Attachment 1 to Appendix A includes the calculation of the mixing zone required for the concentrations of copper, zinc, and mercury to meet State Water Quality objectives.

Suspended particulate phase bioassays were performed to determine the potential interactions among multiple contaminants and the potential for environmental impacts of dissolved contaminants as well as those associated with suspended particulates. Although toxicity (or abnormal development as in the mussel larvae bioassay) of the proposed dredged material was significantly greater than to the reference sediment (see Tables 6-17), in no case was the sediment toxic to 50 percent of the test organisms (or cause abnormal development in 50 percent of the test larva). As a result, the LC50 (or EC50) was greater than 100 percent concentration of the dredged material suspended particulate phase. Therefore, in accordance with the guidance suggested by EPA/USACE (1977), it was concluded that no unacceptable water column impacts would occur as a result of either dredging or disposal of material from Oakland Harbor at either Alcatraz or an ocean disposal site. Furthermore, the results of the suspended particulate phase bioassays support the conclusion that after considering initial mixing, State Water Quality Objectives would not be exceeded at the dredging and disposal area.

Benthic Impact. In order to assess the environmental effect of deposited dredged material, solid phase animal bioassays were conducted using mysid shrimp, bent-nose clam, and a polychaete worm. Sediment obtained offshore in the vicinity of the proposed ocean disposal site was used as both the reference and the control sediment. These tests measure mortality as the end point. Solid phase bioassay data are presented in Tables 6 and 18-20. Of the three species tested, only the polychaete worm demonstrated survival that was statistically lower in sediment from Oakland Harbor than survival in the reference sediment. Again it should be noted that statistically greater toxicity in the test sediment as compared to the reference sediment does not necessarily indicate that adverse toxicity would occur in the field. For this reason, the magnitude of the difference must be evaluated. In no case is the toxicity in the test sediment greater than 50 percentage points above the control and only one of the three species showed any toxicity. While a statistical decrease was observed in this one case, depression was only 25 percent in the worst case. Therefore, it was determined that there is little concern about unacceptable adverse toxicity impacts occurring in the field.

Another solid phase bioassay, using the amphipod, *Rhepoxynius abronius*, was performed at the same time as the other tests to help determine whether sublethal effects would occur as a result of disposal of dredged material from Oakland Harbor at Alcatraz or at an ocean disposal site. This test was also performed to help determine whether this new test organism was suitable for use in evaluating sediment from San Francisco Bay. EPA researchers developed this test for the Puget Sound area in Washington. Since it was developed in 1985, it has no statutory standing. However, the test was viewed as an additional test to evaluate the potential environmental effects of disposal of material from Oakland Harbor on marine organisms. The test results indicated that toxicity was greater in organisms exposed to sediment from Oakland Harbor than in those exposed to the reference sediment (See Tables 6, 21-23).

Although these results indicate that a statistically significant effect occurred, several factors, inherent in the test itself rather than the chemical nature of the dredged material, may have caused the toxicity. For example, grain size may have an effect on these availability amphipods at extremes of fine and coarse material because Rhepoxynius typically inhabits well sorted, fine sand (Tetra Tech, Inc. and EVS Consultants, LTD., 1986). The survival of test organisms exposed to sediments from Oakland Harbor was greatest in the coarse material sample, material from area #1, Oakland Inner Harbor (88% sand, see Figures 4-7 and Tables 24-25). Furthermore, the reference sediment was a fine grained sand (99% sand) in which Rhepoxynius abronius reside in nature and were transported in from the field collection. This is in accordance with protocols developed by Swartz, et al. (1985). A test in which the reference sediment is a sediment to which the organisms are accustomed may only measure differences that are a reaction to a new environment or to fine grained sediment rather than toxicity caused only by contaminants associated with the sediment. Finally, Rhepoxynius abronius does not occur in San Francisco Bay, although Rhepoxynius variatus does occur at the proposed ocean disposal sites. In addition, this test, unlike the other solid phase tests, is a static test which does not simulate conditions at the disposal sites (Alcatraz and the ocean disposal site) in which water is constantly flowing. Thus, results should represent a worst case scenario and should substantially overestimate effects that may occur in the field.

Rhepoxynius abronius may not be a suitable test organism for sediments from San Francisco Bay. Further research studies involving this species and sediments from San Francisco Bay are necessary to determine the suitability of the test organism. This research must address the use of different reference sediments with grain size comparable to each test sediment. The use of another species of amphipod, such as Ampelisca, which is known to reside in San Francisco Bay is currently being investigated by EPA and National Oceanic and Atmospheric Administration.

In summary, the results of the Rhepoxynius bioassay are difficult to interpret because of its sensitivity to fine grained sediments, the high variability of the test results, and the relatively recent use of this test to measure pollutant effects of sediments from San Francisco Bay.

In order to assess the potential for contaminants from the dredged material to be bioaccumulated in the tissues of marine organisms, the tissue of clams and polychaete worms surviving 20-day solid phase bioassays were analyzed for specified chemical constituents (see Tables 6, and 26-43). Attachment 2 contains a summary of the quality assurance data for the bioaccumulation data. Bioaccumulation results indicate that there was a statistically higher concentration of chromium, lead, and zinc in the tissue of clams exposed to sediment from several areas within Oakland Harbor than in clams exposed to the reference sediment (see Tables 26-31). Although bulk chemical analyses indicate the presence of several heavy metals in concentrations higher than those found at the disposal site, closer examination of the bioaccumulation data revealed that the tissue concentrations in the organisms were low as compared to the concentrations in the reference animals. The magnitude of the difference from the reference is small ranging from less than two to four times the reference concentration. None of these differences approached an order of magnitude. Furthermore, the tissue concentrations did not exceed the established FDA-type limits (see Table 1). In fact, no values exceeded one-half the FDA-type limit. In addition, the toxicological importance of the above mentioned contaminants is low (see Table 2) as indicated by a ranking of EPA chronic water quality criteria for protection of aquatic life in sea water. Finally, these metals are not known to bioaccumulate in the marine environment (Kay, 1984). In addition to the trace metals already mentioned, the concentration of chlorinated pesticides (DDE) in the tissue of clams was statistically higher than in clams exposed to the reference sediment for only one station (Oakland Inner Harbor Station 1)(see Table 33). Again the tissue concentration in the test organisms was low as compared to the reference level. The value only exceeded the reference concentration by a factor of 2 and was far below the established FDA-type limits (.005 times the FDA limit) as presented in Table 1. It should be noted that all of the bioaccumulation tests were conducted using 20-day exposure period which is twice as long as is normally used (EPA/USACE, 1977). This was done to further evaluate the potential for bioaccumulation even though the normal ten day exposure would have been adequate (Rubinstein et al., 1983; Rogerson et al., 1985).

Bioaccumulation test results for the polychaete worms reveal that only the concentration of silver in tissue of organisms exposed to sediments from Area 3 in Oakland Inner Harbor and Area 2 in Oakland Outer Harbor was statistically higher than in those exposed to reference sediment (see Tables 6 and 35-43). Closer examination of these data revealed that the tissue concentration of silver was low as compared to the reference levels and below levels reported to cause reproductive effects in other test species (Dillon and Gibson, 1985). In addition, the tissue concentration only exceeded the reference concentration by a factor of 2.5.

In summary, the above results and discussion indicate there is little concern that an unacceptable adverse impact with regard to bioaccumulation will occur in the aquatic environment. Furthermore, the magnitude of the bioaccumulation never approached an order of magnitude (10 times the reference levels) which is normally used in risk assessments to indicate potential impacts. Finally, none of the bioaccumulation values approached the established FDA-type limits.

After considering the eight factors recommended by Peddicord et al. (1986), it was determined that these bioaccumulation and toxicity test results for Oakland Harbor indicate there is little concern that unacceptable impacts would occur in the field. Even though some toxicity and bioaccumulation were observed in all of the composite samples, only five out of 33 contaminants showed any bioaccumulation. In addition, only one species showed any uptake for any one of the contaminants and under no circumstances was the FDA-type level approached. In all cases, the magnitude of bioaccumulation above reference levels is below four and never approaches an order of magnitude (10 times the reference levels). The toxicological importance of all contaminants bioaccumulated to concentrations exceeding reference levels was low as indicated by a ranking of EPA chronic water quality criteria for the protection of aquatic life in sea water. Only four out of seven species showed any toxicity when exposed to the same test sediment. However, the suitability of one of these four species (Rhepoxynius abronius) as a test species for sediments from San Francisco Bay is questionable. Finally the magnitude of the toxicity caused by the same test sediment was below 50 percent for all species tested except Rhepoxynius abronius which may have been affected by the particle size of the test sediments.

After evaluating the results of the initial toxicity and bioaccumulation testing collectively in light of the eight factors recommended by Peddicord et al. (1986), the Corps has determined that material from Oakland Inner and Oakland Outer Harbors is suitable for disposal at Alcatraz and an ocean site pursuant to the requirements of Section 404 of the CWA and Section 103 of the MPRSA.

Additional Testing

Sediment Quality. Concerns were raised during the comment period on the draft SEIS about the quality of sediments in the proposed turning basin adjacent to Schnitzer Steel and Alameda Gateway (formerly Todd Shipyard) because of landbased activities. Consequently, additional testing was conducted on material from these areas. Three sediment core samples were obtained from the areas adjacent to Schnitzer Steel and four from the area adjacent to the old Todd Shipyard site to a depth of -44 feet MLLW wherever possible (see Figure 8). Sediment and water samples were also obtained from the Alcatraz disposal site to be used as a reference. All of the sediment samples were analyzed individually for twelve trace metals, eighteen chlorinated pesticides, seven PCB congeners, sixteen polycyclic aromatic hydrocarbons (PAH's), phenols, pthalates, cyanide, and sulfides. These data are summarized in Table 44. Oyster larvae bioassays were also performed on individual sediment samples.

The concentration of trace metals in sediment from the Schnitzer Steel stations appeared to be elevated when compared to sediment from

Alcatraz. The concentration of mercury at Station S2 (1.3 ug/g dry weight) is five times greater than at Alcatraz. The concentration of trace metals at the Todd Shipyard Stations were much greater than at the Schnitzer Steel site. Of greatest concern is the concentration of mercury at Station T5 (8.0 ug/g dry weight).

No pesticides or phenols were detected in any of the samples. The concentration of PAH's ranged from a low of 6.60 ug/g at Station S1 at Schnitzer Steel to a high of 30.97 ug/g at Station T5 at Todd Shipyard. The Schnitzer Steel site had two stations with concentrations of PAH's an order of magnitude above the reference. Station S2 had a concentration of 13.4 ug/g; Station S3 a concentration of 17.7 ug/g. Two stations at Todd Shipyard had concentrations of PAH's an order of magnitude above the reference. Station T5 had a concentration of 29.82 ug/g; Station T6 had a concentration of 30.97 ug/g. The concentration of total pthalates ranged from 0.74 ug/g at Station S1 to 1.91 ug/g at Station S2. Alcatraz sediment had a concentration of 1.24 ug/g. Todd Shipyard had concentrations of PCB's between five and six times the reference concentration (0.09 ug/g). Todd Shipyard sediments had concentrations of tri-butyl tin that were between five and nineteen times the reference concentration. Station T6 had a concentration of 180 ug/kg; Station T7 had a concentration of 582 ug/kg.

Water Column Impacts. Results of the oyster larvae bioassays indicate that water from the Alcatraz disposal site was toxic to the larvae and resulted in only 20 percent survival as compared to 80 percent survival in the control water. In addition, only 65 percent of the larvae exposed to Alcatraz water developed normally. Exposure of larvae to sediment from Schnitzer Steel and Todd Shipyard also resulted in lower survival than for larvae exposed to control water. In addition, a higher percentage of oyster larvae exposed to sediment from the test sites developed abnormally than did those exposed to reference and control water. Calculated EC50 values ranged from 21.7% to 24.7% for the three stations at Schnitzer Steel and from approximately 0% (at two stations) to 17.3% for the four stations at Todd Shipyard.

The results of the oyster larvae bioassays are difficult to interpret because it is impossible to separate effects of contaminants from sampling errors. The sediment was inadvertently frozen prior to testing. In addition, the water and sediment samples were stored in plastic containers after sampling. Toxicity and abnormal development may have been a result of contaminants such as pthalates leaching from the plastic containers. Furthermore, freezing the sediments may have resulted in increased contaminant mobility. The sediments from Schnitzer Steel and Todd Shipyard are very cohesive materials that are unlikely to mix with other material or to be mixed with water during dredging or disposal operations. Thus, water column impacts should be much less than observed in laboratory tests where total suspensions were prepared.

In summary, sediments from areas adjacent to Todd Shipyard generally have higher concentrations of contaminants than the

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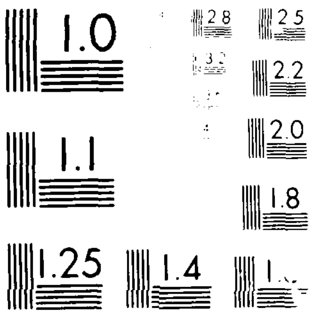
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Alcatraz disposal site and Schnitzer Steel. Of greatest concern are the concentration of PAH's at Stations S2, S3, T5 and T6; the concentration of mercury at Stations T5, T6, and T7; the concentration of PCB's at Stations T6 and T7; and the concentration of tri-butyl tin at Stations T6 and T7. These contaminants can have an adverse impact on marine organisms. Consequently, further evaluation including toxicity and bioacumulation testing is necessary to determine the potential biological impact of these contaminants. Without results of these tests, it must be assumed that these contaminants are potentially bioavailable. Hence, the unrestricted open-water disposal of this material would result in unacceptable adverse impacts on the marine environment. However, no unacceptable adverse impacts would occur if restrictions are placed on the disposal operation so that material from Schnitzer Steel and Todd Shipyard is covered with acceptable cleaner material and isolated from the marine environment. Such a procedure would not be effective at the Alcatraz disposal site because of the existing high energy dispersive environment at Alcatraz. A low energy retentive site is required for the successful isolation of unacceptable material.

ALCATRAZ

Sediment Quality. Four sediment core samples were obtained from each of four quadrants within the Alcatraz disposal area (See Figure 9) in November, 1987. These cores were taken with a vibracore unit to a depth of -72 feet, MLLW. The four core samples within each quadrant were composited for a total of four composited samples. The samples are as follows: Area A200 was the northwest quadrant; Area B200 was the northeast quadrant; Area C200 was the southeast quadrant; and Area D200 was the southwest quadrant. Reference sediment was collected from the vicinity of the proposed ocean disposal site located at 37° 41' 47" N; 122° 42' 16" W, approximately 15.6 nautical miles southwest of the Golden Gate Bridge. Control sediment was clean, uncontaminated sand collected subtidally from West Beach, Whidbey Island, Washington.

Bulk sediment analyses were conducted on each of the four composite Alcatraz samples, the reference sediment and the control sediment. Selection of constituents for which the sediment samples were analyzed was based on results of previous chemical testing of Alcatraz sediment core samples (See Table 45), local concerns, and the requirements of the Ocean Dumping Act (40 CFR 227.13). The six sediment samples were analyzed for six trace metals (antimony, cadmium, copper, lead, mercury, and nickel), 18 chlorinated pesticides, seven PCB congeners, polycyclic aromatic hydrocarbons (PAH's), total organic carbon, and grain size (See Table 46). Concentrations of parameters which were detected in control, reference and four test sediments are summarized in Table 47. Several of the sediment samples from Alcatraz appear to have higher concentrations of trace metals, pesticides, PCB's and PAH's than the reference site. This is expected as a result of the disposal activities at the Alcatraz site. Of greatest concern is the concentrations of PAH's in samples B200 and C200. These samples have concentrations of total PAH's of 78.65 ug/g (dry weight) and 9.51

ug/g (dry weight), respectively. As discussed earlier in this appendix, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a result of dredging or disposal of this material. At present there are no numerical criteria for evaluating contaminant concentrations in dredged sediments. Consequently, further evaluation in the form of bioassay and bioaccumulation tests were conducted.

Water Column Impacts. Suspended particulate phase bioassays were performed to determine the potential interactions among multiple contaminants and the potential for environmental impacts of dissolved contaminants as well as those associated with suspended particulates. Although toxicity of the proposed material was significantly greater than to the reference (See Table 48), in no case was the sediment toxic to 50 percent of the mysid shrimp. As a result, the LC50 was greater than 100 percent concentration of the dredged material suspended particulate phase. Survival of the flatfish and normal development of the oyster larvae was significantly lower in the test material than in the reference and less than 50 percent. Therefore, LC50's (EC50's for the oyster larvae) were calculated for each sediment sample in accordance with guidance provided by EPA/USACE (1977) and the Ocean Dumping Regulations (40 CFR 227.27). Since the LC50's and EC50's were less than 100 percent of the test medium it was necessary to determine whether the Limiting Permissible Concentration (LPC), defined as 0.01 times the LC50, would be exceeded at the disposal site when mixing is taken into account (40 CFR 227.29 and EPA/USACE, 1977).

After consideration of the mixing that occurs at the disposal site, it was concluded that no unacceptable water column impacts would occur as a result of disposal of material from the Alcatraz disposal site at either of the proposed ocean disposal sites (1M or B1) (See Attachment 1). It should be noted that mixing the composite samples took approximately 30 minutes to prepare the total suspensions. This indicates the presence of a very cohesive material that is unlikely to mix with other material or be easily mixed with water during dredging or disposal operations. Thus, water column impacts should be much less than observed in the laboratory tests where the total suspensions were prepared. Therefore, the suspended particulate phase testing on mysid shrimp, flatfish and oyster larvae would represent a worst case scenario and not realistic of what would be likely to occur in the field.

Benthic Impact. In order to assess the environmental effect of deposited dredged material, solid phase animal bioassays were conducted using the bent-nosed clam (*Macoma nasuta*), a polychaete worm (*Nephtys caecoides*), and an amphipod (*Rhepoxyinus abronius*). These tests measured mortality as the endpoint. A summary of solid phase bioassay data are presented in Table 49. None of the species demonstrated survival that was statistically lower in sediment from Alcatraz than survival in the reference sediment. Therefore, it was determined that there is little concern about unacceptable adverse toxicity impacts occurring in the field.

In order to assess the potential for contaminants from the dredged material to be bioaccumulated in the tissues of marine organisms, the tissue of clams and polychaete worms surviving 10-day solid phase bioassays were analyzed for specified chemical constituents (See Tables 50 and 51). Only the tissue of the bent-nose clam was analyzed for PAH's because bivalves appear to have a limited ability to metabolize and degrade PAH's (Clarke and Gibson, 1987). In general, the PAH body burden is difficult to measure because alteration is induced in the organism and the original compounds observed in the sediments may not be present in tissues.

Bioaccumulation results indicate that there was a statistically higher concentration of lead, DDE, DDD, and Dieldrin in the tissue of clams exposed to sediment from only one quadrant (not the same quadrant for each constituent) within Alcatraz than in clams exposed to the control sediment. Closer examination of the bioaccumulation data revealed that the tissue concentrations in the organisms were low as compared to the concentrations in the control-animals. The magnitude of the difference from the control is small ranging from just greater than one to 1.5 times the reference concentration. Furthermore, the tissue concentrations did not exceed the established FDA-type limits (see table 1). In fact, no values exceeded one-tenth the FDA-type limit. Furthermore, the toxicological importance of lead is low (see Table 2) as indicated by a ranking of EPA chronic water quality criteria for protection of aquatic life in sea water and it is not known to bioaccumulate in the marine environment (Kay, 1984). In addition to the constituents already mentioned, the concentration of eight of the PAH's in the tissue of clams was significantly higher than in clams exposed to the reference sediment from quadrant B200. The tissue concentration of the majority of the PAH's was relatively high as compared to the reference level. The values exceeded the reference concentration by a magnitude ranging from five to 400 times the reference concentration. Even though there are no FDA-type limits for these compounds nor are there EPA Chronic Water Quality Criteria for the majority of these compounds, this level of bioaccumulation is reason for concern. PAH's can alter or inhibit the development of embryos from aquatic organisms and have been implicated in the production of cancer in fish both in the field and in the laboratory (Clarke and Gibson, 1987). Studies by Malins et al. (1984) have shown the prevalence of liver lesions in fish are positively correlated with the presence of PAH in sediment.

Bioaccumulation test results for the polychaete worms reveal that the concentrations of lead, nickel, DDD, and DDE was higher in organisms exposed to sediment from several quadrants within Alcatraz than in those exposed to the control sediment. Closer examination of these data revealed that the tissue concentrations in the organisms were low as compared to the concentrations in the reference animals. The magnitude of the difference from the reference is small ranging from less than two to five times the reference concentration. Furthermore, the tissue concentrations did not exceed the FDA-type limits (see Table 1). In fact no values exceeded one-fifth the FDA-type limit. In addition, the toxicological importance of lead and nickel is low (see Table 2) as indicated by a ranking of EPA chronic water quality criteria for protection of aquatic life in sea water and they are not known to bioaccumulate in the marine environment (Kay, 1984).

In summary, the above results and discussion indicate there is little concern that an unacceptable adverse impact with regard to bioaccumulation will occur in the aquatic environment except for PAH's from quadrant B200. Furthermore, the magnitude of the bioaccumulation never approached an order of magnitude (10 times the reference levels) except for PAH's in quadrant B200 which approached three orders of magnitude. An order of magnitude is normally used in risk assessment to indicate potential impacts. Finally, none of the bioaccumulation values approached the established FDA-type limits.

After considering the eight factor recommended by Peddicord et al. (19861), it was determined that the bioaccumulation and toxicity test results from Alcatraz indicate that there is little concern that unacceptable impacts would occur in the field as a result of disposal of material with the exception of area B200. Even though area C200 did not show significant bioaccumulation of PAH's or toxicity in the solid phase, there is still some reason for concern since the concentration of PAH's in the area was 9.5 ug/g dry weight and the total organic carbon content was relatively low. Based on the above information, it is apparent that dredged material from area B200 is not acceptable for unrestricted open water disposal. To be acceptable for open-water disposal, this material must be isolated from the marine environment. This may be achieved by covering this sediment with acceptable material so that bottom dwelling organisms cannot live and feed in and on this material. An environmentally conservative approach would be to dispose of material from B200 first, then material from C200 and finally, covered by other clean material. If these restrictions are followed for material from these two areas, unacceptable adverse impacts would not be expected to occur as a result of their disposal in the marine environment.

The San Francisco District is currently planning studies to determine the extent of the contamination and its location in the Alcatraz mound.

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TABLE 1

ACTION LEVELS AND MAXIMUM CONCENTRATION OF CONTAMINANTS IN AQUATIC ORGANISMS FOR HUMAN CONSUMPTION

Chemical	Food	Action level[1] mg/kg (wet weight edible portion)	Maximum Concentration[2] mg/kg (wet weight edible portion)
Aldrin	Fish and Shellfish	0.3	-[3]
Arsenic	Fish, Crustacea, molluscs	-	1.0
Cadmium	Molluscs	-	1.0
Chlordane	Fish	0.3	
Chromium		-	-
Copper	Molluscs	-	70.0
	All nonspecified foods	-	10.0
DDT, DDE, TDE	Fish	5.0	-
Dieldrin	Fish and Shellfish	0.3	-
Endrin	Fish and Shellfish	0.3	-
Heptachlor and Heptachlor epoxide	Fish and Shellfish	0.3	-
HCH	Frog legs	-	0.5
Lead	Molluscs	-	2.5
	All nonspecified foods	-	1.5
Mercury	Fish, Crustacea, molluscs	-	0.5
PCB (total)	Fish and Shellfish	2.0[4]	-
Toxaphene	Fish	5.0	-
Zinc	Oysters	-	1,000.0
	All nonspecified foods	-	150.0

1 United States Food and Drug Administration (FDA) Action levels for Poisonous and Deleterious Substances in Human Food.
2 Australian National Health and Medical Research Council Standards for Metals in Food, May 1980.
3 -- indicates that no action level or maximum concentration has been established.
4 This is not an action level but a tolerance limit established through the rule making process.

Source: Peddicord et al (1986).

TABLE 2
Ranking of Toxicological Importance of Contaminants
Based on EPA Chronic Water Quality Criteria for
Protection of Aquatic life in Sea Water

Rank	Criteria Range ug/l	Contaminant*
4	0.001-0.01	DDT Dieldrin Endrin Heptachlor Endosulfan
3	0.01-0.1	Mercury PCB Chlordane
2	1-10	Copper Lead Nickel Cadmium
1	10-100	Chromium (Hex) Selenium Zinc

* Within each rank, contaminants are listed in order of increasing criterion values.

Source: Peddicord, et al, 1986

TABLE 3
SEDIMENT CORE LOCATIONS AND DEPTH
OAKLAND INNER AND OUTER HARBORS

OAKLAND INNER HARBOR

Station	Core Identification	Core Location N. Latitude	Core Location W. Longitude	Core Length
Oakland Inner #1	OI-1-aa*	37°48'13.9"	122°20'37.4"	9'
	OI-1-b	5.2"	10.2"	28'
	OI-1-cc	2.2"	1.1"	26'
	OI-1-d	47'48.1"	19'22.2"	4'
	OI-1-e	41.9"	18'53.6"	6'
Oakland Inner #2	OI-2-a	37°47'40.9"	122°18'38.6"	6'
	OI-2-b	40.2"	33.7"	14'
	OI-2-cc	35.8"	27.1"	5'
	OI-2-dd	34.6"	17'56.3"	13'
	OI-2-e	27.7"	57.4"	13'
	OI-2-f	35.1"	48.0"	13'
	OI-2-g	32.2"	42.1"	9'
Oakland Inner #3	OI-3-aa	37°47'34.2"	122°17'29.6"	7'
	OI-3-b	32.3"	20.8"	12'
	OI-3-cc	30.6"	16.4"	9'
	OI-3-dd	40.5"	19.5"	19'
	OI-3-ee	41.5"	16'47.5"	26'

OAKLAND OUTER HARBOR

Station	Core Identification	N. Latitude	W. Longitude	Core Length
Oakland Outer #1	OO-1-a	37°48' 6.7"	122°21' 1.2"	**
	OO-1-bb	19.9"	20'53.8"	10'
	OO-1-cc	49.5"	19'43.2"	14'
	OO-1-d	51.9"	31.9"	23'
	OO-1-ee	39.4"	20.2"	18'
Oakland Outer #2	OO-2-a	37°48'14.3"	122°21'10.7"	11'
	OO-2-b	12.1"	4.8"	4'
	OO-2-c	23.4"		
20'36.4"	5'			
	OO-2-d	38.4"	7.8"	4'
	OO-2-e	43.7"	19'39.7"	5'
	OO-2-f	45.2"	24.8"	6'
	OO-2-g	39.8"	24.6"	14'
	OO-2-h	58.3"	5.7"	9'
	OO-2-i	49' 6.2"	18'57.5"	6'
	OO-2-j	14.9"	36.7"	9'

*Core locations identified by double lower case letters were sampled in duplicate to provide sediment for chemical analysis.
**Depth at location OO-1-a exceeded project depth - no sample was collected.

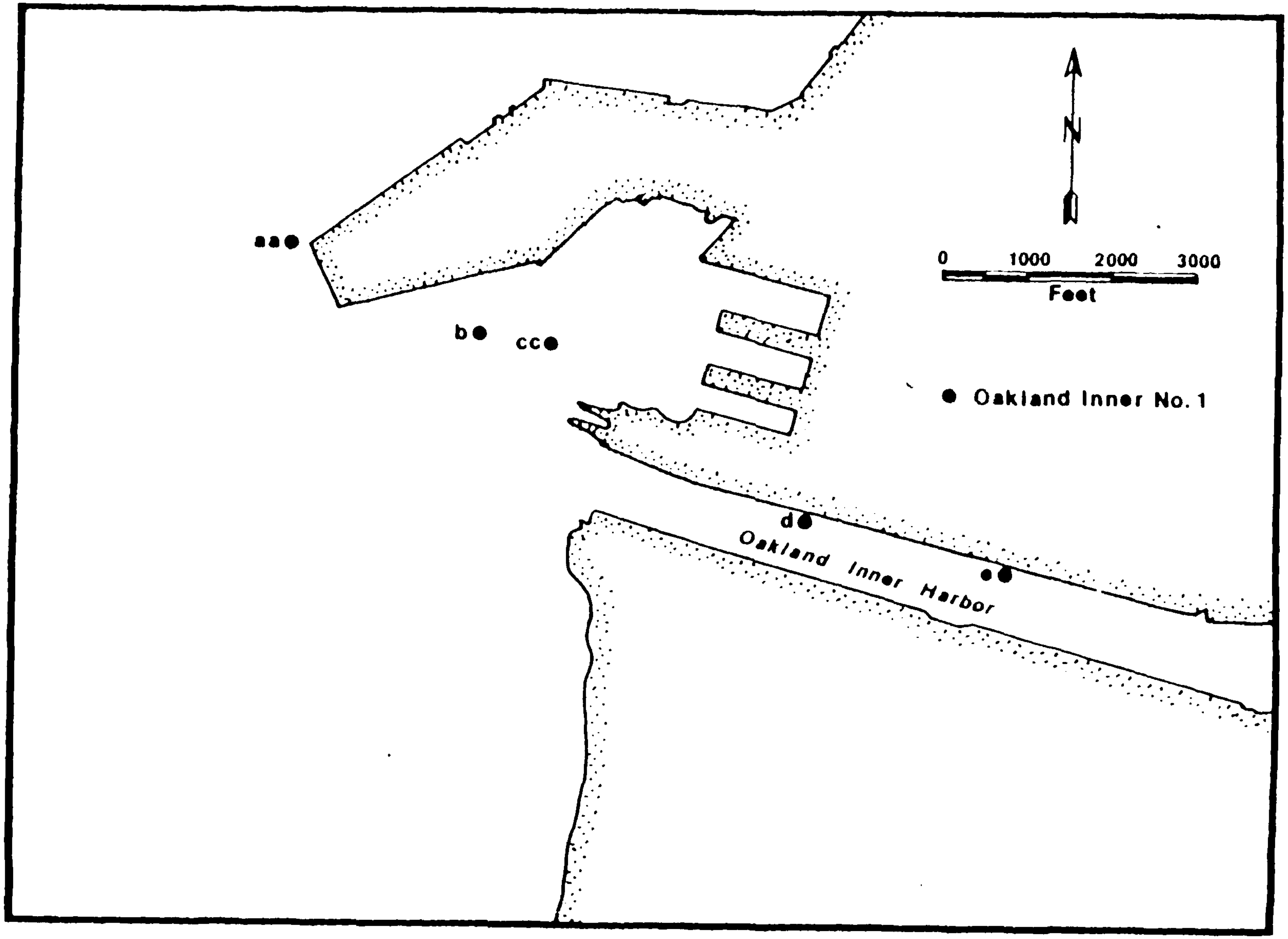


FIGURE 1 - SEDIMENT CORE STATION LOCATIONS - OAKLAND INNER NUMBER 1

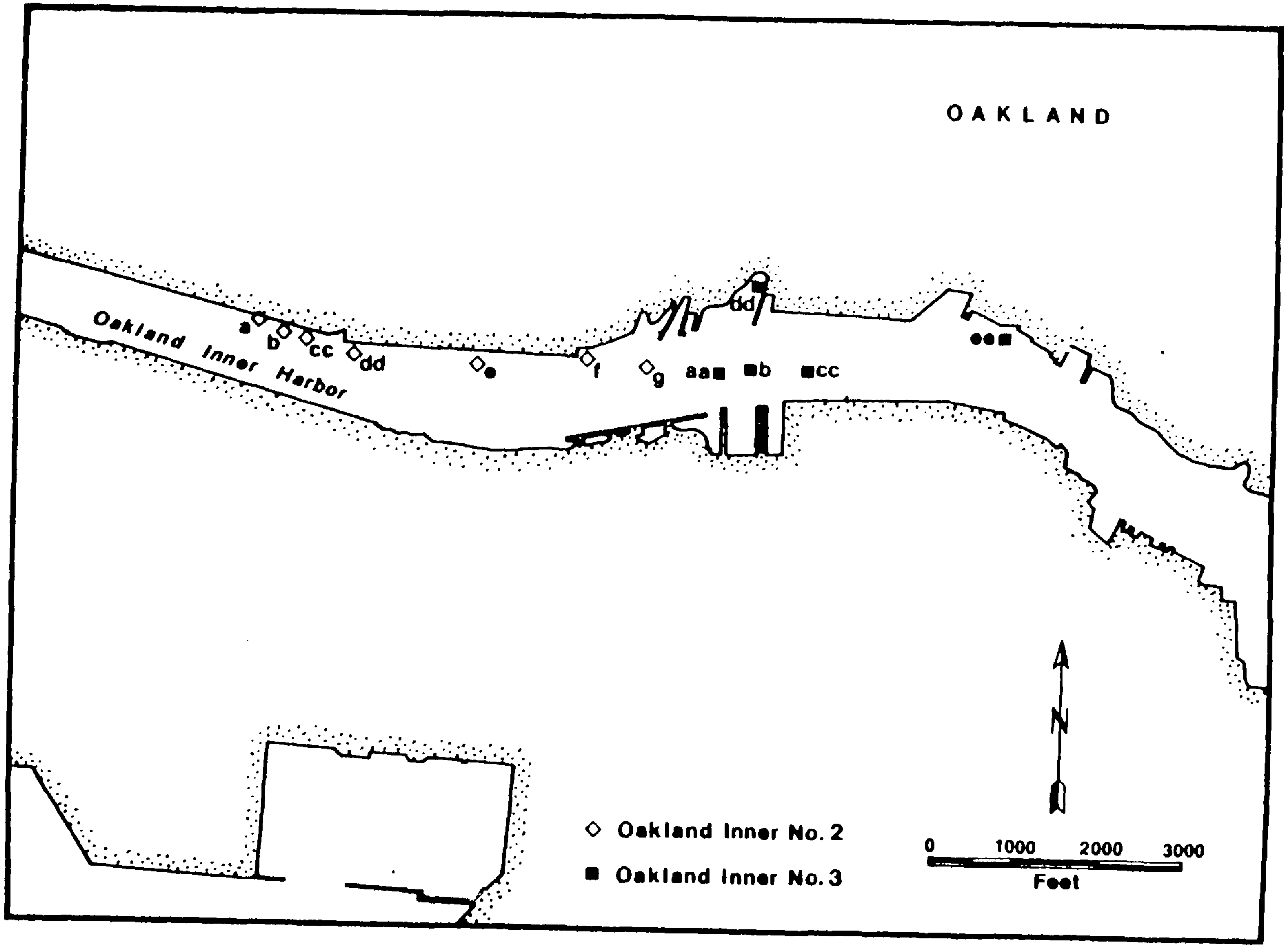


FIGURE 2 - SEDIMENT CORE AND STATION LOCATIONS - OAKLAND INNER NUMBERS 2 and 3

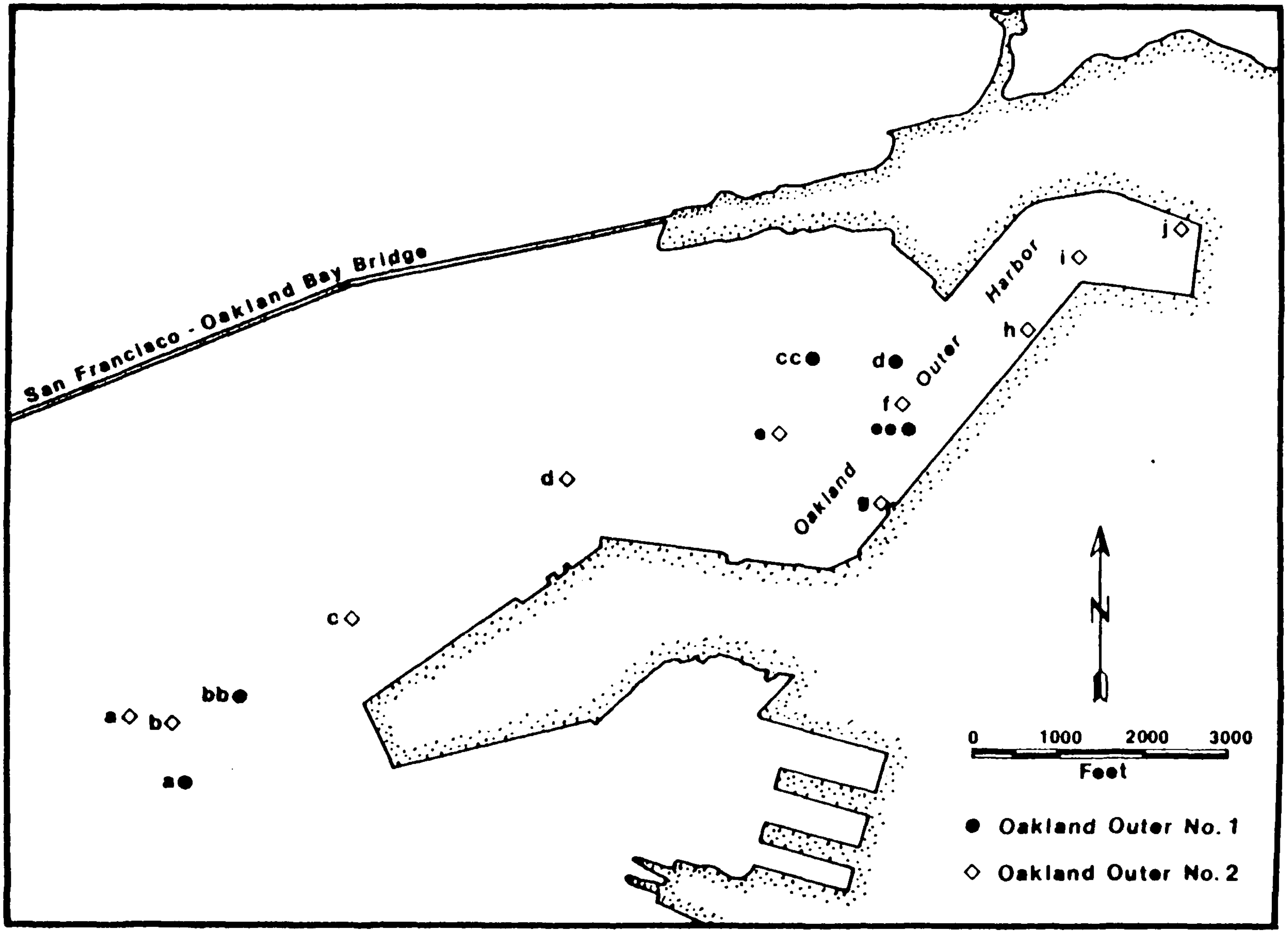


FIGURE 3 - SEDIMENT CORE STATION LOCATIONS - OAKLAND OUTER NUMBERS 1 AND 2

TABLE 4
SEDIMENT CHEMISTRY FOR OAKLAND HARBORS
(wet weight)

	OAKLAND INNER								OAKLAND OUTER			ALCATRAZ[b]
	1aa	1cc	2cc	2dd	3aa	3cc	3dd	3ee	1bb	1cc	1ee	
Arsenic (ppm)	-3.0[a]	-3.0	3.0	-3.0	4.0	5.0	20.0	-3.0	9.0	8.0	9.0	0.4-1.2
Cadmium (ppm)	0.16	0.13	0.30	0.27	0.57	0.38	2.70	0.92	0.94	0.23	0.47	0.81-1.0
Chromium (ppm)	56.0	39.0	57.0	62.0	86.0	73.0	130.0	58.0	80.0	40.0	86.0	56.0-74.0
Copper (ppm)	18.0	19.0	23.0	34.0	76.0	54.0	440.0	45.0	52.0	18.0	60.0	12.0-26.0
Lead (ppm)	9.1	2.5	16.0	13.0	36.0	34.0	200.0	43.0	35.0	7.1	29.0	11.0-45.0
Mercury (ppm)	0.21	0.03	0.26	0.21	0.50	0.68	3.4	1.4	0.38	0.15	0.35	0.06-0.26
Nickel (ppm)	51.0	32.0	53.0	70.0	73.0	77.0	98.0	60.0	75.0	34.0	90.0	28.0-46.0
Silver (ppm)	-0.1	-0.1	0.2	-0.1	-0.1	0.1	-0.1	0.1	0.1	-0.1	0.2	0.58-0.86
Selenium (ppm)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	0.09-0.14
Zinc (ppm)	60.0	42.0	69.0	81.0	130.0	120.0	540.0	137.0	140.0	46.0	163.0	36.0-64.0
Oil and Grease (ppm)	185.0	60.0	700.0	750.0	745.0	785.0	3600.0	2300.0	805.0	140.0	875.0	---[c]
Petroleum Hydrocarbons (ppm)	70.0	25.0	90.0	111.0	205.0	135.0	134.0	118.0	200.0	50.0	160.0	---
PCB's (ppb)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-20.0
Aldrin (ppb)	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-.5
Dieldrin (ppb)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-.5
Chlordane and related compounds (ppb)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
DDT and Deriv (ppb)	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	d
Endrin (ppb)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	e
HCH & Toxaphene (ppb)	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-30.0

a Values with minus sign are less than detection limits

b Values are a range of seven values

c --- indicates test not performed.

d Detection limits are as follows: DDT (1ppb), 4,4'-DDE (0.5ppb), and 2,4'DDE (1ppb). DDD was detected in 2 samples with a high value of 8 ppb. DDE was detected in 4 samples with a high value of 3.4 ppb. DDT was detected in 1 sample with a value of 2 ppb. All other values were below level of detection.

e None detected. The detection limit for Endrin is .5 ppb and 2 ppb for Endrin aldehyde.

TABLE 5
ELUTRIATE CHEMISTRY FOR OAKLAND HARBOR

	OAKLAND INNER								OAKLAND OUTER			BACKGROUND	STATE* WATER Quality
	1aa	1cc	2cc	2dd	3aa	3cc	3dd	3ee	1bb	1cc	1ee	WATER	OBJECTIVES
Arsenic (ug/l)	-5.0	5.0	-5.0	8.0	5.0	-5.0	5.0	-5.0	30.0	5.0	-5.0	-5.0	80.0
Cadmium (ug/l)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	1.0	-1.0	-1.0	-1.0	30.0
Chromium (ug/l)	-3.0	3.0	10.0	4.0	5.0	4.0	-3.0	-3.0	-3.0	4.0	5.0	-3.0	20.0
Copper (ug/l)	40.0	60.0	30.0	30.0	40.0	30.0	20.0	-10.0	20.0	-10.0	-10.0	-10.0	50.0
Lead (ug/l)	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	50.0
Mercury (ug/l)	-.5	-.5	-.5	-.5	-.5	3.3	-.5	-.5	-.5	-.5	-.5	-.5	1.4
Nickel (ug/l)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	20.0	-6.0	200.0
Silver (ug/l)	-5.0	-5.0	-5.0	-5.0	- 5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	4.5
Selenium (ug/l)	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	--
Zinc (ug/l)	100.0	300.0	90.0	30.0	50.0	50.0	60.0	20.0	10.0	-2.0	3.0	-2.0	170.0
Oil and grease (mg/l)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	2.6	-1.0	-1.0	1.0	-1.0	-1.0	--
Petroleum Hydro (mg/l)	-.2	-.2	-.2	-.2	-.2	-.2	.4	-.2	-.2	.2	-.2	-.2	--
PCB's (ug/l)	-.06	-.06	-.06	-.06	-.06	-.06	-.06	-.06	-.06	-.06	-.06	-.06	.009**
Aldrin (ug/l)	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	.006***
Dieldrin (ug/l)	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	
Chlordane & related compounds (ug/l)	-.014	-.014	-.014	-.014	-.014	-.014	-.014	-.014	-.014	-.014	-.014	-.014	.009**
DDT & Deriv (ug/l)	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	.003**
Endrin (ug/l)	-.006	-.006	-.006	-.006	-.006	-.006	-.006	-.006	-.006	-.006	-.006	-.006	.006
HCH & Toxaphene (ug/l)	-.24	-.24	-.24	-.24	-.24	-.24	-.24	-.24	-.24	-.24	-.24	-.24	.033**

* Instantaneous maximum as contained in the State of California State Water Resources Control Board 1983 Water Quality Control Plan for Ocean Waters of California. These 1983 maximums are based on effluent limitations after 100 to 1 initial dilution in the receiving water. It should be noted that this Ocean Plan excludes San Francisco Bay Waters and does not apply to dredged material disposal. The only exception is the objective for zinc which is the instantaneous maximum contained in the California Regional Water Quality Control Board, San Francisco Bay Region, 1986 Water Quality Control Plan, San Francisco Bay Region (2).

** The laboratory technical capabilities to detect these constituents to the level of the instantaneous maximum specified in the Ocean Plan, did not exist at the time these tests were conducted at the U.S. Army Corps of Engineers South Pacific Division Laboratory.

*** Instantaneous maximum for Aldrin & Dieldrin.

TABLE 6
SUMMARY OF BIOASSAY RESULTS

Technical Evaluation

TEST DESCIPTION	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
SUSPENDED PARTICULATE PHASE BIOASSAYS					
Acanthomysis sculpta (mysid shrimp)	ns	ns	ns	ns	ns
Citharicththys stigmaeus (Speckled sanddab)	ns	ns	*	*	*
Mytilus edulis (mussel larvae)	*	ns	ns	ns	*
SOLID PHASE I BIOASSAYS					
Acanthomysis sculpta (mysid shrimp)	ns	ns	ns	ns	ns
Macoma nasuta (bent-nose clam)	ns	ns	ns	ns	ns
Nephtys caecoides (polychaete worm)	*	*	*	*	*
SOLID PHASE II BIOASSAYS - Rhepoxynius abronius (amphipod)					
Survival	*	*	*	*	*
Emergence	ns	ns	ns	ns	ns
Reburial	ns	ns	ns	ns	ns
BIOACCUMULATION - Macoma nasuta (bent-nose clam)					
Cadmium	ns	ns	ns	ns	ns
Chromium	*	*	*	*	*
Copper	ns	ns	ns	ns	ns
Lead	*	*	*	ns	*
Mercury	ns	ns	ns	ns	ns
Silver	ns	ns	ns	ns	ns
Zinc	*	ns	*	ns	*
Chlorinated Pesticides and PCB's	*	ns	ns	ns	ns
Petroleum Hydrocarbons	ns	ns	ns	ns	ns
BIOACCUMULATION - Nephtys caecoides (polychaete worm)					
Cadmium	ns	ns	ns	ns	ns
Chromium	ns	ns	ns	ns	ns
Copper	ns	ns	ns	ns	ns
Lead	ns	ns	ns	ns	ns
Mercury	ns	ns	ns	ns	ns
Silver	ns	ns	*	*	ns
Zinc	ns	ns	ns	ns	ns
Chlorinated Pesticides and PCB's	ns	ns	ns	ns	ns
Petroleum Hydrocarbons	ns	ns	ns	ns	ns

ns indicates statistically non-significant result (alpha = 0.05)
* indicates statistically significant results (alpha = 0.05)

TABLE 7

SUSPENDED PARTICULATE PHASE BIOASSAY

Acanthomysis sculpta

Oakland Inner - 1

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
50%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	9
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10

TABLE 8

SUSPENDED PARTICULATE PHASE BIOASSAY

Acanthomysis sculpta

Oakland Inner - 2

Elutriate Concentration	Replicate	Number of Survivors 0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	8	8	8
	2	10	10	10	10	10	9	9
	3	10	10	10	10	10	10	10
50%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10

TABLE 9

SUSPENDED PARTICULATE PHASE BIOASSAY

Acanthomysis sculpta

Oakland Inner - 3

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	8	8	8
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
50%	1	10	10	10	10	9	9	9
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	9	9	9
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10

TABLE 10

SUSPENDED PARTICULATE PHASE BIOASSAY

Acanthomysis sculpta

Oakland Outer - 1

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	10	9	9
	2	10	10	10	10	10	10	10
	3	10	10	10	10	9	9	9
50%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10

TABLE 11

SUSPENDED PARTICULATE PHASE BIOASSAY

Acanthomysis sculpta

Oakland Outer - 2

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	10	10	8
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10
50%	1	10	10	10	10	8	8	8
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	9
	3	10	10	10	10	10	10	10

TABLE 12

SUSPENDED PARTICULATE PHASE BIOASSAY

Citharichthys stigmaeus

Oakland Inner - 1

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	9	9
	3	10	10	10	10	9	9	9
50%	1	10	10	10	10	10	10	10
	2	10	10	10	10	9	9	9
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	9	9	9
	2	10	10	10	10	9	9	9
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10

TABLE 13

SUSPENDED PARTICULATE PHASE BIOASSAY

Citharichthys stigmaeus

Oakland Inner - 2

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	9	9	9
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
50%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	9
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10

TABLE 14.

SUSPENDED PARTICULATE PHASE BIOASSAY

Citharichthys stigmaeus

Oakland Inner - 3

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	7	7	6
	2	10	10	10	10	9	9	9
	3	10	10	10	10	7	7	5
50%	1	10	10	10	10	10	9	9
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10

TABLE 15

SUSPENDED PARTICULATE PHASE BIOASSAY

Citharichthys stigmaeus

Oakland Outer - 1

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	9	9	8
	2	10	10	10	10	7	7	5
	3	10	10	10	10	9	9	7
50%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10

TABLE 16

SUSPENDED PARTICULATE PHASE BIOASSAY

Citharichthys stigmaeus

Oakland Outer.- 2

Elutriate Concentration	Replicate	Number of Survivors						
		0 hrs	4 hrs	8 hrs	24 hrs	48 hrs	72 hrs	96 hrs
100%	1	10	10	10	10	6	6	4
	2	10	10	10	10	6	6	5
	3	10	10	10	10	9	9	9
50%	1	10	10	10	10	10	10	9
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	9
10%	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10
Control	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10

TABLE 17

SUSPENDED PARTICULATE PHASE BIOASSAYS

Mytilus edulis larvae

Elutriate Concentration		Percent Normal Development to D Stage				
		Dredge Material Stations				
	Replicate	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
100%	1	90	100	91	98	98
	2	86	99	83	98	95
	3	83	98	76	96	92
50%	1	93	99	63	98	96
	2	98	100	97	100	99
	3	80	100	98	93	98
10%	1	94	99	99	98	100
	2	98	100	100	100	99
	3	98	100	100	99	100
Control	1	99	99	99	99	99
	2	100	100	100	100	100
	3	100	100	100	100	100

TABLE 13

SOLID PHASE BIOASSAY I

Nephtys caecoides

Replicate	Number of Survivors					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	10	8	10	8	9	7
2	10	7	9	9	8	7
3	10	10	9	8	9	8
4	10	8	10	8	9	8
5	10	9	8	8	10	7
6	10	9	7	9	9	6
7	10	8	8	10	9	8
8	10	9	8	8	7	9
9	9	9	9	7	6	7
10	10	8	9	7	9	7
Mean	9.9	8.5*	8.7*	8.2*	8.5*	7.4*
Variance	0.010	0.722	0.900	0.844	1.39	0.711

* Indicates significant mortality as compared with reference sediment.

TABLE 19

SOLID PHASE BIOASSAY I

Macoma nasuta

Replicate	Number of Survivors					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	10	10	10	10	10	10
2	10	9	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10
5	10	10	10	10	10	10
6	10	10	10	10	10	10
7	10	10	10	10	10	10
8	10	10	10	10	10	9
9	10	10	10	10	10	10
10	10	10	10	10	10	10
Mean	10	9.9	10	10	10	9.9
Variance	0	0.010	0	0	0	0.010

TABLE 20

SOLID PHASE BIOASSAY I

Acanthomysis sculpta

Replicate	Number of Survivors					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	8	9	6	9	10	6
2	9	9	5	9	9	6
3	10	6	7	9	8	10
4	10	5	7	8	8	10
5	8	9	7	8	8	8
6	7	9	7	7	7	7
7	10	7	9	9	7	8
8	10	6	8	9	7	7
9	9	7	10	8	10	9
10	9	6	9	7	10	8
Mean	9.0	7.3	7.5	8.3	8.4	7.9
Variance	1.11	2.46	2.28	0.68	1.60	2.10

TABLE 21

SOLID PHASE BIOASSAY II

Rhepoxynius abronius

Replicate	Number of Survivors					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	19	7	13	4	4	13
2	20	8	5	3	5	5
3	19	14	7	1	8	3
4	20	12	4	5	0	4
5	20	15	1	13	4	3
Mean	19.6	11.2*	6.0*	5.2*	4.2*	5.6*
Variance	0.30	12.70	20.00	21.20	8.20	17.80

* Indicates significant mortality as compared with reference sediment.

TABLE 22

SOLID PHASE BIOASSAY II

Rhepoxynius abronius

Replicate	Number of Individuals Emerged from Sediment					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	2	2	3	0	2	0
2	1	2	1	3	1	1
3	3	0	0	1	1	1
4	4	0	1	2	0	0
5	0	4	0	1	0	0
Mean	2.0	1.6	1.0	1.4	0.8	0.4
Variance	2.50	2.80	1.50	1.30	0.70	0.30

TABLE 23

SOLID PHASE BIOASSAY II

Rhepoxynius abronius

Replicate	Number of Survivors Failing to Rebury					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0	3	1	1	0	0
2	0	0	1	0	1	1
3	0	0	0	0	0	0
4	0	1	1	0	0	0
5	0	3	1	0	1	0
Mean	0	1.4	1.0	0.2	0.4	0.2
Variance	0	2.30	0.80	0.20	0.30	0.20

U.S. ARMY ENGINEER DIVISION LABORATORY -- SOUTH PACIFIC DIVISION

SOIL TEST RESULT SUMMARY

PROJECT Oakland Inner Harbor **DATE** March 1987

Division Serial No.	Hole No.	Field Sample No.	Depth Or Elevation		Laboratory Descriptive Classification	Mechanical Analysis-% Finer												Liquid Limit	Plasticity Index	Field Moist. %
						Gravel					Sand						Fines			
			From	To							#4	#10	#40	#60	#100		#200			
Oakland	Inner No.	1																		
86-436	1-aa-top				SP. Gr.= 2.71							100	94	58	20		12			23.9
86-434	1-cc-bot				Sp. Gr. = 2.70							100	81	38	14		7			24.2
Oakland	Inner No.	2																		
86-404	2-cc-top				SP.Gr.= 2.71							100	97	70	22		12			25.2
86-406	2-dd-top				Sp.Gr.= 2.71							100	99	79	43		30			50.9
Oakland	Inner No.	3																		
86-457	3-aa-top											100	99	93	77		69			94.9
86-459	3-cc-bot											100	99	84	63		57			88.7
86-408	3-dd-top												100	99	98		96			131.1
86-410	3-ee-top											100	99	75	35		27			41.2

SPD Form 66A
1 May 83

TABLE 24: GRAIN SIZE ANALYSIS OAKLAND INNER HARBOR

U.S. ARMY ENGINEER DIVISION LABORATORY -- SOUTH PACIFIC DIVISION

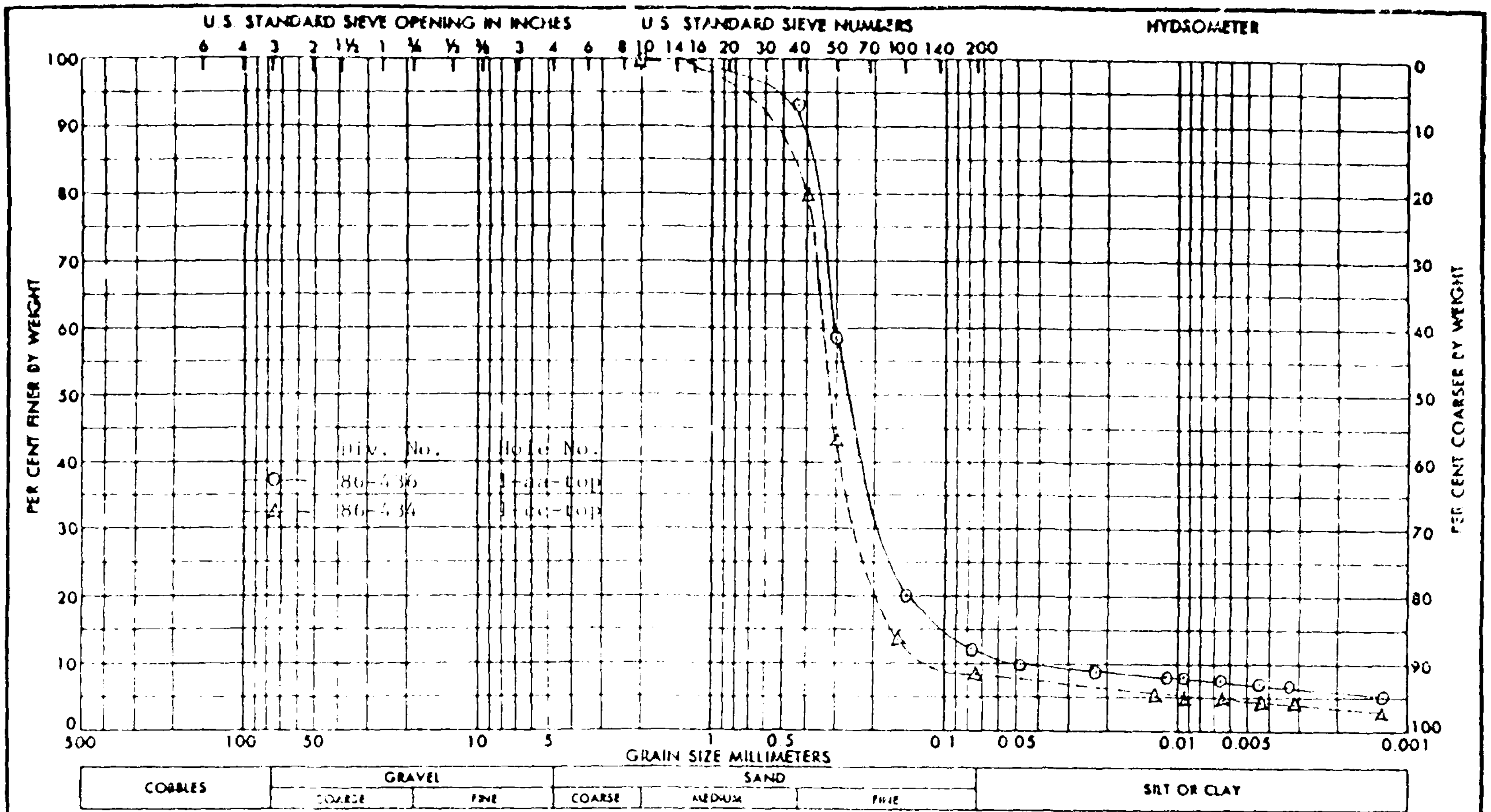
SOIL TEST RESULT SUMMARY

PROJECT Oakland Outer Harbor DATE March 1987

Division Serial No.	Hole No.	Field Sample No.	Depth Or Elevation From	Depth Or Elevation To	Laboratory Descriptive Classification	Mechanical Analysis-% Finer: Gravel					Sand						Fines	Liquid Limit	Plasticity Index	Field Moist. %
										3/8	#4	#10	#40	#60	#100		#200			
Oakland	Outer No.	1.																		
86-442	1-bb-top					Sp.	Gr.	2.69		100	99	97	87	43	11		3			26.8
86-438	1-cc-top					Sp.	Gr.	2.66					100	94	82		78			86.
86-440	1-ee-bot												100	99	98		97			23.9

SPD Form 66A
1 May 83

TABLE 25: GRAIN SIZE ANALYSIS OAKLAND OUTER HARBOR



SAMPLE NO	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
86-436			23.9			
86-43?			24.2			

GRADATION CURVES

PROJECT Oakland Inner Harbor

AREA Oakland Inner No. 1

BORING NO

DATE March 1987

ENG FORM 2087 1 MAY 63 REPLACES WES FORM NO 1241, SEP 1962, WHICH IS OBSOLETE

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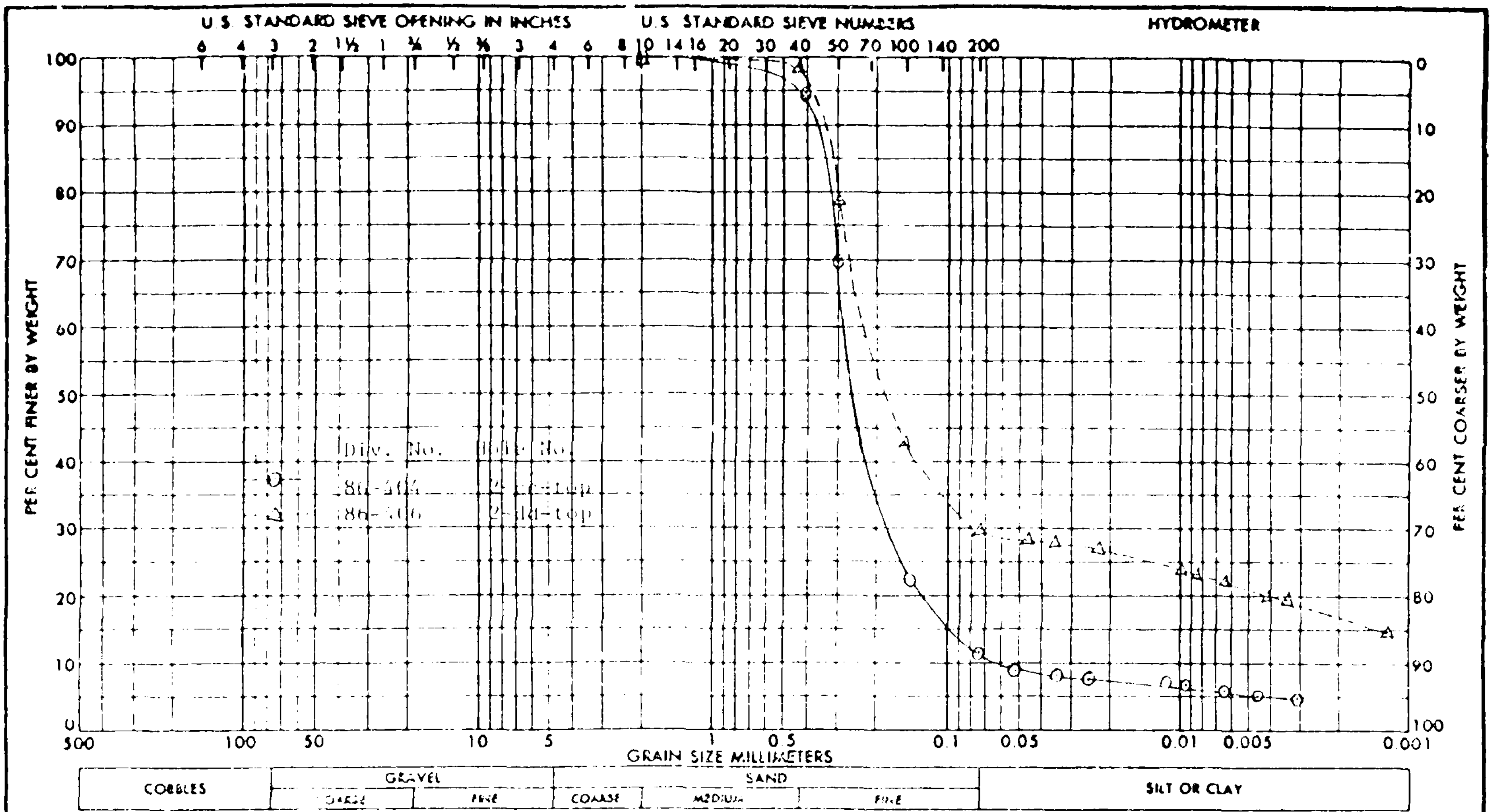
FIGURE 4: GRADATION CURVES OAKLAND INNER HARBOR AREA 1



SAMPLE NO	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
86-404			25.2			
86-406			50.9			

PROJECT Oakland Inner Harbor

AREA Oakland Inner No. 2

BORING NO

DATE March 1987

GRADATION CURVES

ENG FORM 1 MAY 63 2087 REPLACES WES FORM NO 1241, SEP 1962, WHICH IS OBSOLETE

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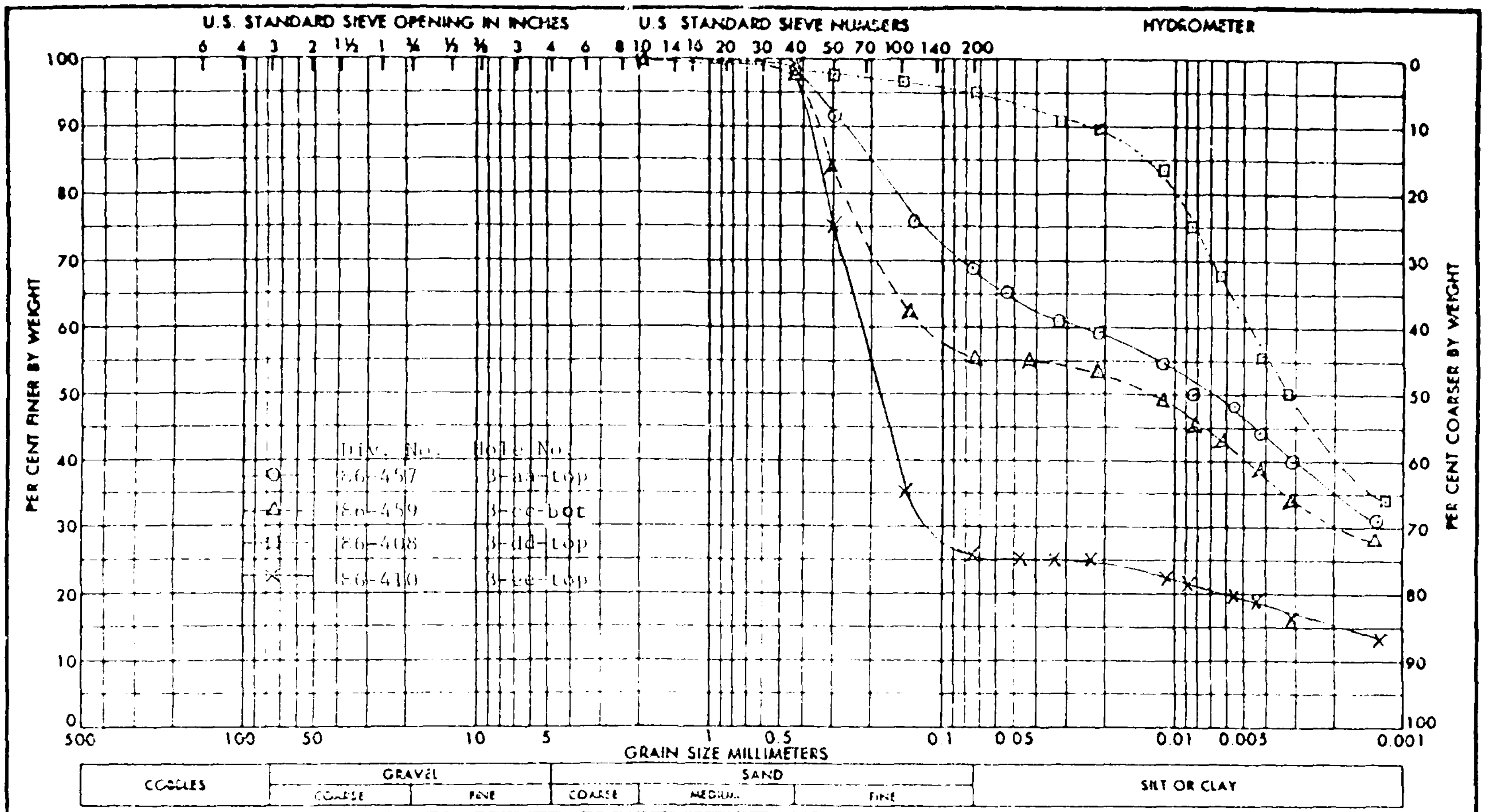
FIGURE 53: GRADATION CURVES OAKLAND INNER HARBOR AREA 2



SAMPLE NO	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
86-457			94.9			
86-459			88.7			
86-408			131.1			
86-410			41.2			

PROJECT Oakland Inner Harbor

AREA Oakland Inner No. 3

BORING NO

DATE March 1987

GRADATION CURVES

ENG FORM 1 MAY 63 2087 REPLACES WES FORM NO 1241, SEP 1962, WHICH IS OBSOLETE

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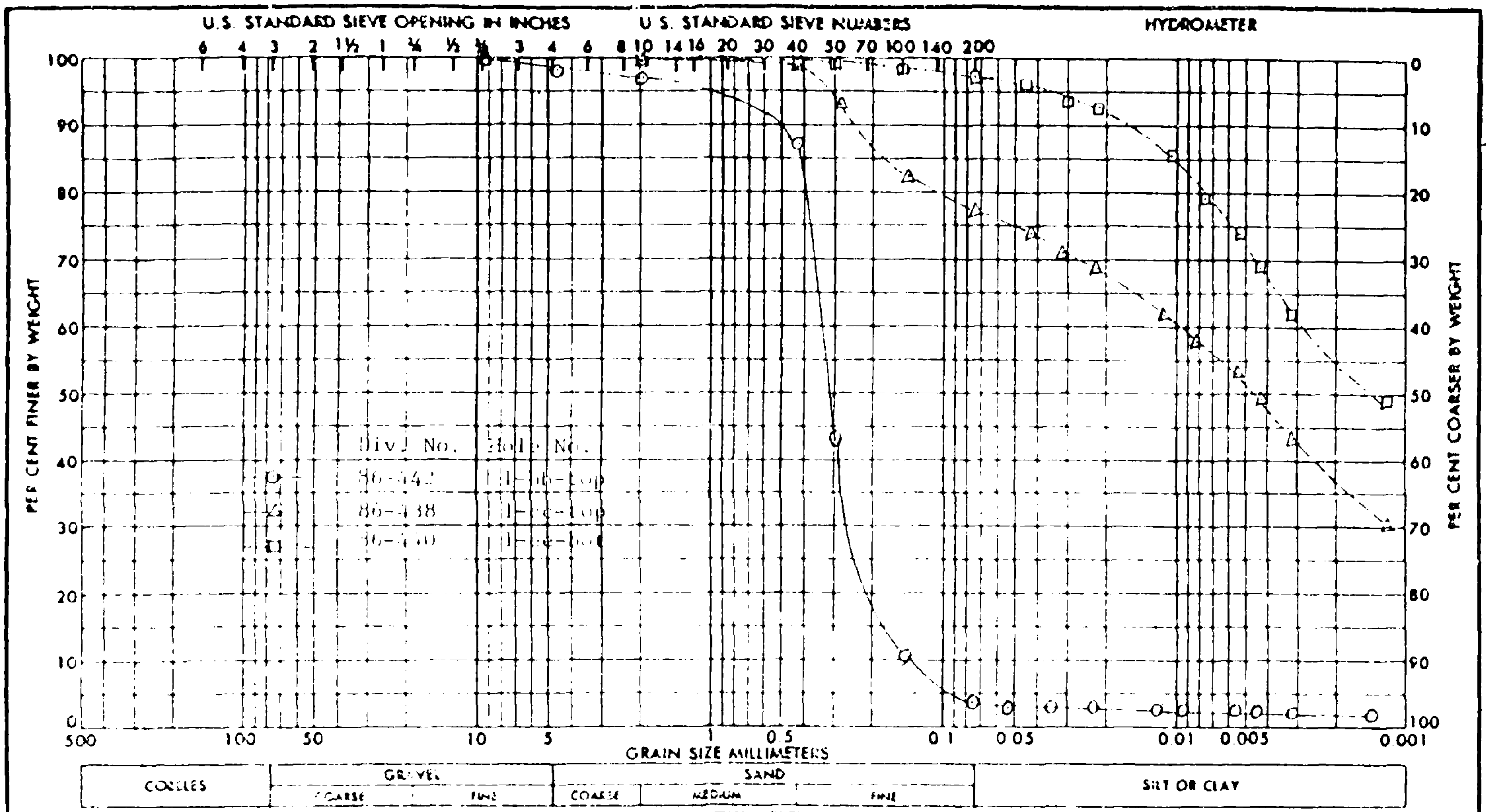
FIGURE 6: GRADATION CURVES OAKLAND INNER HARBOR AREA 3



SAMPLE NO	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
86-442			26.8			
86-438			86.5			
86-440			123.9			

PROJECT Oakland Outer Harbor

AREA Oakland Outer No. 1

BORING NO

DATE March 1987

GRADATION CURVES

ENG FORM 2087
1 MAY 63

REPLACES WES FORM NO 1241, SEP 1962, WHICH IS OBSOLETE

FIGURE 7: GRADATION CURVES OAKLAND OUTER HARBOR AREA 1

TABLE 26

BIOACCUMULATION DATA

Macoma nasuta

Cadmium

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.40	0.24	0.24	0.27	0.18	0.24
2	0.30	0.29	0.31	0.14	0.14	0.19
3	0.33	0.39	0.31	0.23	0.12	0.19
4	0.12	0.35	0.16	0.19	0.11	0.08
5	0.35	0.24	0.26	0.15	0.14	0.19
Mean	0.300	0.302	0.256	0.196	0.138	0.178
Variance	0.01145	0.00467	0.00383	0.00298	0.00072	0.00347

TABLE 27

BIOACCUMULATION DATA

Macoma nasuta

Chromium

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<1.0	2.4	3.6	1.2	8.3	6.0
2	<1.0	3.4	3.1	3.3	2.4	2.4
3	<1.0	1.3	3.6	2.7	<1.0	<1.0
4	<1.0	<1.0	3.6	2.4	6.0	10
5	1.1	<1.0	2.9	1.6	4.2	1.7
Mean	1.02	1.82*	3.36*	2.24*	4.38*	4.22*
Variance	0.0020	1.112	0.1130	0.7130	8.342	14.152

* indicates statistically significant result at alpha = 0.05

TABLE 28

BIOACCUMULATION DATA

Macoma nasuta

Copper

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	2.0	1.0	1.0	2.0	<1.0	2.0
2	2.0	1.0	1.0	1.0	1.0	1.0
3	2.0	2.0	1.0	2.0	1.0	1.7
4	2.0	1.0	1.0	2.0	1.0	1.7
5	1.0	1.0	1.0	1.0	1.0	2.0
Mean	1.80	1.20	1.0	1.60	1.0	1.68
Variance	0.20	0.20	0	0.30	0	0.17

TABLE 29

BIOACCUMULATION DATA

Macoma nasuta

Lead

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.66	1.10	0.52	0.87	0.47	1.03
2	0.45	1.40	0.61	1.82	0.60	0.96
3	0.58	1.94	1.58	1.07	0.41	1.76
4	0.32	0.47	0.98	0.82	0.48	1.04
5	0.58	0.61	0.81	0.66	0.58	0.55
Mean	0.518	1.104**	0.900**	1.048**	0.508	1.068**
Variance	0.01792	0.35813	0.17635	0.20767	0.00637	0.19027

** indicates statistically significant result at alpha = 0.01

TABLE 30

BIOACCUMULATION DATA

Macoma nasuta

Mercury

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.18	0.23	0.17	0.13	0.15	0.18
2	0.16	0.14	0.15	0.15	0.14	0.14
3	0.15	0.14	0.14	0.18	0.15	0.14
4	0.15	0.15	0.16	0.18	0.14	0.17
5	0.23	0.14	0.15	0.15	0.14	0.16
Mean	0.174	0.160	0.154	0.158	0.144	0.158
Variance	0.00113	0.00155	0.00013	0.00047	0.00003	0.00032

TABLE [illegible]

BIOACCUMULATION DATA

Macoma nasuta

Silver

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mean	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Variance	0	0	0	0	0	0

TABLE [illegible]

BIOACCUMULATION DATA

Macoma nasuta

Zinc

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	20	36	34	44	23	38
2	20	32	28	23	21	28
3	22	37	27	37	26	34
4	20	31	30	34	21	24
5	32	29	29	31	24	19
Mean	22.8	33.0*	29.6	33.8*	23.0	28.6*
Variance	27.20	4.5	7.30	59.70	4.50	57.80

* indicates statistically significant result at alpha = 0.05

TABLE 33

BIOACCUMULATION DATA

Macoma nasuta

Chlorinated Pesticides (only DDE detected)

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.008	0.030	0.016	0.018	0.014	0.010
2	0.008	0.034	0.017	0.018	0.010	0.010
3	0.012	0.027	0.015	0.023	0.015	<0.001
4	0.017	0.024	0.017	0.015	0.016	0.008
5	0.021	0.014	0.013	0.015	0.018	0.006
Mean	0.0132	0.0258*	0.0156	0.0178	0.0146	0.0070
Variance	0.000033	0.000057	0.000003	0.000011	0.000009	0.000014

* indicates statistically significant result at alpha = 0.05

TABLE 34

BIOACCUMULATION DATA

Macoma nasuta

Petroleum Hydrocarbons

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Mean	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Variance	0	0	0	0	0	0

TABLE 35

BIOACCUMULATION DATA

Nephtys caecoides

Cadmium

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.38	0.29	0.19	0.30	0.16	0.15
2	0.36	0.30	0.27	0.31	0.33	0.22
3	0.30	0.34	0.16	0.30	0.33	0.15
4	0.33	0.42	0.30	0.14	0.20	0.28
5	0.30	0.38	0.23	0.24	0.18	0.31
Mean	0.334	0.346	0.230	0.258	0.240	0.222
Variance	0.001280	0.002980	0.003250	0.005120	0.006950	0.005370

TABLE 36

BIOACCUMULATION DATA

Nephtys caecoides

Chromium

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	7.2	3.6	6.7	<1.0	3.0	17
2	5.1	3.5	4.6	3.2	1.2	4.1
3	3.0	2.3	8.9	3.2	3.2	2.6
4	4.6	2.6	5.8	7.2	1.1	<1.0
5	3.7	2.5	5.8	2.5	9.3	<1.0
Mean	4.72	2.90	6.36	3.42	3.56	5.14
Variance	2.577	0.365	2.573	5.272	11.25	45.62

TABLE 37

BIOACCUMULATION DATA

Nephtys caecoides

Copper

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<1	1	<1	1	1	<1
2	1	1	1	1	1	<1
3	<1	1	1	<1	1	<1
4	<1	1	1	1	1	1
5	<1	<1	1	1	1	<1
Mean	1	1	1	1	1	1
Variance	0	0	0	0	0	0

TABLE 38

BIOACCUMULATION DATA

Nephtys caecoides

Lead

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.08	0.11	0.10	0.10	0.18	0.11
2	0.15	0.12	0.05	0.17	0.11	0.16
3	0.08	0.16	0.96	0.21	0.09	0.21
4	0.19	0.14	0.12	0.21	0.12	0.21
5	0.15	0.11	0.15	0.19	0.10	0.16
Mean	0.130	0.128	0.276	0.176	0.120	0.170
Variance	0.00235	0.00047	0.14753	0.00208	0.00125	0.00175

TABLE 39

BIOACCUMULATION DATA

Nephtys caecoides

Mercury

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	0.07	0.02	<0.01	0.02	0.08	1.8
2	0.08	0.02	0.02	0.08	0.02	0.07
3	0.05	<0.01	<0.01	0.05	0.03	0.05
4	0.05	0.02	<0.01	0.06	0.02	0.02
5	0.02	0.04	<0.01	0.02	0.03	0.05
Mean	0.054	0.022	0.012	0.046	0.036	0.398
Variance	0.000530	0.000120	0.000020	0.000680	0.000630	0.615

TABLE 40

BIOACCUMULATION DATA

Nephtys caecoides

Silver

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<0.1	<0.1	<0.1	0.2	0.3	<0.1
2	<0.1	<0.1	<0.1	0.3	0.2	<0.1
3	0.1	<0.1	<0.1	0.2	0.2	<0.1
4	<0.1	<0.1	0.2	0.3	0.2	<0.1
5	<0.1	<0.1	<0.1	0.2	0.3	<0.1
Mean	0.1	0.1	0.12	0.240**	0.240**	0.1
Variance	0	0	0.002	0.003	0.003	0

** indicates statistically significant result at alpha = 0.01

TABLE 41

BIOACCUMULATION DATA

Nephtys caecoides

Zinc

Replicate	Tissue Concentration (mg/kg wet weight)					
	Dredge Material Stations					
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	13	18	17	17	19	40
2	16	21	26	18	23	21
3	19	21	17	16	17	17
4	24	16	15	15	20	26
5	16	17	23	23	20	16
Mean	17.6	18.6	19.6	17.8	19.8	24.0
Variance	17.30	5.30	21.80	9.70	4.70	95.5

TABLE 42

BIOACCUMULATION DATA

Nephtys caecoides

Petroleum Hydrocarbons

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<15	<15	<15	<15	<15	<15
2	<15	<15	<15	<15	<15	<15
3	<15	<15	<15	<15	<15	<15
4	<15	<15	<15	<15	<15	<15
5	<15	<15	<15	<15	<15	<15
Mean	<15	<15	<15	<15	<15	<15
Variance	0	0	0	0	0	0

TABLE 43

BIOACCUMULATION DATA

Nephtys caecoides

Chlorinated Pesticides

Replicate	Tissue Concentration (mg/kg wet weight)					
		Dredge Material Stations				
	Reference	Oakland Inner 1	Oakland Inner 2	Oakland Inner 3	Oakland Outer 1	Oakland Outer 2
1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mean	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Variance	0	0	0	0	0	0

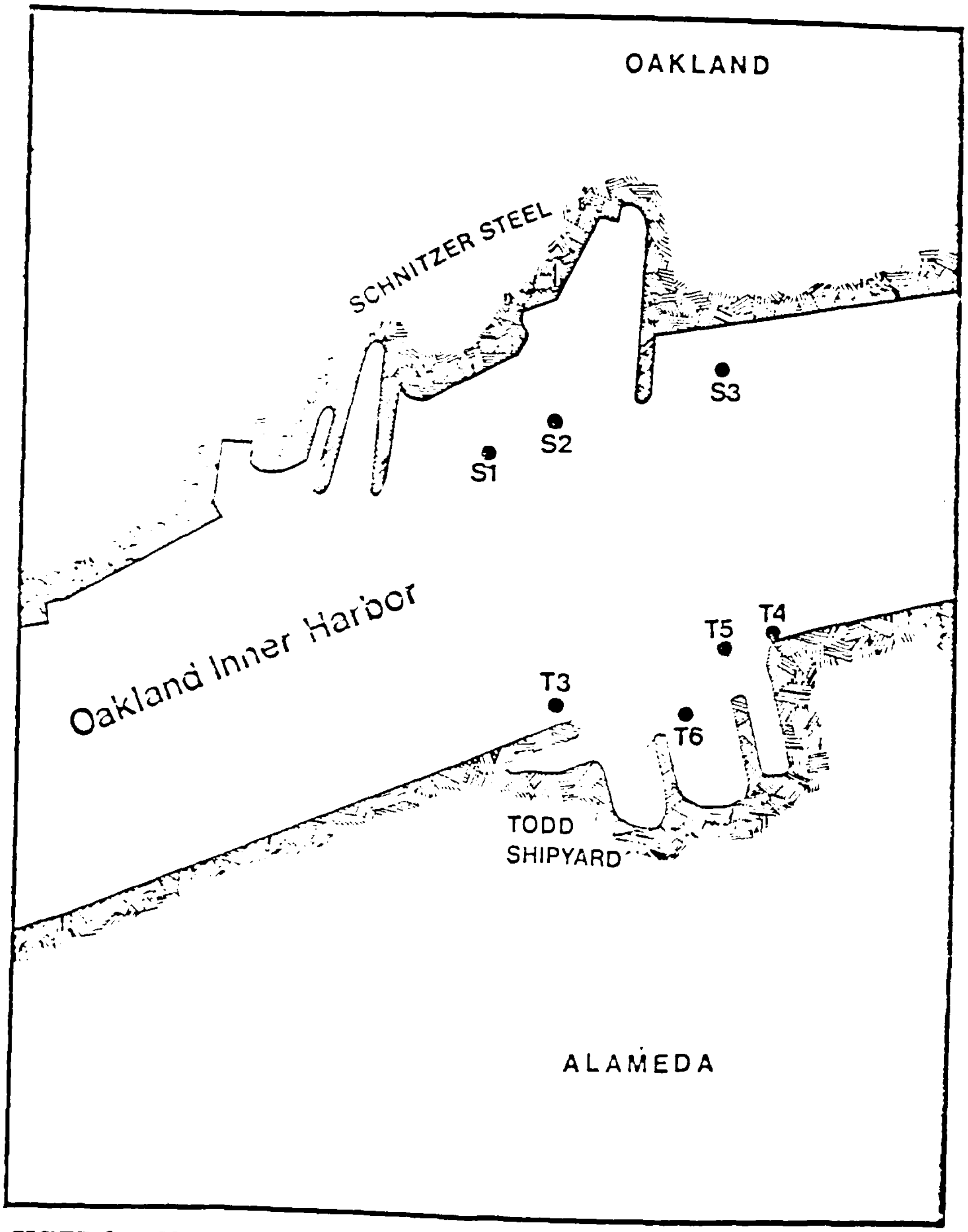


FIGURE 8: SEDIMENT CORE LOCATIONS-SCHNITZER STEEL AND TODD SHIPYARD

TABLE 44

SUMMARY OF BULK SEDIMENT ANALYSES SCHNITZER STEEL AND TODD SHIPYARD

(ug/g dry weight)

	Alcatraz	Schnitzer Steel			Todd Shipyard			
		S1	S2	S3	T4	T5	T6	T7
Antimony	2.82	2.58	7.37	3.78	3.09	13.12	18.83	11.39
Arsenic	10.90	10.60	7.10	10.50	5.90	16.30	13.30	9.20
Cadmium	0.69	1.42	1.97	1.05	0.67	2.02	1.16	1.33
Chromium	246.00	230.00	343.00	217.00	416.00	390.00	930.00	437.00
Copper	56.20	71.10	79.00	81.40	96.70	326.00	423.00	224.00
Lead	29.00	48.40	100.00	87.60	78.50	177.00	246.00	174.00
Mercury	0.26	0.41	1.30	0.76	1.30	8.30	4.20	2.70
Nickel	118.00	129.00	101.00	130.00	85.70	146.00	212.00	155.00
Selenium	0.31	0.38	0.16	0.23	0.08	0.31	0.23	0.31
Silver	0.37	0.45	0.57	0.63	0.33	1.00	0.62	0.70
Thallium	0.64	0.64	0.52	0.65	0.39	0.52	0.45	0.65
Zinc	131.00	179.00	260.00	208.00	183.00	428.00	549.00	287.00
Total Low Molecular Weight PAH's	0.14	0.39	0.93	0.56	0.25	2.86	1.84	0.44
Total High Molecular Weight PAH's	1.29	5.27	12.47	17.19	8.89	26.96	29.13	7.21
Total Pthalates	1.24	0.74	1.91	ND	1.09	0.38	1.47	0.84
Total Phenols	ND	ND	ND	ND	ND	ND	ND	ND
Total PCB's	0.09	0.09	0.25	0.22	0.49	0.67	1.37	1.44
Tributyl Tin(ug/kg)	30.40	30.50	19.40	16.60	58.80	ND	180.00	582.00
% TOC	1.30	1.90	1.50	2.60	0.80	2.00	1.60	1.40
% Sand	11.00	5.00	33.00	7.00	62.00	22.00	42.00	28.00
% Silt	49.00	30.00	27.00	35.00	13.00	24.00	20.00	27.00
% Clay	40.00	65.00	40.00	58.00	25.00	54.00	38.00	45.00

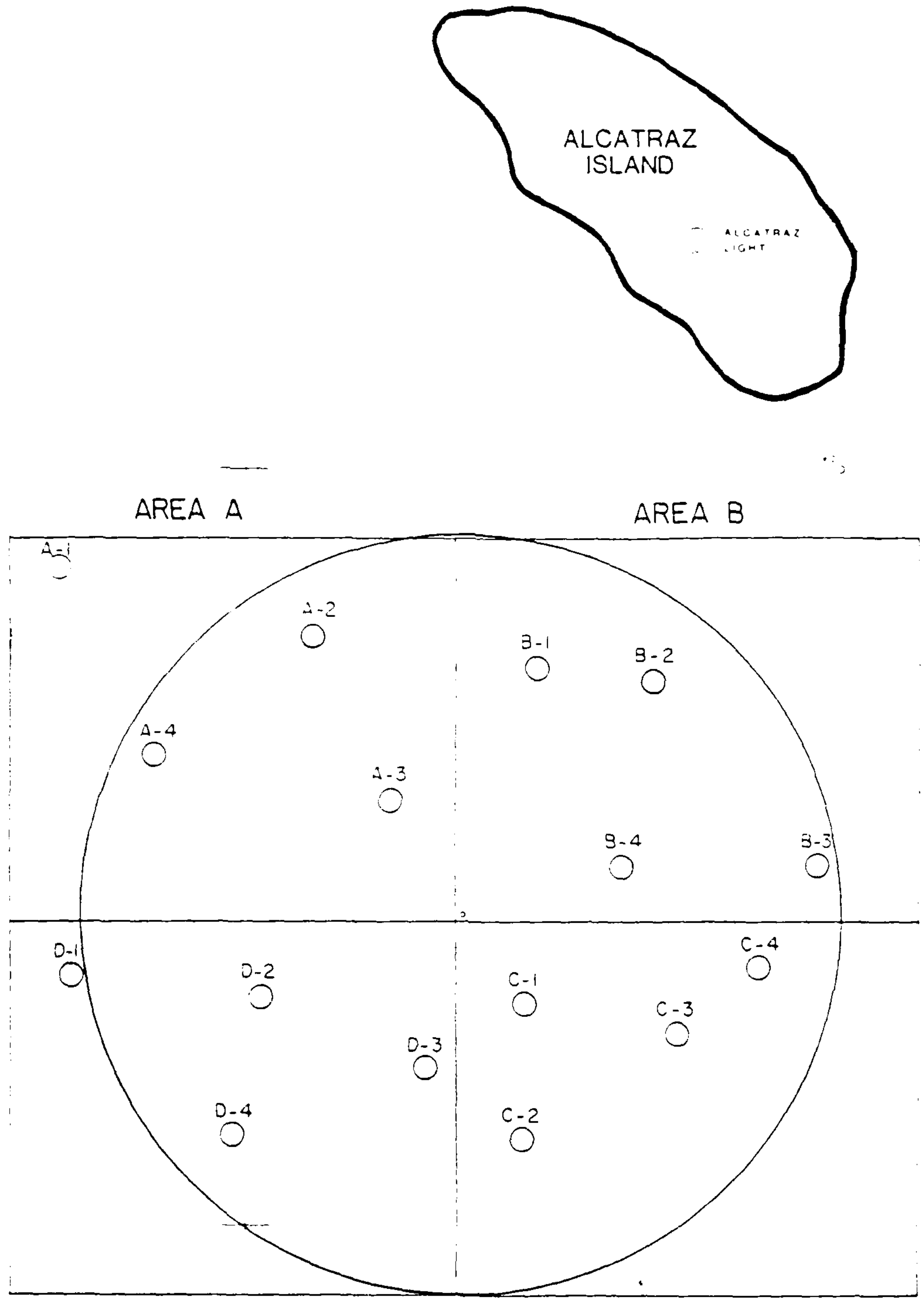


FIGURE 9: SEDIMENT CORE LOCATIONS ALCATRAZ DISPOSAL AREA

TABLE 45
Bulk Sediment Chemistry for Alcatraz
October 1985
(mg/kg wet weight)

Sample No.[1]	Lead	Zinc	Cadmium	Copper	Chromium	Silver	Mercury	Selenium	Arsenic	Pesticides[3] and PCB's	Petroleum Hydrocarbons	Oil and Grease
4-1-0	-.01[2]	2.1	.066	.14	.13	-.01	.44	-.01	-.01	ND[4]	99	849
2-10-26.5	-.01	2.43	.07	.3	.13	-.01	.82	-.01	-.01	ND	162	1659
7-9-24.5	.52	1.03	.99	.92	.95	-.01	.32	-.01	-.01	ND	53	694
7-3-7.5	-.01	1.61	.045	.08	.10	-.01	.93	-.01	-.01	ND	21	278
4-4-8.5	-.01	2.35	.079	.16	.10	-.01	.51	-.01	-.01	ND	149	623
7-12-33	-.01	2.46	.067	.13	.11	-.01	1.23	-.01	-.01	ND	86	216
7-18-5	.33	6.21	.071	.73	.28	-.01	1.03	-.01	-.01	ND	56	260
1-4-8.5	1.07	8.77	.098	1.05	.41	-.01	.41	-.01	-.01	ND	13	246
3-7-18	-.01	1.33	.053	.21	.9	-.01	1.15	-.01	-.01	ND	43	239
3-13-35	-.01	.80	.046	.06	.11	-.01	1.22	-.01	-.01	ND	76	502
3-4-9.5	-.01	3.86	.065	.12	.9	-.01	.33	-.01	-.01	ND	122	663
3-16-43	4.12	23.3	.225	3.30	1.22	.04	.44	-.01	-.01	ND	111	574
8-19-80.5	.44	11.02	.111	1.11	.24	-.01	.61	-.01	-.01	ND	141	715
4-13-63.5	-.01	2.60	.089	.154	.14	-.01	.30	-.01	-.01	ND	108	616
7 15-41.5	-.01	3.09	.059	.12	.11	-.01	.41	-.01	-.01	ND	134	704

1 The first number is the core number, the second the tube number, and the third is the depth below the mudline.
2 Values reported with a minus sign after them are less than the reported value.
3 Includes Aldrin, Dieldrin, Chlordane and related compounds, DDT and derivatives, Endrin, HCH, and Toxaphene.
4 None detected (Detection Limit = 0.05 ug/kg)

TABLE 46
PARAMETERS FOR WHICH TISSUE AND SEDIMENT ANALYZED
AT ALCATRAZ DISPOSAL SITE

Parameter	Sediment	Tissue Clams	Tissue Worms
Antimony	x	x	x
Cadmium	x	x	x
Copper	x	x	x
Lead	x	x	x
Mercury	x	x	x
Nickel	x	x	x
Aldrin	x	x	x
a-BHC	x	x	x
b-BHC	x	x	x
g-BHC	x	x	x
y-BHC	x	x	x
Chlordane	x	x	x
4,4'-DDD	x	x	x
4,4'-DDE	x	x	x
4,4'-DDT	x	x	x
Dieldrin	x	x	x
Endosulfan I	x	x	x
Endosulfan II	x	x	x
Endosulfan Sulfate	x	x	x
Endrin	x	x	x
Endrin Aldehyde	x	x	x
Heptachlor	x	x	x
Heptachlor epoxide	x	x	x
Toxaphene	x	x	x
PCB-1016	x	x	x
PCB-1221	x	x	x
PCB-1232	x	x	x
PCB-1242	x	x	x
PCB-1248	x	x	x
PCB-1254	x	x	x
PCB-1260	x	x	x
Acenaphthene	x	x	
Acenaphthylene	x	x	
Anthracene	x	x	
Benzo(a)anthracene	x	x	
Benzo(a)pyrene	x	x	
Benzo(b)fluoranthene	x	x	
Benzo(ghi)perylene	x	x	
Benzo(k)fluoranthene	x	x	
Chrysene	x	x	
Dibenzo(a,h)anthracene	x	x	
Fluoranthene	x	x	
Fluorene	x	x	
Indeno (1,2,3 cd)pyrene	x	x	
Naphthalene	x	x	
Phenanthrene	x	x	
Pyrene	x	x	
Total Organic Carbon	x		
Grain Size	x		

TABLE 47

SUMMARY OF BULK SEDIMENT DATA*

ALCATRAZ DISPOSAL AREA (NOVEMBER, 1987)

Parameter	Concentration (ug/g dry weight) Control	Reference	A200	B200	C200	D200
Antimony	0.18	0.23	0.26	0.34	0.28	0.26
Cadmium	0.65	0.92	1.05	1.61	1.27	1.30
Copper	7.81	7.43	35.2	47.2	40.9	42.7
Lead	6.54	9.00	29.6	38.3	32.7	39.5
Mercury	0.013	0.022	0.17	0.34	0.30	0.27
Nickel	37.9	41.3	86.3	95.9	86.5	88.9
Chlordane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.006
4,4'-DDD	<0.001	<0.001	0.095	0.005	0.003	0.008
4,4'-DDE	<0.001	<0.001	0.002	0.002	0.001	0.002
4,4'-DDT	<0.001	<0.001	0.082	0.011	0.004	<0.001
Dieldrin	<0.001	<0.001	0.004	<0.001	<0.001	<0.001
PCB-1260	<0.020	<0.020	0.025	0.054	0.12	0.053
Acenaphthene	<0.005	<0.005	0.046	0.27	0.017	0.013
Acenaphthylene	<0.005	<0.005	0.025	2.49	0.051	0.022
Anthracene	<0.005	<0.005	0.051	2.28	0.20	0.095
Benzo(a)anthracene	<0.010	<0.010	0.11	2.72	0.46	0.20
Benzo(a)pyrene	<0.020	<0.020	0.18	4.51	0.88	0.37
Benzo(b)fluoranthene	<0.020	<0.020	0.21	5.05	0.84	0.42
Benzo(ghi)perylene	<0.020	<0.020	0.16	3.97	0.82	0.30
Benzo(k)fluoranthene	<0.020	<0.020	0.076	1.33	0.28	0.13
Chrysene	<0.010	<0.010	0.12	2.95	0.57	0.23
Dibenzo(a,h)anthracene	<0.020	<0.020	0.039	0.44	0.09	0.062
Fluoranthene	<0.010	<0.010	0.21	13.0	1.70	0.49
Fluorene	<0.005	<0.005	0.019	0.85	0.062	0.040
Indeno([illegible],3-cd)pyrene	<0.020	<0.020	0.13	3.44	0.76	0.25
Napthalene	<0.020	<0.020	0.26	6.05	<0.020	<0.020
Phenanthrene	<0.005	0.008	0.14	14.2	0.81	0.26
Pyrene	<0.010	0.013	0.31	15.1	1.95	0.06
Total Organic Carbon (%)	0.11	0.25	0.68	0.99	0.73	0.73
Sand (%)	97.5	24.4	49.9	30.3	41.6	49.3
Silt (%)	0.6	21.9	22.4	32.0	25.5	21.1
Clay (%)	1.9	3.7	27.7	37.7	32.9	29.6

* This is a summary of detected values. All other parameters were undetected

TABLE 48
SUMMARY OF SUSPENDED PARTICULATE PHASE BIOASSAY RESULTS
ALCATRAZ DISPOSAL AREA

Sample	Conc. (%)[a]	96-h Mean Percent Survival ± S.D. Mysids	96-h Mean Percent Survival ± S.D. Flatfish	96-h LC50[b] Flatfish	48-h Mean Percent Normal ± S.D. Oyster Larvae	48-h EC50[b] Oyster Larvae
A200	100	73.3±15.3*	0.0± 0.0		12.6± 3.3	
	50	66.7±25.2	96.7± 5.86	68.3	92.1± 3.0	78.2
	10	76.7± 5.8	100.0± 0.0		86.1± 4.4	
B200	100	70.0±10.0*	0.0± 0.0		0.0± 0.0	
	50	86.7±11.5	90.0±10.0	65.5	69.6± 7.5	60.4
	10	90.0±10.0	93.3± 5.8		83.3± 1.7	
C200	100	63.3±15.3*	20.0±10.0		16.8± 9.1	
	50	90.0±17.3	100.0± 0.0	80.7	91.5± 5.7	80.0
	10	76.7± 5.8	100.0± 0.0		87.4± 3.2	
D200	100	66.7±11.6*	0.0± 0.0		0.0± 0.0	
	50	70.0± 0.0	96.7± 5.8	68.3	26.3± 2.6	23.2
	10	73.3± 5.8	96.7± 5.8		68.4±21.7	
Reference Sediment	100	80.0± 0.0	100.0± 0.0		94.0± 1.1	
	50	90.0± 0.0	nt	>100%	93.3± 4.7	>100%
	10	76.7± 5.8	nt		94.6± 1.5	
Reference Water	100	93.3± 5.7	100.0± 0.0	n/a	95.6± 1.6	n/a
Control Water	100	90.0± 6.3	98.3± 4.1	n/a	92.3± 2.8	n/a

a. 3 replicates per concentration except control (n = 6)
b. LC50's and EC50's are expressed as % (vol/vol).
nt = not tested as 100% survival was observed at 100% concentration, n/a = not applicable
* = asterisks denote mysid survival rates in 100% concentration of test medium which were significantly lower than in the control, determined statistically using a t-test ($p<0.05$).

TABLE 49
SUMMARY OF SOLID PHASE BIOASSAY RESULTS
ALCATRAZ DISPOSAL AREA

	Mean Percent Survival ± S.D.[a]		
Sample	Amphipods[b]	Clams	Worms[b]
Control	19.2±0.4	19.4±0.5	19.0±0.7
Reference	18.2±0.3	17.8±1.1	17.8±1.9
A200	16.6±1.7	19.0±0.7	17.4±3.0
B200	15.0±2.9	18.6±1.5	17.2±1.1
C200	15.6±1.8	19.2±1.3	19.0±1.4
D200	16.0±1.6	18.6±1.3	19.0±0.7

a. n=5, a value of 20.0 = 100%.

b. Analyses of variance indicated no statistically significant ($P<0.05$) difference in survival between reference and test sediments for each species tested.

TABLE 50

RESULTS OF BIOACCUMULATION STUDY FOR CLAMS SURVIVING 10 DAY SEDIMENT EXPOSURE

ALCATRAZ DISPOSAL AREA

(Results expressed as wet weight with dry weight in parentheses below)

Parameter	Mean Tissue Concentration ± S.D. (ug/g of tissue) Control	Reference	A200	B200	C200	D200
Cadmium	0.015±0.002 (0.12±0.02)	0.015±0.0004 (0.12±0.01)	0.014±0.001 (0.11±0.01)	0.014±0.006 (0.11±0.05)	0.013±0.002 (0.10±0.01)	0.013±0.004 (0.10±0.03)
Copper	1.64±0.39 (12.8±3.2)	1.38±0.11 (11.2±0.2)	1.49±0.34 (12.0±2.6)	1.28±0.17 10.1±1.3)	1.32±0.31 (10.3±1.6)	1.43±0.22 (11.8±1.9)
Lead+	0.18±0.08 (1.40±0.60)	0.13±0.01 (1.04±0.12)	0 21±0.11 (1.70±0.82)	0.28±0.18 * (2.21±1.44)	0.15±0.01 (1.19±0.14)	0.14±0.03 (1.15±0.25)
Mercury	0.007±0.001 (0.054±0.004)	0.007±0.001 (0.055±0.002)	0.006±0.001 (0.052±0.004)	0.006±0.001 (0.047 0.006)	0.006±0.001 (0.049±0.005)	0.006±0.0004 (0.051±0.004)
Nickel+	0.48±0.09 (3.70±0.54)	0.48±0.06 (3.94±0.61)	0.67±0.16 (5.43±1.40)	0.49±0.12 (3.88±0.96)	0.46±0.07 (3.62±0.53)	0.57±0.17 (4.65±1.39)
Chlordane+	<0.001±0.00 (ND)	<0.001±0.0 <0.009±0.0	0.002±0.001 0.012±0.003	0.002±0.001 0.014±0.006	0.002±0.001 0.015±0.009	0.001±0.0004 0.011±0.002
4,4'-DDD+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.002±0.001* 0.016±0.005	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 0.009±0.001
4,4'-DDE+	<0.001±0.0 <0.010±0.0	<0.001±0.0 <0.010±0.0	0.001±0.0 <0.010±0.0	0.001±0.001 * <0.013±0.004	0.001±0.0004 0.010±0.001	<0.001±0.0 (ND)
Dieldrin+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 0.010±0.002	<0.001±0.0 0.008±0.0004	0.001±0.001* 0.011±0.004	<0.001±0.0 (ND)
Endosulfan I+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 <0.012±0.0	<0.001±0.0 (ND)	<0.001±0.0 (ND)
Heptachlor+ epoxide	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0004 0.011±0.002	<0.001±0.0 (ND)	<0.001±0.0 (ND)

\+ Parameters with concentrations greater in the test sediments than in the control.

* significantly greater than control, as determined by Dunnett's procedure.

(ND) not detected

TABLE 50 (CONTINUED)
RESULTS OF BIOACCUMULATION STUDY FOR CLAMS SURVIVING 10 DAY SEDIMENT EXPOSURE
ALCATRAZ DISPOSAL AREA
(Results expressed as wet weight with dry weight in parentheses below)

Parameter	Mean Tissue Concentration ± S.D. (ug/g of tissue) Control	Reference	A200	B200	C200	D200
Acenapthene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.005±0.004 (0.035±0.032) *	<0.001±0.0 (ND)	<0.001±0.001 (0.010±0.007)
Acenaphthylene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.112±0.073 (0.877±0.556) *	0.002±0.001 (0.012±0.009)	0.003±0.002 (0.025±0.019)
Antracene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.032±0.025 (0.249±0.187) *	0.001±0.0 (ND)	0.001±0.004 (0.008±0.003)
Benzo(a) anthracene+	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.005±0.002 (0.035±0.015)	<0.004±0.0 (ND)	<0.004±0.0 (ND)
Benzo(b) fluoranthene	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (<0.034±0.0)	<0.004±0.0 (ND)	<0.004±0.0 (ND)
Benzo(k) fluoranthene	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (ND)	<0.004±0.0 (<0.036±0.0)	<0.004±0.0 (ND)	<0.004±0.0 (ND)
Chrysene+	<0.002±0.0 (ND)	<0.002±0.0 (ND)	<0.002±0.0 (ND)	0.006±0.006 (0.045±0.046)	0.002±0.0 (ND)	0.002±0.0 (ND)
Fluoranthene+	<0.002±0.0 (ND)	<0.002±0.0 (ND)	0.002±0.0004 (0.017±0.006)	0.150±0.082 (1.179±0.616) *	0.003±0.003 (0.023±0.021)	0.009±0.007 (0.075±0.058)
Fluorene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.01 (ND)	0.024±0.017 (0.189±0.131) *	0.001±0.0 (ND)	0.002±0.001 (0.016±0.010)
Naphthalene+	0.006±0.003 (0.036±0.011)	0.004±0.001 (0.032±0.008)	<0.004±0.0 (ND)	0.033±0.029 (0.254±0.224) *	0.006±0.004 (0.047±0.032)	0.007±0.003 (0.060±0.027)
Phenanthrene+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.001 (0.011±0.009)	0.412±0.227 (3.14±1.79) *	0.003±0.004 (0.02±0.029)	0.009±0.008 (0.074±0.068)
Pyrene+	<0.002±0.0 (ND)	<0.002±0.0 (ND)	0.003±0.001 (0.019±0.011)	0.149±0.078 (1.69±0.588) *	0.004±0.004 (0.025±0.025)	0.011±0.008 (0.089±0.070)

\+ Parameters with concentrations greater in the test sediments than in the control.
* significantly greater than control, as determined by Dunnett's procedure.
(ND) not detected

TABLE 51

RESULTS OF BIOACCUMULATION STUDY FOR WORMS SURVIVING 10 DAY SEDIMENT EXPOSURE

ALCATRAZ DISPOSAL AREA

(Results expressed as wet weight with dry weight in parentheses below)

Parameter	Mean Tissue Concentration ± S.D. (ug/g of tissue) Control	Reference	A200	B200	C200	D200
Cadmium+	0.019±0.004 (0.11±0.03)	0.016±0.0002 (0.10±0.02)	0.018±0.014 (0.11±0.09)	0.017±0.002 (0.11±0.01)	0.019±0.003 (0.13±0.02)	0.018±0.002 (0.10±0.04)
Copper	1.23±0.29 (7.55±1.85)	1.04±0.06 (6.60±0.28)	0.89±0.08 (5.60±0.51)	0.73±0.11 (4.92±0.62)	0.83±0.09 (5.65±0.53)	0.99±0.12 (6.06±0.73)
Lead+	0.015±0.009 (0.09±0.06)	0.024±0.008 (0.15±0.05)	0.050±0.021* (0.31±0.13)	0.042±0.006* (0.28±0.03)	0.036±0.007* (0.24±0.05)	0.067±0.005* (0.41±0.05)
Mercury+	0.004±0.0 (0.025±0.003)	0.004±0.001 (0.023±0.004)	0.004±0.0004 (0.027±0.002)	0.004±0.001 (0.028 0.006)	0.004±0.0 (0.027±0.001)	0.005±0.001 (0.029±0.005)
Nickel+	0.28±0.14 (1.71±0.77)	0.36±0.06 (2.264±0.33)	0.48±0.10 * (3.05±0.60)	0.25±0.07 (1.86±0.26)	0.33±0.06 (2.25±0.41)	0.32±0.09 (1.94±0.57)
Aldrin	0.001±0.0004 (0.007±0.002)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.0 (<0.010±0.0)	<0.001±0.0 (ND)	<0.001±0.0 (ND)
Chlordane+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.0 (ND)	0.001±0.0 (0.008±0.001)	<0.001±0.0 (ND)	0.001±0.0004 (0.008±0.004)
4,4'-DDD+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.005±0.002 * (0.028±0.015)	0.001±0.0 (0.007±0.0)	<0.001±0.0 (ND)	<0.001±0.0 (ND)
4,4'-DDE+	0.001±0.0 (0.007±0.0)	0.002±0.001 (0.010±0.002)	0.002±0.0004 * (0.011±0.002)	0.001±0.001 (0.008±0.004)	0.001±0.0 (0.007±0.0004)	0.001±0.0004 (0.008±0.003)
Dieldrin+	<0.001±0.0 (ND)	<0.001±0.0 (ND)	0.001±0.0004 * (0.008±0.001)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)
Heptachlor	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)	<0.001±0.0 (ND)

\+ Parameters with concentrations greater in the test sediments than in the control.

* significantly greater than control, as determined by Dunnett's procedure.

(ND) not detected

Appendix A

Water and Sediment Quality

Attachment 1

Mixing Zone Calculations

1. Interpretation of liquid phase chemical test data (elutriate data) and suspended particulate phase data requires an analysis of mixing and dilution after disposal (40 CFR 227.13 of the Ocean Dumping Regulations and 40 CFR 230.61 of the regulations implementing Section 404b(1) of the Clean Water Act). The implementing guidance states that dredged material may be considered environmentally acceptable if bioassay and elutriate results indicate that the limiting permissible concentration (LPC) will not be exceeded (40 CFR 227.27). The LPC of the liquid phase (elutriate) is that concentration at which none of the constituents of concern will exceed the applicable water quality criteria after allowance for initial mixing. The LPC of the suspended particulate phase is defined at the concentration that, after initial mixing, will not exceed a toxicity threshhold of 0.01 of the acutely toxic concentration (.01 times the EC 50).

2. The release zone method as described in 40 CFR 227.29 and in the point EPA/COE Implementation Manual (1977), can be used to estimate the initial mixing dynamics of dredged material disposal. The release zone method asssumes that the liquid and suspended particulate phases of the dredged material are evenly distributed at the end of the 4-hour initial mixing period. The zone is distributed over a column of water bounded on the surface by a loci of points constantly 100 meters from the perimeter of the disposal barge, beginning at the first moment in which dumping commences, end at the last moment (the release zone) and extending to the disposal site bottom, thermocline or halocline if one exists, or to a depth of 20 meters, whichever is shallower. A depth of 14 meters is used for disposal at Alcatraz; a depth of 20 meters is used for disposal in the ocean.

3. The disposal barge to be used is 54 m long, 14 m wide, and carries a volume of 2294 m^3 of dredged material. During disposal at Alcatraz, the barge is normally moving at about 1 m/sec. Because precise placement of dredged material is required to ensure the success of capping, the barges will be stationary during disposal. Approximately 20 seconds is required for complete evacuation of the barge. The volume of the initial mixing zone (v_m) is calculated from the formula:

$$v_m = 3.1416(100)^2 d + 200ud + (200+w)(ut+l)d$$

where d = depth (20 m for ocean disposal; 14 m for Alcatraz Disposal)

w = width of disposal barge (11 m)

l = length of the disposal barge (54 m)

u = speed of disposal barge (0 m/s for ocean disposal; 1 m/s for Alcatraz Disposal)

t = elapsed time during discharge (20 sec)

Thus, v_m = 676,540 m^3 for Ocean Disposal; v_m = 687,000 m^3 for Alctraz Disposal.

4. The following calculations are required to determine whether the applicable water quality criteria will be exceeded as a result of disposal of material from Oakland Harbor at Alcatraz or in the ocean:

a. The dilution factor D, the amount by which the liquid phase must be diluted to meet the water quality criteria, can be determined by the following equation:

$$D = (c_e - c_s) / (c_s - c_a)$$

where c_e = liquid phase concentration of the constituent of interest

c_s = water quality criteria for the constituent of interest

c_a = ambient disposal site water concentration of constituent of interest

b. The volume of the liquid phase V_w can be determined by the following equation:

$$V_w = [(P_b - P_d) / (P_w - P_d)] (v_T)$$

where P_b = bulk density (1.5 for ocean disposal; 1.3 for Alcatraz Disposal

P_d = particle density (2.6)

P_w = density of liquid phase (1.0)

v_T = total volume of disposal vessel (2294 m^3)

Thus, V_w = $1{,}577^3$ for ocean disposal; V_w = 1,864 m^3 for Alcatraz Disposal.

c. The volume of disposal site water required to dilu e the discharged liquid phase to acceptable levels can be found using the equation:

$$Vol = DV_w$$

The volume must be calculated for each constituent that exceeded the applicable State Water Quality Objective. Calculation for each constituent is presented below:

Constituent	C_e	C_s	C_a	D	Volume (ocean disp)	Volume (Alc Disp)
Copper	60 mg/l	50 mg/l	10 mg/l	0.25	394 m^3	525 m^3
Zinc	300 mg/l	170 mg/l	2 mg/l	0.77	1,214 m^3	1,620 m^3
Mercury	3.3 mg/l	1.4 mg/l	0.5 mg/l	2.1	3,312 m^3	4,400 m^3

Since the volume of disposal site water necessary to dilute the discharged liquid phase of material from Oakland Harbor is much smaller than the volume of the initial mixing zone in all cases, the LPC would not be exceeded.

c. In order to determine whether the LPC of the suspended particulate phase will be exceeded, additional calculations are necessary. The volume of suspended particulate phase contained in the disposal vessel must now be determined. Since it is impractical to calculate the volume directly, the environmentally protective assumptions are made that all silt and clay-sized particles are contained in the suspended particulate phase and that they would remain in suspension during the 4-hour initial mixing zone. The volume of suspended particulate phase in the discharge (v_{sp}) can be calculated as:

$$v_{sp} = (v_T - v_w)(P_c + P_s)/100$$

Where: v_T = Total volume of discharge vessel (2294 m^3)

v_w = Volume of liquid phase in the discharge (calculated below)

P_c = Percent clay in the dredged material

P_s = Percent silt in the dredged material

The volume of the liquid phase in the discharge can be calculated as:

$$v_w = (P_b - P_d)v_T / (P_w - P_d)$$

Where: P_b = Bulk density (1.5)

P_d = Particle density (2.6)

P_w = Density of liquid phase (1.0)

v_t = Total volume of discharge barge (2294 m^3)

Thus, v_w = 1,864 m^3

The volume of suspended particulate phase material at the disposal site after initial mixing, as a percentage of the volume of the initial mixing zone (C_{sp}), is calculated as follows:

$$C_{sp} = (v_{sp}/v_m)(100)$$

Where: v_{sp} = volume of suspended particulate phase in the discharge (calculated below)

v_m = volume of the initial mixing zone (676,540 m^3)

C_{sp} must be calculated for each of the Alcatraz sample areas and compared to the LPC (.01 times LC50 or EC50) in each of the two species (flatfish and oyster larvae). These data are presented in the table below:

Sample Area	Percent Silt	Percent Clay	C_{sp}	LPC (flatfish)	LPC (Oyster Larvae)
ALC-A200	22.4	27.7	.05%	0.69%	0.78%
ALC-B200	32.0	37.7	.07%	0.66%	0.60%
ALC-C200	25.5	32.9	.06%	0.81%	0.80%
ALC-D200	21.1	29.6	.05%	0.68%	0.23%

Since C_{sp} is less than the LPC in each case, no unacceptable adverse water column impacts are expected as a result of disposal of material from Alcatraz in the Ocean.

Appendix A

Water and Sediment Quality

Attachment 2

Tissue Chemistry Quality Assurance Date Summary

Oakland Inner and Oakland Outer

Constituent	%Spike Recovery[1]	% Precision[2]
Clam Tissue		
Cadmium	92	20.3
Chromium	133	5.0
Copper	86	11.0
Lead	87	11.7
Mercury	101	7.0
Silver	94	0
Zinc	95	9.0
Petroleum Hydrocarbons	64	ND
Chlorinate Pesticides (DDE only)	QA data not found	
Worm Tissue		
Cadmium	95	21.3
Chromium	136	7.7
Copper	93	11.0
Lead	108	21.3
Mercury	107	47.3
Silver	93	0
Zinc	127	4.3
Petroleum Hydrocarbons	55	ND
Chlorinated Pesticides (DDE only)	QA data not found	

[1] % spike recovery is a measure of analytical accuracy and represents the percent of added analyte recovered for each constituent.

[2] Precision is a measure of agreement between replicate analyses, expressed as the percent variation of the analytical results from the mean of all analytical results for that constituent.

ND indicates that the constituent was not detected in our analyses.

APPENDIX B

DREDGING EQUIPMENT AND METHODS

APPENDIX B

DREDGING EQUIPMENT AND METHODS

Dredges can be classified into two main categories: mechanical and hydraulic. Mechanical plants consist of bucket, dipper, dragline, and clamshell (or grapple) dredges. Hydraulic equipment consists of the plain suction pipeline, cutterhead pipeline, side casting hopper and self-propelled hopper dredges. (Reference Figures B-1 thru B-4) In San Francisco Bay, excavation is normally accomplished with either the bucket clamshell dredge, hydraulic cutterhead dredge or self-propelled hopper dredge. The following paragraphs briefly describe the operations of each of these three pieces of equipment as they relate to typical dredging work in San Francisco Bay.

The bucket clamshell dredge resembles a derrick mounted on a barge. The bucket is lowered and raised by cables from a swinging boom and is placed in the "cut" by moving the boom vertically and horizontally. The buckets are emptied into a scow, with bottom dump capability, for tug transport to the selected aquatic disposal site. This dredging equipment is best suited for dredging soft cohesive material in confined areas such as near piers and docks. Other advantages are the ability to operate at almost any depth and to work continuous even with long scow haul distances. Slow excavation is the chief limitation of this dredge.

The hydraulic cutterhead dredge sucks up the material through a pipe. Attached to the intake of the suction pipe is a rotating cutter which is shaped like a basket and equipped with sharp teeth in order to loosen and agitate the bottom material. The material is drawn into the suction pipe by a centrifugal pump. The depth of "cut" is controlled by lowering or raising the hinged ladder and suction pipe while horizontal control of the "cut" is achieved with swing lines moving the dredge in an arc. The cutting and suction introduces additional water to the system in a ratio of appoximately 1 part sediment to 4 parts water. This slurry is pumped through the pipeline to either a land disposal site or to a dump scow for tug transport to an aquatic disposal site. The main advantage of the hydraulic cutterhead dredge is its high production rate.

The self-propelled hopper dredge is a trailing suction dredge which hydraulically lifts bottom sediments, collects and concentrates these sediments in onboard hoppers, and transports the sediments to the aquatic disposal site where it is released through the bottom of the vessel. The vessel usually has port and starboard suction pipes to which dragheads are attached. The dredged sediment is moved through pumps and discharged into the vessel's hoppers as a mud-water slurry. After the hoppers have been initially filled, pumping continues a short time in order to displace water and increase sediment density for an economic load. As a result of the additional pumping, the excess sediment-laden water overflows the hoppers and discharges through the bottom of the dredge. The main advantages of the self-propelled hopper dredge are its ability to operate in rough, open waters and high production rate. The limitation of a self-propelled hopper dredge is that production is interrupted during transport and disposal operations.

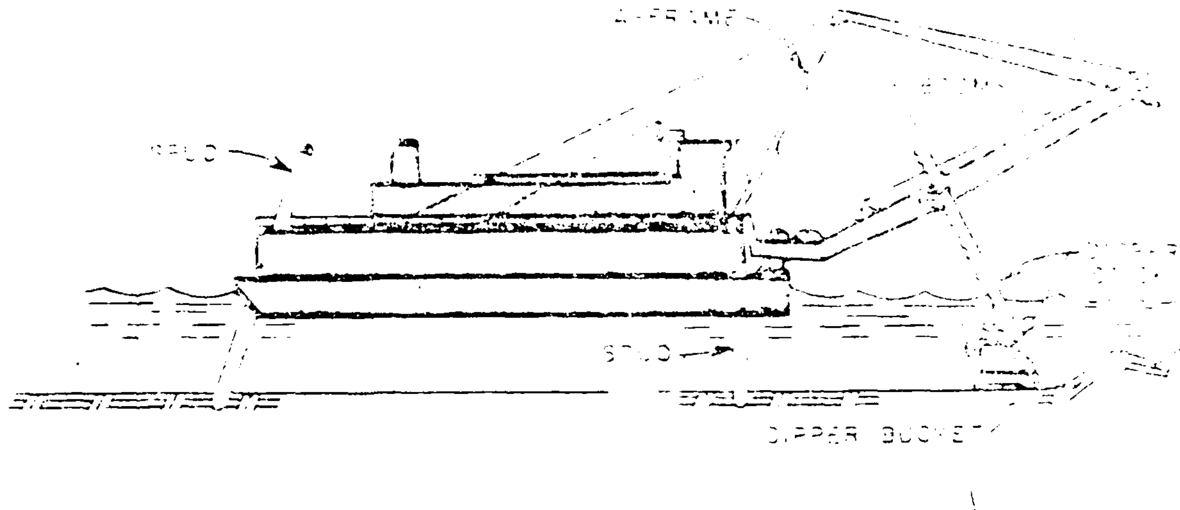


FIGURE B-1 [illegible]

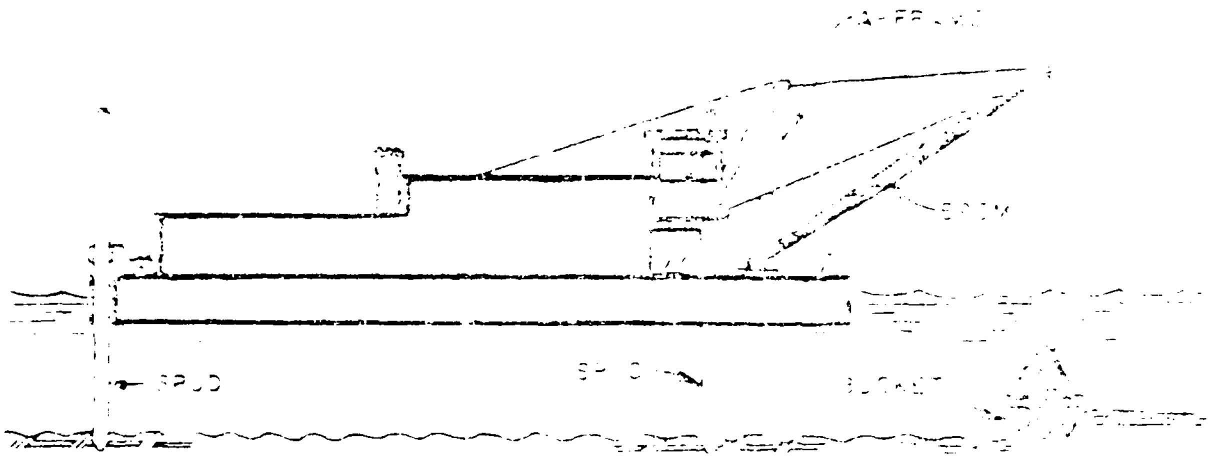


FIGURE B-2 [illegible]

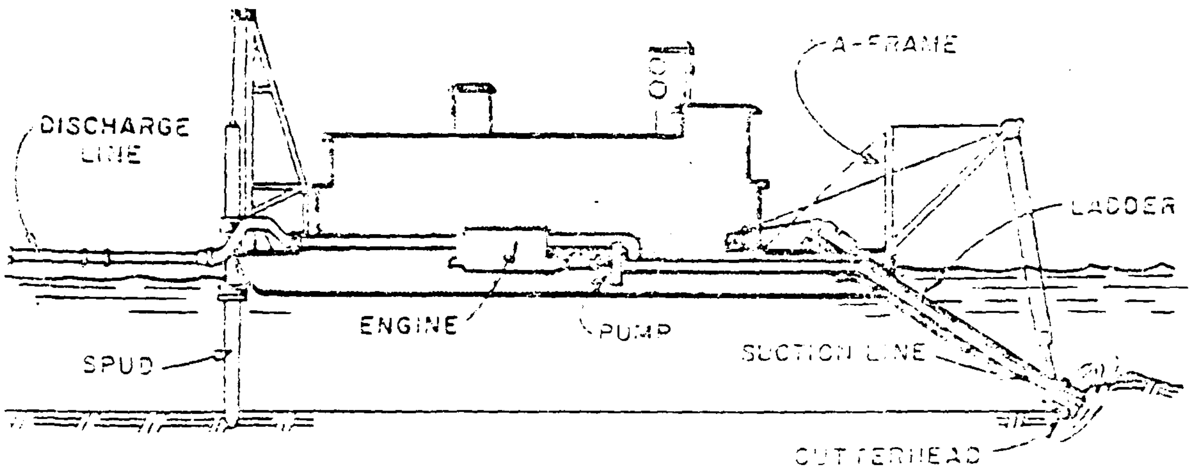
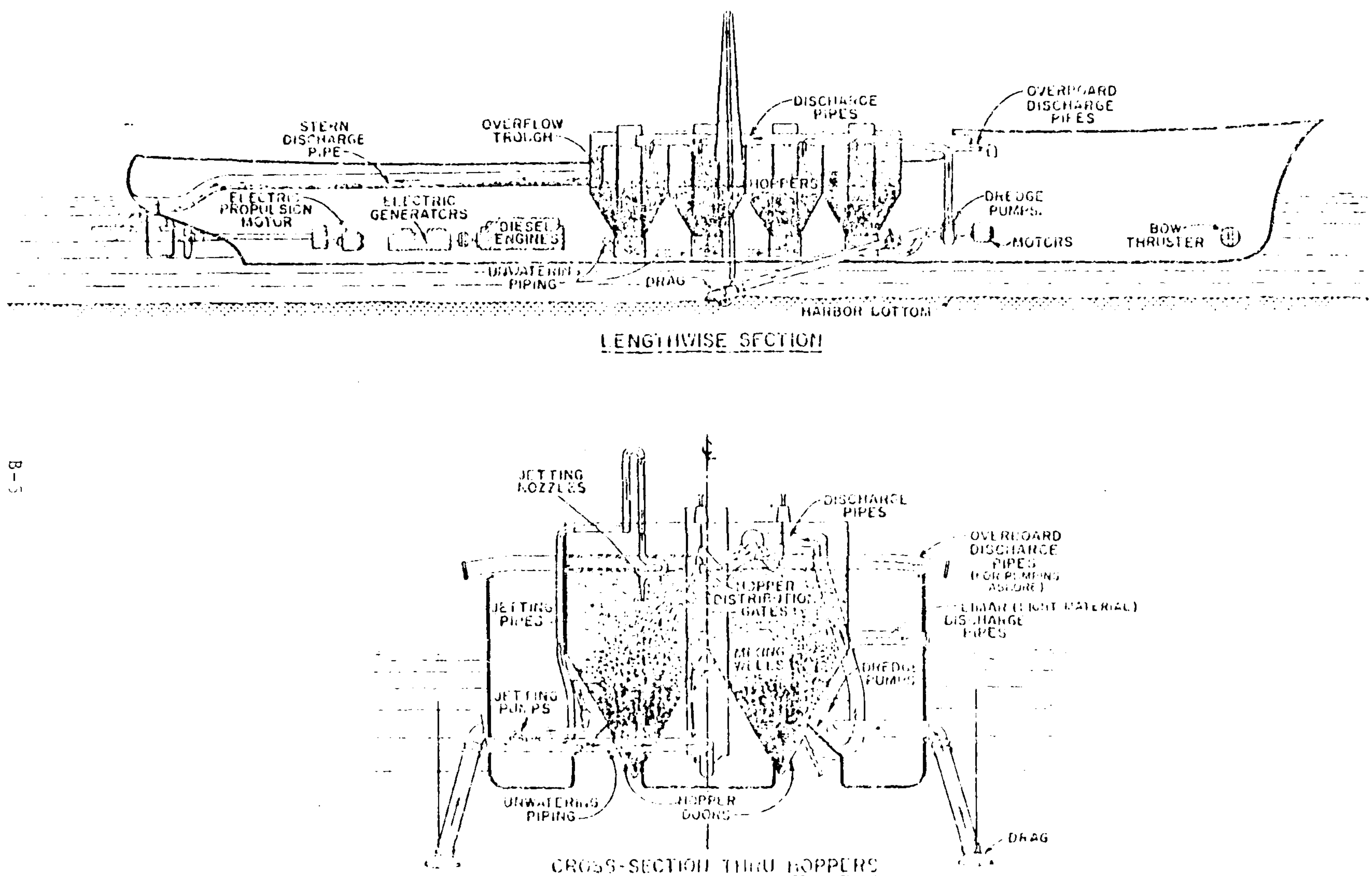


FIGURE B-3 Pipeline Dredge



LENGTHWISE SECTION

CROSS-SECTION THRU HOPPERS

SYMMETRICAL ABOUT ℄

OPERATIONAL SKETCH OF HOPPER DREDGE FIGURE B-4

APPENDIX C

BCDC CONSISTENCY STATEMENT

APPENDIX C

The U.S. Army Corps Of Engineers, San Francisco District
Consistency Determination On The
Oakland Harbor Deep-Draft Navigation Improvements Project
(BCDC Consistency Determination No. CN 12-87)

This Consistency Determination has been prepared in compliance with the Coastal Zone Management Act of 1972, Section 307 (Title 16, U.S.C. Section 1456(c), which states that Federal actions must be consistent with State coastal management programs to the maximum extent practicable. Sections of the approved San Francisco Bay Plan, the program managing this area under the State of California Coastal Management Program, applicable to the Oakland Harbor Deep-Draft Navigation Improvements Project are Bay Plan policies on Fish and Wildlife; Water Pollution; Dredging; and Ports.

Project Description (Reference Exhibits A, B, C,and D)

The specific improvements to be undertaken within BCDC's jurisdiction include the following:

The Port of Oakland consists of an Outer Harbor, a Middle Harbor, and an Inner Harbor. The entrance channel to the Outer, Middle, and Inner Harbors is known as the Bar Channel.

Oakland Outer Harbor includes the Oakland Bar Channel, an Outer Harbor Entrance Channel, an Outer Harbor Turning Basin Reach, and the North End Reach. The proposed plan of improvement for Oakland Outer Harbor is to deepen the existing 3.4 mile Outer Harbor Channel from 35 feet below mean lower low water (MLLW) to 42 feet below MLLW, and to relocate, deepen, and enlarge the turning basin.

Oakland Inner Harbor is 8.5 miles long and includes an Inner Harbor Entrance Reach, an Inner Harbor Reach, the Brooklyn Basin Reach, Park Street Reach and a Tidal Canal that connects with San Leandro Bay at Project Mile 8.5. The proposed plan of improvement for Oakland Inner Harbor is to deepen approximately 4 miles of channel between the Entrance Channel Reach and the Clay Street Pier from 35 feet below MLLW to 42 feet below MLLW. Also, the channel will be widened at the Inner Harbor Entrance, at Project Mile 3 of the Inner Harbor Channel, and at the upper project terminus. In addition, a turning basin will be constructed.

An estimated 7.0 million cubic yards (cys.) of material will be dredged from the Oakland Harbor Deep-Draft Navigation Improvements Project. Of the estimated 7.0 million cys. of required dredging, the Federal portion of the project is estimated at 6.5 million cys. and the non-Federal local sponsor (i.e. the Port of Oakland) portion is estimated at 0.5 million cys. The estimated 7.0 million cys. of "new work" dredged material will be disposed at a U.S. Environmental Protection Agency (EPA) / U.S. Army Corps of Engineers approved open-water ocean site located outside the jurisdiction of BCDC and the California Coastal Commission. Annual maintenance dredging quantities following the navigation improvements to Oakland Harbor are estimated to be 600,000 cubic yards. The current BCDC Letter of Agreement for Consistency Determination No. 13-85 (issued March 6, 1986, as amended through September 15, 1987) reflects an Oakland Harbor annual maintenance dredging quantity of 500,000 cubic yards. By separate transmittal, the Corps will request Consistency Determination No. 13-85 be amended to reflect the estimated annual maintenance dredging quantity increase of 100,000 cubic yards.

Of the estimated total 7.0 million cys. of required dredging, an initial estimated 0.5 million cys. of dredging in the Inner Harbor is proposed to be completed by June 4, 1988 in order to provide a safe navigable channel for the first arrival of the new generation container ship. The initial estimated 0.5 million cys. of dredging represents an Inner Harbor channel deepening from -35 feet MLLW to -38 feet MLLW, as shown in Exhibit C. (It is noted that the Port of Oakland has submitted a permit application to BCDC for the dredging of 560,000 cys. of material from the Inner Harbor. The Port's BCDC application and the Corps's proposed initial estimated 0.5 million cys. of Inner Harbor dredging are the same proposal. The Corps understands that the Port has submitted the application to BCDC in order to better ensure project construction approval in the time frame necessary for implementation of a -38 foot MLLW channel to accommodate the new generation container vessel scheduled arrival of June 8, 1988.)

Project Need And Purpose

The Port of Oakland is a complete transportation/distribution center with access to modern marine terminals specializing in containerized shipments. This world class port is the largest on San Francisco Bay and one of the largest container ports on the west coast. An estimated 30 ships per day currently travel inbound and outbound from the Port of Oakland, with one ship passing through the entrance channel an every 1.75 hours on average.

The Oakland Harbor channels are no longer adequate to efficiently and cost effectively accommodate modern deep-draft vessels. Deepening of the Oakland Harbor is necessary to accommodate the arrival of the new generation, deep-draft container vessels scheduled to arrive at the Port of Oakland in June 1988. Deep-draft container vessels built in the 1970s ranged in the 700 foot length with a draft of 33 feet. New container vessels range up to 1,050 feet in length with a draft of 38 feet. The current authorized Oakland Harbor channel depths are -35 feet MLLW.

Currently, problems encountered by ship pilots are: that inbound vessels operating during strong ebb tides risk grounding in the shallow water off the Seventh Street Terminal; and lack of adequate channel width at the Outer Harbor Entrance Channel increases the risk of a vessel in transit colliding with berthed ships at the Seventh Street Terminal or creating a wake or surge which could damage berthed ships or break mooring lines. The Oakland Harbor Deep-Draft Navigation Improvements Project will: improve navigational safety and efficiency of container vessel movement in the harbor channels; reduce the potential for vessel collisions and groundings; and eliminate vessel tidal delays.

Project Details

1. Dredging. Dredging an estimated total 7.0 million cys. from the Oakland Harbor is based on channel configurations which were optimized through navigation simulation study. Conditions modeled in the simulation study included vessel size and maneuverability, winds, waves, currents, bottom and bank conditions, visibility and mode of operation. The purpose of the simulation study was to provide the minimum channel dimensions required for safe and efficient ship transit. Approximately 3.4 miles of the Outer Harbor will be deepened and the turning basin will be relocated, deepened, and enlarged. Approximately 4 miles of the Inner Harbor channel will be deepened, the entrance channel widened, a 1,200 foot diameter turning basin between Schnitzer Steel Products Company and the Alameda Gateway Properties will be dredged, and a 1,000 foot radius fan-shaped area adjacent to the eastern end of the Charles P. Howard Terminal will be dredged. The dredging will terminate approximately 550 feet west of the Webster Street tube. The most likely method of dredging is by clamshell with tug/barge transport of the dredged material to an EPA/Corps approved ocean disposal site.

2. Dredged Material Sediment Tests. The Corps has conducted the appropriate sediment sampling and testing (physical, chemical, and biological) of the material to be dredged from the Oakland Outer and Inner Harbor channels and disposed at an EPA/Corps approved ocean site. The sediment testing protocol and test results as contained in reference item A. was provided to the San Francisco Bay Regional Water Quality Control Board (RWQCB) in September 1987. Following submittal of the sediment test results to the RWQCB, the RWQCB requested the industrial areas such as Schnitzer Steel and the former Todd Shipyards adjacent to the navigation project be investigated for potential toxic chemicals. Due to concerns related to possible contamination from land based activities at the Schnitzer Steel Company and at the former Todd Shipyards, the Corps, in cooperation with the Port of Oakland, collected sediment samples for testing. The results of this additional sediment testing are contained in the "Oakland Harbor Deep-Draft Navigation Improvements Design Memorandum Number 1 and Final Supplement To The Environmental Impact Statement, Alameda County, California", dated March 1988 (reference item No. 9). With respect to dredging material from the Oakland Harbor improvement project, sediment tests show the material to be highly plastic with little or no mixing in the water column. Thus no adverse impacts on water quality at the dredge site are anticipated. Disposal of the dredged material will be at an EPA/Corps approved open water ocean site located outside State waters.

3. Aquifers. The Corps has been coordinating closely with the RWQCB, Alameda County Flood Control and Water Conservation District, and the Port of Oakland to achieve an acceptable water monitoring plan. Reference item H. describes the Corps' proposed ground water monitoring plan which was transmitted to the RWQCB. By letter dated

March 3, 1988 (reference item No. 10, enclosed) the Executive Officer of the RWQCB determined the Corps' ground water monitoring program to be adequate and acceptable.

Consistency With The Bay Plan

The proposed navigation improvements to the Oakland Harbor are consistent to the maximum extent practicable with the following relevant portions of the San Francisco Bay Plan.

> Bay Plan Policies on Fish and Wildlife, in part, state that "The benefits of fish and wildlife in the Bay should be insured for present and future generations of Californians ..." and "... to the greatest extent feasible, the remaining marshes and mudflats around the Bay, the remaining water volume and surface area of the Bay, and adequate fresh water inflow into the Bay should be maintained." The proposed navigation improvements to the Oakland Harbor will not affect the Bay's marshes, mudflats, water volume, surface area, and fresh water inflow.
>
> Bay Plan Policies on Water Pollution, in part, state that "Water quality in all parts of the Bay should be maintained at a level that will support and promote the beneficial uses of the Bay as identified in the Regional Water Quality Control Board's Basin Plan." No unacceptable Bay water column impacts would occur as a result of deepening the Oakland Harbor channels.
>
> Bay Plan Policies on Dredging, in part, state that "Dredging or construction work should not be permitted that might reasonably be expected to damage an underground water reservoir..." and that "To prevent sedimentation resulting from dredging projects, mud from future dredging should be disposed of in one of the following ways: (a) placement on dry land, (b) placement as fill in approved fill projects, (c) barging or piping to suitable disposal sites in the ocean, or (d) if no other alternative is feasible, dumping in designated parts of the Bay where the maximum amount will be carried out the Golden Gate on ebb tides...". All proposals for deepening Oakland Harbor that could penetrate the mud "cover" of aquifers have been reviewed by the Regional Water Quality Control Board (RWQCB). The RWQCB has approved the Corps' proposed ground water monitoring program. The dredged material from the Oakland Harbor improvement project will be barged to an EPA/Corps approved ocean disposal site.
>
> Bay Plan Policies on Ports, in part, state that "The Seaport Plan provides for expansion and/or redevelopment of port facilities at ... Oakland ..." and "Further deepening of ship channel [s] [are] needed to accommodate expected growth in ship size and improve terminal productivity ...". This is the purpose of the Oakland Harbor Deep-Draft Navigation Improvements project.

Summary

Based on a review of the relevant portions of the San Francisco Bay Plan and on the information contained in the enclosed list of references, the proposed Oakland Harbor Deep-Draft Navigation Improvements project is consistent with the San Francisco Bay Plan to the maximum extent practicable.

The U.S. Army Corps of Engineers, San Francisco District
Consistency Determination On The
Oakland Harbor Deep-Draft Navigation Improvements Project
(BCDC Consistency Determination No. CN 12-87)

References

1. "Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, Draft Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, Alameda County, California", dated September, 1987

2. San Francisco Bay Conservation and Development Commission (BCDC) letter dated October 19, 1987, Subject: Request for Concurrence with Consistency Determination Proposed Navigation Improvements, Oakland Harbor (BCDC Consistency Determination No. CN 12-87)

3. U.S. Army Corps of Engineers, San Francisco District letter to BCDC dated October 30, 1987

4. California Department of Fish and Game Memorandum to Mr. Gordon Van Vleck, Secretary for Resources, dated November 2, 1987, Subject: Draft Supplement to the Environmental Impact Statement (DEIS) Oakland Inner and Outer Harbor Improvements SCH 87081823

5. U.S. Army Corps of Engineers, San Francisco District letter to Ms. Linda Martinez, State Lands Commission, dated December 3, 1987

6. BCDC letter dated December 24, 1987, Subject: Corps of Engineers Proposed Navigation Improvements, Oakland Harbor: BCDC Consistency Determination No. CN 12-87

7. U.S. Army Corps of Engineers, San Francisco District letter to Mr. Roger B. James, California Regional Water Quality Control Board, dated January 21, 1988, requesting water quality certification for the dredging of the Oakland Outer and Inner Harbors and disposal of the dredged material at the Alcatraz site

8. U.S. Army Corps of Engineers, San Francisco District, Proposed Oakland Groundwater Monitoring Plan, January 1988

9. "Oakland Harbor Deep-Draft Navigation Improvements Design Memorandum Number 1 and Final Supplement To The Environmental Impact Statement, Alameda County, California", dated March, 1988

10. California Regional Water Quality Control Board - San Francisco Bay Region letter dated March 3, 1988, Subject: Groundwater Monitoring Program for Monitoring the Impact of the Oakland Inner and Outer Harbors Navigational Improvement Project

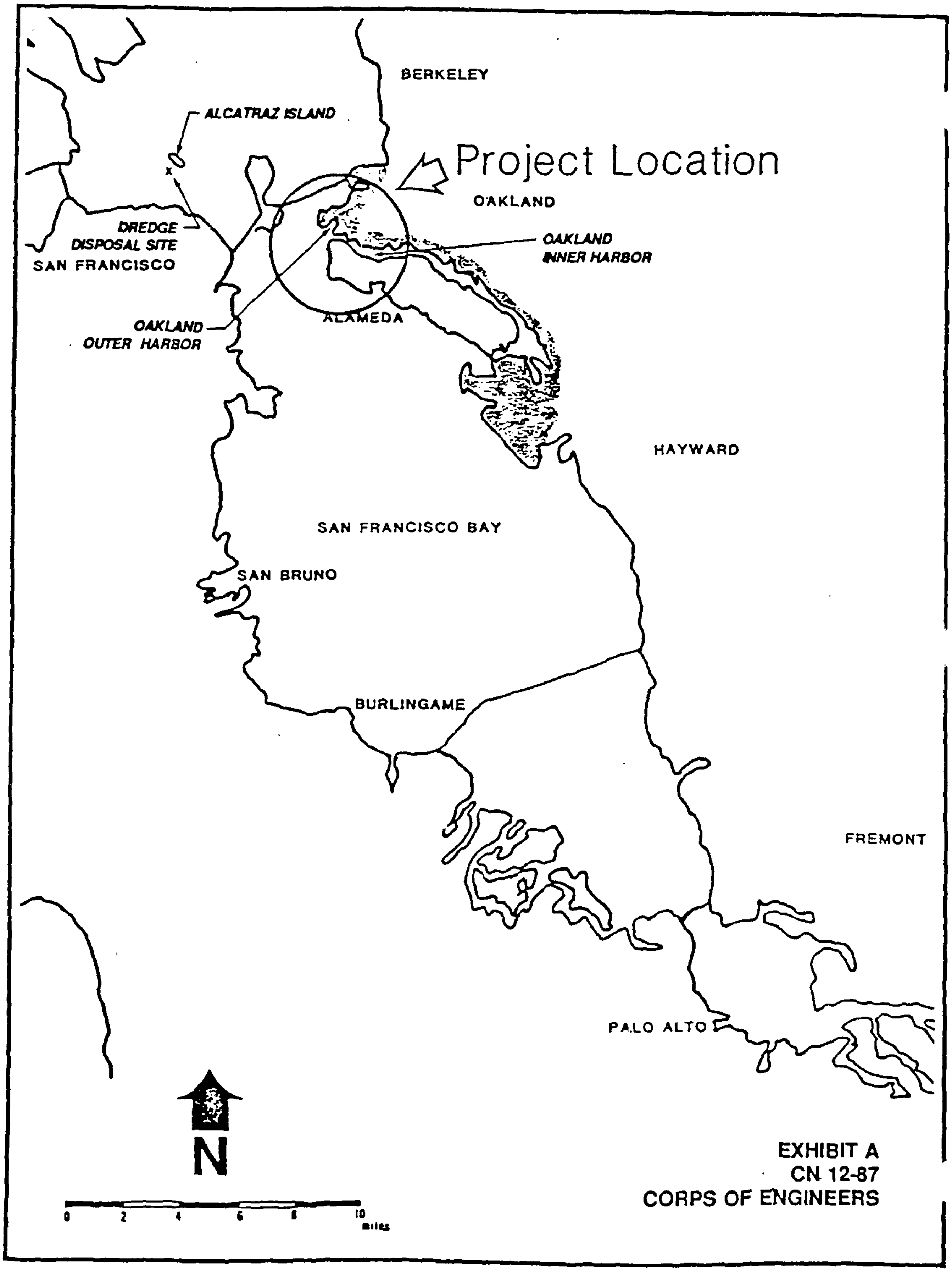

BERKELEY
ALCATRAZ ISLAND
Project Location
OAKLAND
DREDGE
DISPOSAL SITE
SAN FRANCISCO
OAKLAND
INNER HARBOR
OAKLAND
OUTER HARBOR
ALAMEDA
HAYWARD
SAN FRANCISCO BAY
SAN BRUNO
BURLINGAME
FREMONT
PALO ALTO
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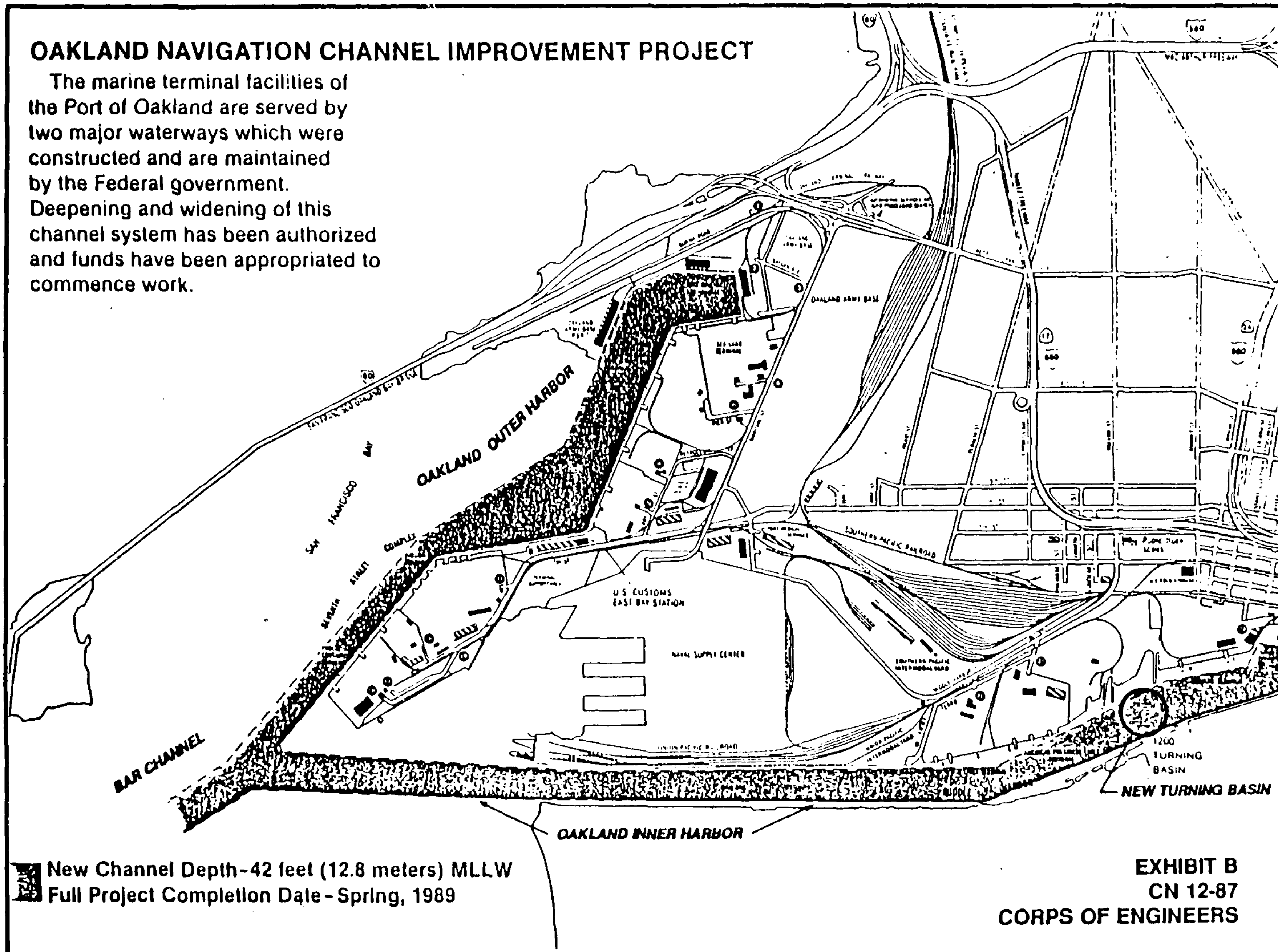
EXHIBIT A
CN 12-87
CORPS OF ENGINEERS

OAKLAND NAVIGATION CHANNEL IMPROVEMENT PROJECT

The marine terminal facilities of the Port of Oakland are served by two major waterways which were constructed and are maintained by the Federal government. Deepening and widening of this channel system has been authorized and funds have been appropriated to commence work.



New Channel Depth–42 feet (12.8 meters) MLLW
Full Project Completion Date - Spring, 1989

EXHIBIT B
CN 12-87
CORPS OF ENGINEERS

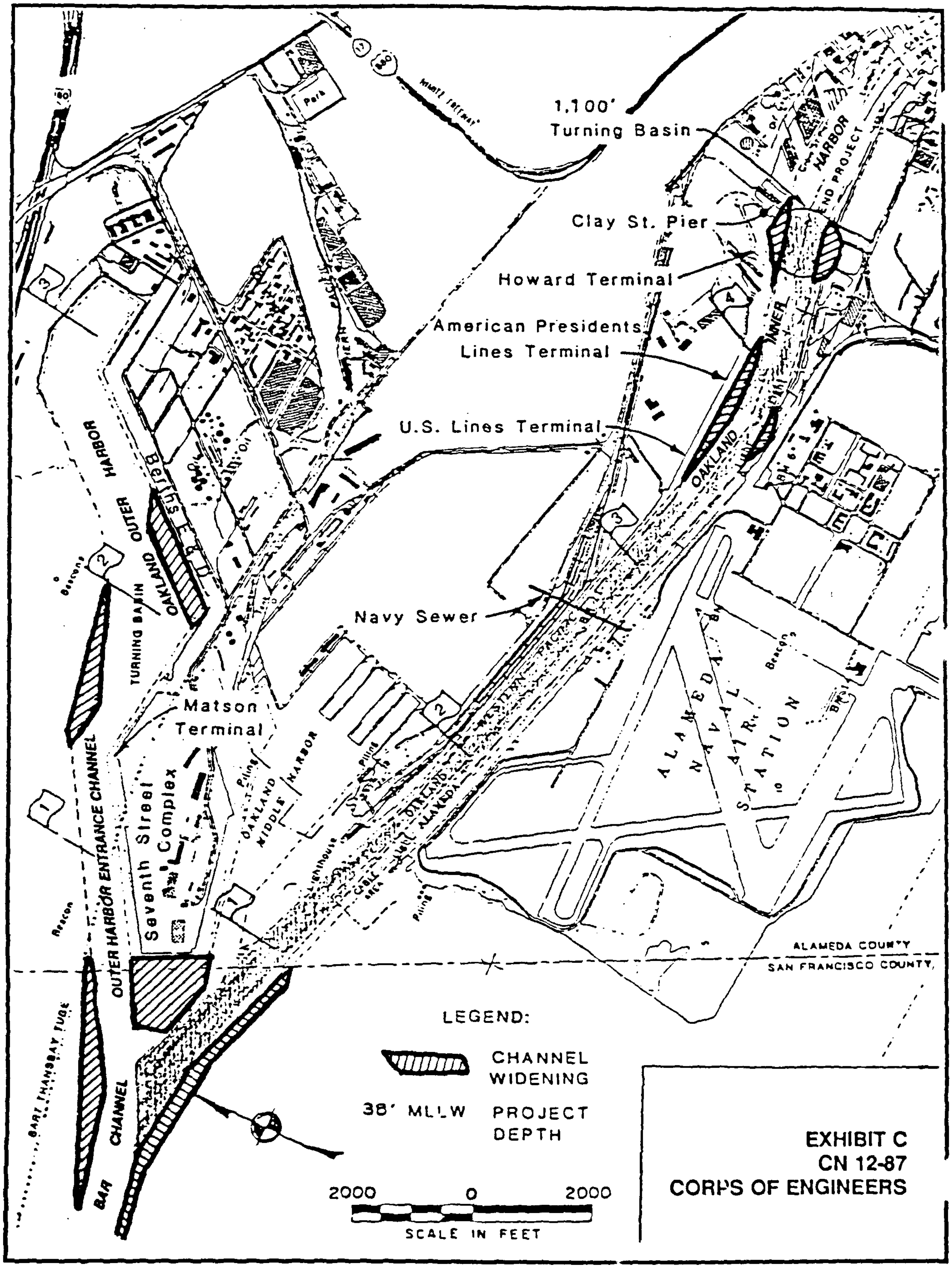


EXHIBIT C
CN 12-87
CORPS OF ENGINEERS

Detailed Project Description

Oakland Outer Harbor. The proposed plan of improvement is deepening the harbor from -35 feet to -42 feet MLLW and widening the south side of the Bar Channel from 800 feet to 900 feet. The apex of the bend between the Bar and Entrance Channels will be removed and the north side of the channel widened. The knoll adjacent to the end of the Seventh Street Complex is proposed for removal. The "dogleg" at the northeastern end of the Seventh Street Terminal will be eliminated, and the turning basin will be relocated and enlarged by widening the north side of the channel opposite berths 32 and 33 (formerly D and E) in the Matson Terminal near Project Mile 2.0. At Project Mile 2.25, approximately 1,900 feet of channel will be widened 350 feet to accommodate the existing wharf. In the final 4,600 feet of the project, the berths will be widened to 125 feet, which will narrow the channel to a width which varies from 850 to 600 feet).

Oakland Inner Harbor. The proposed plan of improvement specifies the deepening of the Inner Harbor channel from -35 feet to -42 feet MLLW between the Entrance Channel reach and the Clay Street Pier, a distance of approximately 4 miles. The proposed plan also includes widening within the Entrance Channel Reach as follows:

The northern channel boundary will be moved northward to coincide with the U.S. Pierhead and Bulkhead line off the end of the Seventh Street Terminal, and then taper in to meet the existing channel limit at approximate Project Mile 1.0.

The southern channel boundary will be shifted south by 200 feet at the turn into the Entrance Reach, and by 150 feet beyond the turn. East of the mouth of the Middle Harbor, the widened channel will taper in to meet the existing channel limit at approximate Project Mile 1.0.

The modifications described above result in a channel width of 1,130 feet off the southeast corner of the Seventh Street Terminal which transitions to 720 feet at approximately Project Mile 1.0. The channel then gradually narrows to a minimum width of 435 feet between the stone jetties near Project Mile 1.6, then widens to 460 feet, and flares out to 575 feet at the beginning of the channel bend opposite the terminals for the American Presidents Lines. This channel bend will be widened to a maximum width of 900 feet, and then taper to 600 feet to meet the existing width of the channel. Additional project features include providing a 1,200 foot diameter turning basin between the Schnitzer Steel Products Company and the Alameda Gateway Properties, and providing a 1,000 foot radius fan-shaped area adjacent to the eastern end of the Charles P. Howard Terminal. The project reach will terminate approximately 550 feet west of the Webster Street tube.

The existing U.S. Navy Sanitary Sewer Export Main, a 16-inch diameter cast iron pipe located under the Inner Harbor Channel at approximate Project Mile 2.5, must be lowered to accommodate the proposed channel improvements. Dredging of the ship channel necessitates relocation of the existing sewer main from an invert elevation of -45 feet MLLW to a depth approximately 12 feet lower.

EXHIBIT D

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 6/11

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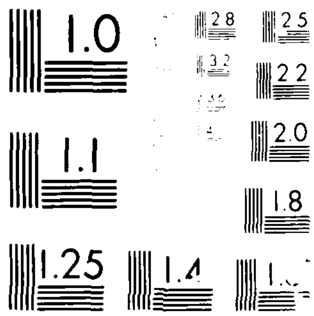
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STATE OF CALIFORNIA—THE RESOURCES AGENCY

GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

AN FRANCISCO BAY REGION
111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

March 3, 1988
File No. 2199.9237(TCW)tmh

Mr. William C. Angeloni, Chief
Planning/Engineering Division
Department of the Army
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105-1905

Dear Mr. Angeloni:

Subject: Groundwater Monitoring Program for Monitoring the Impact of the Oakland Inner and Outer Harbors Navigational Improvement Project

The staffs of San Francisco Bay Regional Water Quality Board and Alameda County Public Works Agency have reviewed your proposed groundwater monitoring program for Oakland Harbors Improvement Project, which was transmitted to us February 1, 1988.

We find the proposed program adequate and acceptable. However we would like to make one suggestion: the cable-tool method for drilling be used in well drilling rather than the rotary mud drilling method because the cable-tool method would provide a better definition of soil type.

We request that the monitoring program be initiated as soon as possible and be continued for at least three years. Alameda County Public Works Agency has indicated that they will probably take over the monitoring function after the three years.

We also request that you file quarterly and annual reports with us. Quarterly reports shall be filed within 45 days of the completion of sampling and analysis of each quarter. The first quarterly report shall contain a description and discussion of regional and site geology/hydrology, methods and procedures used in installing, developing and sampling monitoring wells, and methods and procedure used in water analyses as well as the analytical results obtained. Subsequent quarterly reports can be less elaborate and shall present only the procedures and results of groundwater sampling and analysis and groundwater flow pattern. Annual reports shall summerize past four quarters' results and present a discussion and assessment of dredging project's impact on the area's groundwater if appropriate. They should also propose modifications to the monitoring program if the results of monitoring program indicate some modifications is desirable.

Thank you for your cooperation in implementing a groundwater monitoring program. If you have any questions, please call Dr. Teng-chung Wu of my staff at (415) 464-0899.

Sincerely,

Lawrence P. Kolb
for
ROGER B. JAMES
Executive Officer

cc: John R. Monser, Alameda County
Carl Hauge, DWR-Central District
Clyde A. Morns, EPA-Region 9
W. E. Vandenberg, Port of Oakland

APPENDIX D

AGENCY COORDINATION

LETTERS INCLUDED IN APPENDIX D

U.S. Environmental Protection Agency, Region IX (page D-117)
- 2-17-88
- 1-14-88 (Corps to EPA)
- 12-30-87 (Corps to EPA)
- 12-7-87 (See Appendix E-Comments and Responses)
- 11-24-87
- 11-16-87 (Corp to EPA)
- 11-5-87
- 10-20-87 (Corp's PN announcing Intent to Use An Ocean Disposal Site)
- 8-17-87

California Coastal Commission (page D-153)
- 10-7-87
- 9-23-87 (Corps to CCC)

California State Department of Parks and Recreation, Historic Preservation Office (page D-157)
- 10-6-87
- 10-2-87 (Corps to SHPO)

California State Lands Commission (page D-163)
- 2-17-88 (SLC to BCDC and Port of Oakland)
- 12-3-87 (Corps to SLC)
- 11-2-87

Regional Water Quality Control Board (page D-171)
- 3-3-88 (Corps to RWQCB)
- 3-3-88 (Acceptance Groundwater Monitoring Program)
- 2-1-88 (Corps to RWQCB)
- 1-29-88
- 1-21-88
- 11-5-88
- 10-9-87
- 9-23-87 (Corps to RWQCB)
- 7-3-87

S.F. Bay Conservation and Development Commission (page D-239)
- 3-8-88 (Corps to BCDC)
- 3-4-88
- 2-26-88 (Corps to BCDC)
- 2-4-88
- 2-1-88 (Corps to BCDC)
- 12-24-87
- 10-30-87 (Corps to BCDC)
- 10-19-87
- 9-23-87 (Corps to BCDC)

U.S. CONGRESS, HOUSE OF REPRESENTATIVES

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

February 22, 1988

Executive Office

Honorable Barbara Boxer
U.S. House of Representatives
307 Cannon Building
Washington, D. C.20515

Dear Congresswoman Boxer:

Brigadier General Patrick J. Kelly has asked me to respond to your and Congresswoman Pelosi's January 26, 1988 letter concerning dredge material disposal at the Alcatraz disposal site in San Francisco Bay. The disposal of dredged material is a particularly challenging assignment for us as we seek to meet our responsibilities in the water resources development area with its attendant effect on national and regional economic development, the environment and the use of public funds.

I will first respond to your specific concerns, then discuss in broader terms some of the dredging issues before us.

No toxic materials are deposited at Alcatraz. All dredge materials require testing, a determination of the degree of toxicity, and the proper disposition of such material. All disposal operations require Water Quality Certification from the State of California. The general framework for determining if dredged material is toxic and will cause an unacceptable adverse impact to the aquatic environment is found in the guidelines pursuant to Section 404 (b) (1) of the 1974 Clean Water Act. All material intended for in-Bay disposal is tested in response to these guidelines. Based on these rules, sediments deemed "toxic" have not and will not be approved for disposal in San Francisco Bay either by the Corps of Engineers or the Water Quality Control Board.

Last November, the National Park Service requested the Corps apply for a permit from the Service for navigation projects in the vicinity of Alcatraz. We reviewed the statutes and regulations upon which the Service based its request and believe they do not apply to dredge disposal operations. In our response of December 23, 1987, we outlined our position regarding the need for a permit and offered to meet with Service representatives to discuss our activities and responsibilities under Federal law. While the Service has not responded, we nevertheless will continue to follow established testing and disposal guidelines and secure the required approvals mentioned in the preceding paragraph for any Alcatraz disposal projects.

We are currently examining several ocean disposal sites near the Farallones as alternatives for our Oakland Inner and Outer Harbor Project. One site (1M) is 14 nautical miles west of the Golden Gate and about 1.2 nautical miles east of the marine sanctuary boundary. Environmental studies have been performed on the site and on the sediment to be dredged as required under the 1972 Marine Protection, Research, and Sanctuaries Act. In addition, sediment transport studies were conducted which indicate that the material to be deposited would not move toward the marine sanctuary.

To summarize our response to your specific concerns, we fully intend to dispose of all sediments, either at Alcatraz or at an ocean site, in a legal and responsible manner and with the required approvals from other federal and state agencies. Also, any ocean disposal site selected under Corps of Engineers authority will be outside the marine sanctuary.

The Corps of Engineers has been dredging in the San Francisco Bay estuary for commercial and defense facilities since the late 1800's. This dredging is both maintenance work, required to keep existing facilities in operation, and new dredging for the development of new ports and marinas or for the deepening of those already in use to meet technological changes in the shipping industry. The Sacramento and San Joaquin Rivers bring much silt into the Bay. Harbor and channel dredging is essential to insure safe and efficient navigation. Approximately eight million cubic yards of maintenance dredging is done in the Bay each year. Most of that is placed at Alcatraz because of its proximity to many Central Bay Projects.

Three approved EPA disposal sites exist in the Bay. Presently there is no EPA designated ocean disposal site for the fine grained materials which are found within San Francisco Bay. It is Corps policy that all dredged material meet the standards set by the Regional Water Quality Control Board and that the work be consistent with the Bay Plan of the Bay Conservation and Development Commission. Within San Francisco Bay, it is Corps policy to dispose of all materials downstream of the work site. This tends to facilitate the natural movement of the material out through the Golden Gate. The geography of San Francisco Bay, our downstream policy, and the cost of ocean disposal have resulted in most of the Bay's dredged material going to the Alcatraz site. Even after a general-use ocean disposal site is designated by EPA, Alcatraz must remain open for maintenance dredging and for other small projects. Otherwise, projects such as San Rafael Creek and Islais Creek might not be economically feasible for continued operation.

Since 1985 the Corps of Engineers has been involved in a major effort to develop an environmentally and economically feasible disposal plan. It focuses on decreased use of the Alcatraz site while attempting to identify and designate other potential disposal areas. This study was initiated because of our concern over mounding at the Alcatraz site.

The Corps is being asked to consider ocean disposal sites located at great distance from the Golden Gate. While we are considering several sites, we must also consider the increased costs associated with each site, as well as the environmental acceptability of each site. Increased costs are not only borne by the American tax payers (Federal dollars) but also by local ports, small marina operators, and local citizens under the cost-sharing provisions of the Water Resources Development Act of 1986. Let me use the Oakland Harbor deepening project to illustrate. The project with disposal at Alcatraz would cost $20 million cost-shared on a 75%/25% ratio between the Federal Government and the Port of Oakland. Project costs associated with the various ocean disposal sites under consideration range from $39 million to $68 million. Increased costs must be weighed against measurable improvements in the protection of the environment as well as differing operational considerations. Even at the most distant site, there are potential impacts on endangered species such as the Humpback Whale.

Our responsibilities as stewards of the public's funds require that any decision to adopt alternatives with substantially higher costs must be made on sound scientific and technical evidence that Alcatraz disposal is adversely affecting San Francisco Bay or that taking the material further out produces a significant environmental benefit over the near shore sites.

In closing, I would like to point out that we have been working very closely with many agencies and with the public in addressing the many issues surrounding dredged material disposal. Numerous meetings over the past six months have included representatives from EPA, US Fish & Wildlife Service, National Marine Fisheries Service, California Department of Fish and Game, the dredging industry, Citizens for a Better Environment, and representatives from the fishing industry. We strongly believe that we are fulfilling our obligations and responsibilities in striving for solutions that are in the best overall interest of the public in the San Francisco Bay area.

Thank you for your interest in our dredging and dredge disposal operations. I would be happy to arrange to provide you and your staff with an in-depth briefing on this important and complex issue at your earliest convenience.

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Copies Furnished

(See Attached)

Honorable Nancy Pelosi, U. S. House of Representatives, 1632 Longworth Office Building, Washington, D.C. 20515

Mr. John Wise, Acting Regional Administrator, Region IX EPA, 215 Fremont Street, San Francisco, CA 94105

Mr. Roger B. James, Executive Officer, Regional Water Quality Control Board, San Francisco Bay Region, 1111 Jackson Street, Oakland, CA 94607

Mr. Brian O'Neill, Director, Golden Gate National Recreation Area, National Park Service, Ft. Mason, CA 94123

Mr. James McKevitt, Field Supervisor, U.S. Fish & Wildlife Service, 2800 Cottage Way - Room E-1823, Sacramento, CA 95825

Mr. E. C. Fullerton, Regional Director, U.S. Department of Commerce, National Marine Fisheries Service, S. W. Region, 300 S. Terry Street, Terminal Island, CA 90731

Mr. Brian Hunter, California Department of Fish & Game, Yountville Facility C, Yountville, CA 94599

Mr. Alan Ramo, Citizens for a Better Environment, 942 Market Street, Suite 505, San Francisco, CA 94102

Mr. Alan Pendleton, San Francisco Bay Conservation & Development Commission, 30 Van Ness Avenue, San Francisco, CA 94102

Ms. Ellen Johnck, Bay Planning Coalition, 666 Howard Street, Suite 301, San Francisco, CA 94105

NANCY PELOSI
5TH DISTRICT, CALIFORNIA

1535 LONGWORTH BUILDING
WASHINGTON, DC 20515-0505
(202) 225-4965

DISTRICT OFFICE
FEDERAL BUILDING
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CA 94102-3460
(415) 556-4862

COMMITTEES
BANKING, FINANCE
AND URBAN AFFAIRS
GOVERNMENT OPERATIONS

Congress of the United States
House of Representatives
Washington, DC 20515-0505

January 20, 1988

Brigadier General Patrick J. Kelly
Division Engineer, U.S. Army
Engineer Division, South Pacific
630 Sansome Street
San Francisco, California 94111

Dear General Kelly:

After reviewing correspondence between your office and the National Park Service, and the many letters from concerned constituents regarding the dumping of dredge spoils off Alcatraz Island, it is unclear to us how this activity is allowed to continue without further clarification.

The area extending 300 yards and encircling Alcatraz Island is within the boundary of the Golden Gate National Recreation Area. Disposing of toxic materials on national park lands is inconsistent with federal policy governing these lands. We urge your office to cease dumping activities until appropriate representatives of the Department of the Interior and the Department of Defense, either through the required permit process or by established mutual agreement, resolve this question.

We are appalled that a federal agency would be involved in actions that so obviously degrade the environmental quality of San Francisco Bay. If federal agencies are not able to set public examples to protect the environment, how can we expect citizens to understand the importance of protecting this estuary? We encourage you to locate an alternative site for disposing of toxic sediments, preferably a deepwater site where the possibility of adverse environmental impacts will be reduced.

We understand that a dump site near the Farallones has been discussed. Again, this would be in direct conflict with federal policy established to protect this area as a marine sanctuary. In light of these objections and of those raised by other federal agencies, we urge you to cease dredge dumping on GGNRA lands and to seek an alternative <u>deepwater</u> site for this purpose.

Thank you for your earliest attention to this important matter affecting the health of our citizens and the life of San Francisco Bay.

Sincerely,

Barbara Boxer

BARBARA BOXER, M.C.

Nancy Pelosi

NANCY PELOSI, M.C.

cc: John Wise
Environmental Protection Agency

GEORGE MILLER
7TH DISTRICT, CALIFORNIA

2228 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-2095
JOHN LAWRENCE
ADMINISTRATIVE ASSISTANT

CHAIRMAN, SELECT COMMITTEE ON
CHILDREN, YOUTH AND FAMILIES

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
CHAIRMAN, SUBCOMMITTEE ON WATER AND POWER

COMMITTEE ON THE BUDGET

COMMITTEE ON EDUCATION AND LABOR

Congress of the United States

House of Representatives

Washington, DC 20515

[illegible]
[illegible] CA 94523
415 687 [illegible]
MARY [illegible]
[illegible] ADMINISTRATOR

[illegible]
RICHMOND, CA 94806
415 222 [illegible]

ANTIOCH CITY HALL
P.O. BOX [illegible]
ANTIOCH, CA 94509
[illegible]

TTY (202) 225-1904

February 16, 1988

General Patrick J. Kelly
Division Engineer
U.S. Army Corps of Engineers
Division of South Pacific
630 Sansome Street
San Francisco, CA 94111

Dear General Kelly:

Both the U.S. Army Corps of Engineers (COE) and the Port of Oakland are to be commended for their recent proposal which eliminated disposal of dredged spoils generated by the planned deepening of the Port to the dump site near Alcatraz Island. This is a clear indication of your concern for the environmental quality of San Francisco Bay.

In order to properly balance the timely development of the Port with the need to protect the San Francisco Bay estuary from further degradation, you have proposed to utilize Section 103 of the Ocean Dumping Act to establish a temporary ocean disposal site. During this process, please give consideration to the data and opinions of Federal and State Resource Agencies and private fishery representatives prior to selection of a 103 site. We urge you to consider selection of the B-1 or B-1A sites because they provide the greatest margin of protection to fisheries resources.

Recent information introduced by resource agencies and Pacific fisherman clearly illustrates that environmental uncertainties and fishing data gaps exist. Consequently, if the COE and the environmental and fishery agencies of the federal government are not able to reach agreement as to the appropriateness of site 1-M versus site B-1 or B-1A in the short time available, we encourage you to consider a bifurcated process.

Given the urgency of the Port of Oakland to complete dredging of 500,000 cubic yards by June 1988 and assuming that the test results determine the sediments are clean, we propose that the Environmental Protection Agency (EPA) and the COE should:

(1) reach consensus on an ocean disposal site for the first 500,000 cubic yards so that the project can move forward; but

(2) delay decision on the remaining 6.5 million cubic yards until economic, biological, chemical and oceanic uncertainties are addressed.

This would allow additional time to analyze data and reach a justifiable decision on the appropriate disposal site for the remaining 6.5 million cubic yards of dredged material.

We recognize the need for a full and adequate section 102 designation of a permanent ocean disposal site including analysis of an outer shelf site as well as an upland disposal site for materials that fail to meet the criteria for Bay or ocean disposal. We urge the COE and EPA to proceed with this designation expeditiously and offer our support so that the crucial needs of the Port of Oakland and the protection of the vital resources of San Francisco Bay and estuary are addressed.

We appreciate your timely consideration and response to this critical issue.

Sincerely,

George Miller
GEORGE MILLER
Member of Congress

Nancy Pelosi
NANCY PELOSI
Member of Congress

Barbara Boxer
BARBARA BOXER
Member of Congress

Pete Stark
FORTNEY STARK
Member of Congress

Ronald V. Dellums
RONALD DELLUMS
Member of Congress

U.S. DEPARTMENT OF COMMERCE, NATIONAL OCEAN AND
ATMOSPHERIC ADMINISTRATION

National Marine Fisheries

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

November 5, 1987 F/SWR33:DJS
1514-05

Colonel Galen H. Yanagihara
District Engineer
San Francisco District
Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dear Colonel Yanagihara:

This responds to your October 2, 1987, request for concurrence regarding the potential for adverse affects to threatened or endangered species from the proposed "Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements Draft Memorandum Number 1 and Supplement to the Environmental Impact Statement (SEIS), September 1987".

We concur with your conclusion that the dredging and disposal activities proposed for inside of the San Francisco Bay are unlikely to affect adversely populations of listed species. We previously reached a similar conclusion (March 18, 1987 enclosed letter) regarding listed species for disposal activities outside the Bay as a result of this project.

If you have any further questions, please contact Mr. Dana J. Seagars of our Protected Species Program at (FTS) 795-6665 or (213) 514-6665.

Sincerely,

EC Fullerton
E. C. Fullerton
Regional Director

Enclosure

Enclosure

Species Which May Be Present in Project Areas

Common Name	Scientific Name	Status
Gray whale	(*Eschrichtius robustus*)	Endangered
Right whale	(*Eubalaena glacialis*)	Endangered
Blue whale	(*Balaenoptera musculus*)	Endangered
Fin whale	(*B. physalus*)	Endangered
Sei whale	(*B. borealis*)	Endangered
Humpback whale	(*Megaptera novaengliae*)	Endangered
Sperm whale	(*Physter catadon*)	Endangered
Guadalupe fur seal	(*Arctocephalus townsendi*)	Threatened

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

October 2, 1987

Environmental Branch

Mr. E.C. Fullerton, Regional Director
U.S. Department of Commerce, National Marine
Fisheries Service, Southwest Region
300 South Terry Street
Terminal Island, CA 90731

Dear Mr. Fullerton:

The enclosed General Design Memorandum Number 1 and Supplemental Environmental Impact Statement for the Oakland Harbors deep-draft navigation improvement project is provided for your review and comment.

Pursuant to Section 7(c) of the Endangered Species Act (16 USC 661-666c) and the regulations found at 50 CFR 402, the U.S. Army Corps of Engineers, San Francisco District has determined that the project will not affect threatened or endangered species in the marine environment. Please refer to Table 2.D and paragraph 3.4.5c (SEIS pages 19, 54), and to your letter of March 18, 1987 located in Appendix C of the SEIS.

Your concurrence with this determination is requested within 30 days of receipt of this letter. Questions regarding this project should be directed to Ms. Patricia Duff (415/974-0441, FTS 454-0441) or to Mr. Les Tong (415/974-0439, FTS 454-0439).

Sincerely,

Galen H. Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

Copy Furnished:
Mr. Gail C. Kobetich, U.S. Fish and Wildlife Service
Endangered Species Office, 2800 Cottage Way, Room E-1823,
Sacramento, California 95825

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

March 18, 1987

F/SWR33:DJS
1514-05

Mr. William C. Angeloni
Chief, Planning/Engineering
San Francisco District
Arrmy Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

Dear Mr. Angeloni:

This responds to your March 3, 1987 information request concerning endangered, threatened, or candidate species that may be affected by the proposed designation of an ocean disposal site south of the Farallon Islands to receive material dredged from San Francisco Bay.

The enclosed list indicates those species which may be present in the project area. The gray whale and the humpback whale are the most likely of these species to be found in the proposed area. While both of these species frequent the region on a seasonal basis, we do not expect that the use of these sites for disposal of San Francisco Bay dredge material will result in any adverse affects to any of the species on the attached list. Therefore, we believe that conducting an informal consultation may satisfy the requirements of Section 7(c) of the Endangered Species Act. We would apprecate receiving a copy of the DEIS for this project and believe this document may be used in place of submitting a formal Biological Assessment.

If you have any further questions, please contact Mr. Dana J. Seagars of our Protected Species Program at (FTS) 795-6665 or (213) 514-6665.

Sincerely,

E.C. Fullerton
Regional Director

Enclosure

Enclosure

Species Which May Be Present in Project Areas

Common Name	Scientific Name	Status
Gray whale	(*Eschrichtius robustus*)	Endangered
Right whale	(*Eubalaena glacialis*)	Endangered
Blue whale	(*Balaenoptera musculus*)	Endangered
Fin whale	(*B. physalus*)	Endangered
Sei whale	(*B. borealis*)	Endangered
Humpback whale	(*Megaptera novaeangliae*)	Endangered
Sperm whale	(*Physter catadon*)	Endangered
Guadalupe fur seal	(*Arctocephalus townsendi*)	Threatened

U.S. DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE

Ecological Services

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Division of Ecological Services
2800 Cottage Way, Rm. E-1803
Sacramento, California 95825

February 24, 1988

Colonel Galen H. Yanagihara
District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: CE - Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements

Dear Colonel Yanagihara:

We commend you on your decision (January 29, 1988 meeting) to eliminate the use of the Alcatraz dredge disposal site (predredging of 2.5 million cubic yards and disposal of 7.0 million cubic yards) for this project. We believe this will significantly reduce any adverse effects of the project on the Bay biota.

As you know, the Service feels the use of Site 1M is unacceptable. We believe the studies conducted by the Corps on the 1M site have been inadequate. In fact, the evidence presented by the California Department of Fish and Game, the National Marine Fisheries Service, and the sport and commercial fishing interests seems to overwhelmingly indicate that Site 1M is an extremely important resource area. It is in view of these considerations that the Service believes that a deep water ocean disposal site should be selected for long-term disposal of dredged material. However, to meet the time constraints of the Oakland Inner and Outer Harbor Project and until adequate studies are conducted and a deep water ocean disposal site designated, we are amenable to use of Site B-1 in this instance only (see FWS Planning Aid letter, dated 2/24/87; Department of the Interior comments on draft Design Memorandum #1 and draft Supplemental EIS, dated November, 1987; and my January 15, 1988 letter to you).

It now appears that the Corps of Engineers intends to dispose of dredged spoil from the Oakland Inner and Outer Harbor Project at Site 1M. I hope you will reconsider as this will leave us no recourse but to initiate referral to the Council on Environmental Quality (as per the National Environmental Quality Act of 1969, as amended). I would prefer to resolve the matter without initiating this laborious and time consuming process. Any substantial delay would preclude the Port of Oakland from meeting their immediate need for a deep-draft navigation channel. We still believe this project can be constructed in an environmentally sound manner and also meet the needs of the Port of Oakland. I urge that your office continue to meet and discuss the issues and alternatives with all concerned to avoid an impasse.

Please direct any question regarding this matter to Fred Nakaji of my staff or me at (916) 978-4613.

Sincerely,

James J. McKevitt
Field Supervisor

Enclosure

cc: all with enclosure

Bob Tasto, CDFG, Menlo Park, CA
Jim Bybee, NMFS, Santa Rosa
Harry Seraydarian, EPA, San Francisco
John Beutler, United Anglers, Berkeley
Alan Ramo, Citizens for a Better Environment, San Francisco
Div. Engineer, South Pacific Div., CE, San Francisco
Port of Oakland, Oakland

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
2800 Cottage Way, Room E-1803
Sacramento, California 95825

January 15, 1988

Colonel Galen H. Yanagihara
District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: CE - Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements, Fish and Wildlife Coordination Act Activities

Dear Colonel Yanagihara:

This is provided as our continuing coordination under the Fish and Wildlife Coordination Act. It should not, however, be construed as our detailed report as required under Section 2 of the Act.

The Service will not be able to provide either a draft or final supplemental Fish and Wildlife Coordination Act report as you requested in your October 1, 1987 letter (which requested only a final), by January 15, 1988. Our decision that a Coordination Act report, as envisioned in the Act, cannot be completed at this time, is based on the following:

1. After reviewing the draft supplement to the EIS (September 1987), we have concluded that numerous and significant deficiencies occur in the EIS and in the project data available, and that additional short and long-term biological studies are needed before an adequate project impact analysis can be conducted. Our concerns on various segments of the project have been voiced many times in the past and also more recently in our letters of February 24, May 5, and August 18, 1987;

2. We are concerned with the recent and major decline of in-Bay fisheries in the vicinity of Alcatraz and adjacent San Francisco Bay waters, and the increase in Bay turbidity. Fisheries declines were recently brought to our attention by local sport and commercial fishermen and substantiated by California Department of Fish and Game catch data. It has been inferred that the declines are directly attributable to dredge spoil disposal practices. These changes in the fishery and the relationship between the declines and dredge spoil disposal must be thoroughly investigated;

3. We must evaluate thoroughly the significant and valid concerns raised by the California Department of Fish and Game (prior to and on the

draft EIS), National Marine Fisheries Service, Environmental Protection Agency and other federal, state and local agencies, and concerned sport and commercial fishermen and conservation organizations on the draft supplemental EIS and the project in general;

4. With the inclusion of San Francisco Bay in the National Estuary Program (Water Quality Act of 1987), the protection of its valuable and unique resources becomes evermoreso significant. The goal of the program is to identify nationally significant estuaries, protect and improve their water quality, and enhance their living resources. Anything less than a thorough evaluation of the proposed Oakland Inner and Outer Harbors project would be inconsistent to this goal;

5. The time frame requested for preparation and provision of the required Coordination Act reports is inadequate. A much longer period of time will be required to conduct the needed studies, perform the analyses, coordinate and write the report. During the negotiations for the scope of work on this project, your staff was advised that considerably more time and funds could be required to fulfill the requirements of the Coordination Act if our preliminary investigations revealed that additional studies were required for our project impact evaluation.

6. In addition, the failure to receive project information in a timely manner was the major contributor to the delay. Although requested several times by my staff prior to issuance of the draft EIS, specific and final project information was not received until October 5, 1987 with the draft EIS. Early and close coordination with the Fish and Wildlife Service, California Department of Fish and Game, and the National Marine Fisheries Service, during the draft EIS stage, would have alleviated many of the problems with the proposed project changes and the draft EIS.

In summary, as a result of the above and because of the severe ecological implications associated with the dredging and aquatic disposal of 9.5 million cubic yards of spoil at Alcatraz and in the ocean, we recommend that the project not proceed until we have had the oppo.tunity to conduct a thorough and detailed analysis of the impacts to fish and wildlife pursuant to the Fish and Wildlife Coordination Act. As per the National Agreement between our agencies, those investigations should be conducted by the Service with Corp's funds. However, we would be willing to consider using the Corps' Central San Francisco Bay Project Dredge Material Disposal Site

Investigation, proposed at the January 6, 1988 meeting of the Dredge Advisory/Steering Committee, as the vehicle to obtain some of the needed data. This would be, however, long-range, and therefore, would not meet the immediate needs of the Oakland Inner and Outer Harbors project.

As an alternative, until such studies are completed and information is available to determine the effects of dredge spoil disposal on the Bay biota, dredged spoils from this project might be disposed of at the Site B-1 ocean disposal site; this would be in lieu of dredging Alcatraz (2.5 million cubic yards) and the disposal of the material in the ocean (Site 1M), and the subsequent disposal of 7 million cubic yards from Oakland Inner and Outer Harbors at Alcatraz as presently proposed. This would require additional investigation but we feel it could be completed in a shorter time frame if the site were to be used on a one-time basis. Although we prefer a deep-water ocean disposal site, Site B1 would be acceptable for this project only and only until a suitable ocean disposal site is designated.

We are hopeful that with close coordination, many of the issues previously discussed can be resolved and an environmentally sound project constructed. We would like to meet with you at your convenience to discuss this matter further, and determine a course of action to complete the Fish and Wildlife Coordination Act process for this project. I or Fred T. Nakaji of my staff can be reached at (916) 978-4613.

Sincerely,

James J. McKevitt
Field Supervisor

cc: Reg. Dir., (AFWE), FWS, Portland, OR
Bob Tasto, CDFG, Marine Res. Branch, Menlo Park, CA
Jim Bybee, NMFS, Santa Rosa
EPA, San Francisco
Alan Ramo, Citizens for a Better Environment, San Francisco
John Beuttler, United Anglers, Berkeley

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

30 October 1987

Environmental Branch

Mr. James McKevitt, Field Supervisor
Division of Ecological Services
U. S. Fish and Wildlife Service
2800 Cottage Way, Room E-2828
Sacramento, CA 95825

Dear Mr. McKevitt,

We are pleased to submit for your review and concurrence the draft scopes of work (enclosed) for our FY 1988 transfer fund agreement. Please review and notify us of your concurrence or conflicts. We expect to receive your concurrence as soon as possible to execute our agreement with your Regional Office. Copies of the transmittal of the FY 1988 Transfer Fund agreement and scopes of work will be provided to you when completed.

Briefly, we have input requirements during FY 1988 for dredged material disposal for the Oakland Harbor deep-draft navigation improvements; San Francisco Bay to Stockton, Phase 3 Project; San Francisco Shoreline Study, for 3 Interims; Noyo River Channel Extension; the Marin County Shoreline/San Rafael Creek 205 flood control Study; Pescadero Creek 205 flood control; and San Pedro Creek 205 flood control. Funding for the San Pedro Creek 205 flood control effort is not presently available, and notification of study funding is expected during the fiscal year. We will also process the scopes of work for the San Francisco Shoreline Study, for 3 Interims, after further coordination and discussion with your staff to be arranged during November 1987. Briefly, the FY 1988 input requirements for the San Francisco Bay Shoreline Study are as follows:

Interim Study	Task	Tentative Schedule	
		Start	Complete
1	Supplement to Draft Coordination Act Rept	December (87)	February (88)
	Final Coordination Act Report	August (88)	September (88)
2	Habitat Evaluation	January (88)	April (88)
	Draft Coordination Act	January (88)	May (88)
3	Planning aid letter	March (88)	June (88)

As our FY 1988 program and budget are supplemented or modified due to potential add-ons to our small project authorities, we expect to have additional work to schedule with your Field Office in Sacramento during the fiscal year. Questions related to the the FY 1988 transfer funding requirements should be directed to Mr. Les Tong (FTS) 454-0439. We look forward to completing our transfer agreement for FY 1988 after your review.

Sincerely,

Robert R Mooney Jr

William C. Angeloni
Chief, Planning/Engineering Division

Enclosures

OAKLAND HARBOR FY 88

Project Manager: Dennis Thuet FTS 454-0394

SEIS Coordinator: Patricia Duff, FTS 454-0441

Objective: To provide a final supplemental Coordination Act letter report on the disposal of approximately 3.1 million cubic yards of dredged material from the navigation improvements of Oakland Outer Harbor and approximately 4.1 million cubic yards of dredged material from Oakland Inner Harbor at the Alcatraz disposal site, San Francisco Bay, and 2.7 million cubic yards of material from the Alcatraz disposal site at a designated ocean disposal site.

Project Description: Oakland Harbor is located on the eastern shore of central San Francisco Bay in Alameda County, about eight miles inside the Golden Gate. The existing -35 foot 3.4 mile long Oakland Outer Harbor channel is located immediately south of the San Francisco-Oakland Bay Bridge. The Outer Harbor Channel serves the Seventh Street Terminal, various private and public container terminals, and the Oakland Army Base Terminal. It varies in width from 600 feet to 800 feet and contains a turning basin 950 feet in diameter. The existing -35 foot Inner Harbor Channel provides access to three major container facilities at U. S. Lines, American President Lines, and the Howard terminal. The channel is 600 feet wide with lesser widths between the rock banks at the entrance channel.

Two Plans, Y and Z, are being considered for the proposed Outer Harbor improvement. Both Plans call for deepening the entire one-way channel from -35 feet to -42 feet MLLW. Both would widen the bar channel from 800' to 900', and widen the existing entrance channel from 800 to 1,000 feet. Plan Z retains the dogleg width at 600'. Plan Y widens the dogleg from 600 to 700 feet. Both Plans relocate and increase the diameter of the turning basin from 950 to either 1600 feet (Plan Z) or 1425 feet (Plan Y). Plan Z is the preferred alternative as it would not result in relocation of the Bay Area Rapid Transit (BART) tunnel and less dredging would be necessary. The proposed improvements for the Inner Harbor includes deepening to -42 feet and the dredging of a 1,200-foot diameter turning area at project mile 3.3.

There is no designated ocean disposal site at this time. The former 100-fathom site (SF-7) was located within the Farallon Islands Marine Sanctuary in 1980. The Corps of Engineers, with oversight from the Environmental Protection Agency, is in the process of designating an ocean site for disposal of dredged material which meets the criteria of 40 CFR Part 227. The location, depth and distance from the Golden Gate of the preferred site is described in the Supplemental Draft EIS.

The proposed dredging of 2.7 million cubic yards from the Alcatraz site (SF-11) with disposal at an ocean site represents an additional disposal requirement. Ocean disposal of material from the Alcatraz site will require use of a clamshell dredge. Material would be loaded into barges for transport to the selected ocean disposal site.

Previous Coordination Activities: Information provided by the Fish and Wildlife Service relevant to this project includes the Oakland Outer Harbor Coordination Act Report, dated 1 September 1976 for disposal at Alcatraz on the ebb tide only; the Planning Aid Letter dated 31 January 1986 for unrestricted disposal of dredged materials from Oakland Outer and Richmond Harbors at the Alcatraz disposal site. Additional comments, on ebb tide disposal of dredged materials at Alcatraz, were provided in the Planning Aid Letter for John F. Baldwin Ship Channel dated 25 April 1984 and 14 August 1985. The final Coordination Act Report for Oakland Inner Harbor was furnished by Fish and Wildlife Service in April 1984. Disposal of dredged material at the Alcatraz site was discussed. Draft Supplemental Environmental Impact Statement (SEIS) for the Oakland Harbor project (both Outer and Inner Harbors) was distributed for review September 23, 1987.

Corps Furnished Data: The dredge material is characterized as intermixed sand and consolidated fine-grained sediments. Elutriate tests on sediment samples from the site in 1985 and 1987 have been conducted and indicate that the material would meet state water quality criteria after dilution. Suspended particulate and solid phase bioassays were also performed on samples in 1985 and no environmentally unacceptable effects were indicated. Further bioassay and bioaccumulation testing are in progress to determine if the material from the Alcatraz site meets the criteria for ocean disposal. Preliminary test results will be available by January 1988.

Statement of Services:

1. Provide a final supplemental letter report which discuss the disposal of dredged material from the Alcatraz disposal site into the preferred ocean disposal site as described in the Draft SEIS.

2. Coordinate with the State Department of Fish and Game, National Marine Fisheries Service, and other agencies as appropriate. Letters should be obtained by FWS from other agencies describing their concurrence in the FWS report, or providing other views, and this should be appended to the FWS report furnished to the Corps.

Checkpoint Dates:

Checkpoint 1: September 23, 1987 Draft SEIS circulated for review

Public Meeting: November 5, 1987

Checkpoint 2: December 15, 1987 Submit Final Letter Report

Funds Available:

Assistant Director Date
Fish and Wildlife Service

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

October 1, 1987

Mr. James J. McKevitt
Division of Ecological Services
Attention: Mr. Fred Nakaji
U.S. Fish and Wildlife Service
2800 Cottage Way, Room E-1803
Sacramento, California 95825

Dear Mr. McKevitt:

The enclosed document, "Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Draft General Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, Alameda County, California" is provided for your review and comment.

Please provide us with a final supplemental Coordination Act letter report pursuant to the Fish and Wildlife Coordination Act (16 USC 661-666C). As requested in our Scope of Services (Item 2 in the Statement of Services), and in our letter of August 6, 1987 to Mr. Nakaji, please include the views of the California Department of Fish and Game (CDFG) and National Marine Fisheries Services (NMFS) in your report. Copies of the SEIS and results of the second season biological testing are also being sent to CDFG (Mr. Robert Tasto) and NMFS (Mr. Jim Bybee). The final ocean disposal site selection document is not yet available; however, information from the draft document has been incorporated in the Supplemental EIS. Please note the schedule in the August 6th letter for completion of the formal coordination.

As stated in our Scope of Services, FWS representation at our public meeting scheduled for November 5, 1987, 7:30 P.M., at the Bay Model in Sausalito, California is also required. Questions regarding this project should be directed to Ms. Patricia Duff (415/974-0441 or FTS/454-0441) or Mr. Les Tong (415/974-0439 or FTS 454-0439) of my staff.

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

2 Enclosures

Copy Furnished:
Mr. Robert Tasto, California Department of Fish and Game, Marine Resources Branch, 411 Burgess Drive, Menlo Park, CA 94025
Mr. James Bybee, National Marine Fisheries Service, Habitat Conservation Service, 777 Sonoma Avenue, Room 325, Santa Rosa, CA 95404

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
2800 Cottage Way, Room E-1803
Sacramento, California 95825

August 18, 1987

Mr. William C. Angeloni, Chief
Planning Engineering Division
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105-1905

Subject: Corps of Engineers - Oakland Harbor Deep Draft Navigation Improvements, Alameda County, California - Pre-dredging of Alcatraz Dredge Disposal Site

Dear Mr. Angeloni:

This responds to your August 6, 1987 letter requesting our comments on the Corps' proposal to dredge 2.7 million cubic yards of material from the in-Bay dredge disposal site at Alcatraz for disposal at an ocean disposal site. Subsequent to the dredging, 7.3 million cubic yards of spoils from Oakland Harbor will be disposed of at the same *in-Bay Alcatraz disposal* site.

As you are aware, we have repeatedly stated clearly, in the past, our concerns on disposal of dredge spoils at Alcatraz, and just recently on the use of ocean disposal Site B-1. Those concerns are still applicable today. They are based on fish and wildlife impacts associated with (1) the actual dredging process, (2) the deposition-resuspension-recirculation-redeposition cycle, (3) the shoaling problem at Alcatraz, and (4) the basic lack of biological information for the selection of an ocean disposal site (Site B-1, Station 1, etc.).

The Corps' proposal to pre-dredge Alcatraz for the sole purpose of allowing additional dumping of spoils from the Oakland Harbor channels at Alcatraz will increase impacts of dredging and the deposition-resuspension-recirculation-redeposition cycle on the Bay biota. The direct impacts of dredging would be unnecessarily repeated, resulting in materials again being resuspended, recirculated, and redeposited within other areas of San Francisco Bay, especially if dredging is conducted by a clamshell dredge during the flood tide. We have assumed that dredging will occur at all tidal cycles once it is initiated. Therefore, we believe more than 4.6 million cubic yards of material will ultimately (pre-dredging and subsequent disposal at Alcatraz) be resuspended, recirculated, and redeposited within San Francisco Bay, or out of the Golden Gate. We believe, however, that a significant portion of the sediments will be retained within the Bay.

Our primary goal is to minimize dredging and dredge spoil disposal impacts on fish and wildlife by reducing or eliminating recirculation and redeposition of dredged spoils within San Francisco Bay as much as possible. Therefore, our basic position has always been that first priority for disposal of dredged material should be upland areas followed by ocean disposal. Only if these alternatives are not feasible should open-water disposal in the Bay be considered, and then only on ebb tides.

Your present proposal includes ocean disposal; however, it does not reduce or eliminate in-Bay disposal and hence the adverse effects of in-Bay disposal on the Bay biota. In fact, the pre-dredging of Alcatraz contributes to these effects. We, therefore, recommend that: (1) to minimize the impacts of dredging and dredge spoil disposal on fish and wildlife of San Francisco Bay, dredging at Alcatraz (2.7 million cubic yards) not be conducted for the sole purpose of providing additional space for the deposition of newly dredged material (7.3 million cubic yards) from the Oakland Harbor channels at the same Alcatraz site; (2) if an upland site is not available, dredge materials from the Oakland Harbor channels be directly disposed of at an ocean disposal site acceptable to the Fish and Wildlife Service, the California Department of Fish and Game, National Marine Fisheries Service, and the Environmental Protection Agency; and (3) sufficient biological information be provided to the above concerned resource agencies to determine whether the proposed ocean disposal sites are suitable for this purpose.

We appreciate the opportunity to provide input to your planning process. For assistance regarding this matter, please contact Mr. Fred T. Nakaji of my staff at FTS 460-4613 or (916) 978-4613.

Sincerely,

James D. Carson
Acting Field Supervisor

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

August 6, 1987

Environmental Branch

Mr. Fred Nakaji
U.S. Fish and Wildlife Service
Ecological Services Office
2800 Cottage Way, Room E1803
Sacramento, CA 95825

Dear Mr. Nakaji:

In reference to your conversation with Patricia Duff of my staff on August 6, 1987, the purpose of this letter is to request additional, informal planning assistance and to inform you of our proposed schedule for formal coordination for the Oakland Inner and Outer Harbor deep-draft navigation improvement projects.

Since your submittal of the planning aid letter dated February 24, 1987 which commented on selection of an ocean disposal site to receive dredged material from the Oakland channels, the project has been modified. The U.S. Army Corps of Engineers, San Francisco District now proposes clamshell dredging 2.7 million cubic yards of material from the in-Bay Alcatraz disposal site and taking this material to an ocean disposal site. Then, 7.3 million cubic yards of slurried dredged material from the Oakland channels would be disposed at the Alcatraz disposal site. The material removed from the Alcatraz site would be equal to that from Oakland expected to be retained at the in-Bay site. The remaining 4.6 million cubic yards of material would be available for resuspension and movement out of the Golden Gate, or recirculation within San Francisco Bay.

The disposal sites under consideration for receipt of the Alcatraz material are the nearshore site (Station 1 on the attached map) and the midshelf site (Station B1 on the map). Since we would like to include your comments on pre-dredging the Alcatraz site in our Administrative Draft Supplemental Environmental Impact Statement which will be reviewed by our division office beginning August 27, 1987, your comments are needed by August 21, 1987.

The following is our schedule for finalizing formal coordination with your office:

1. October 1, 1987 -- Request to FWS for Final Supplemental Coordination Act Letter Report

2. October 1, 1987 -- Submission to FWS, NMFS, and CDFG of the following:

   a. Draft SEIS, Oakland Outer and Inner Harbor Deep-Draft Navigation Improvements

   b. Final Report, Ocean Disposal Site Selection

   c. Final Report, Second Season Testing Program (April 1987) Baseline Physical and Biological Analysis of Potential Ocean Disposal Sites Offshore San Francisco

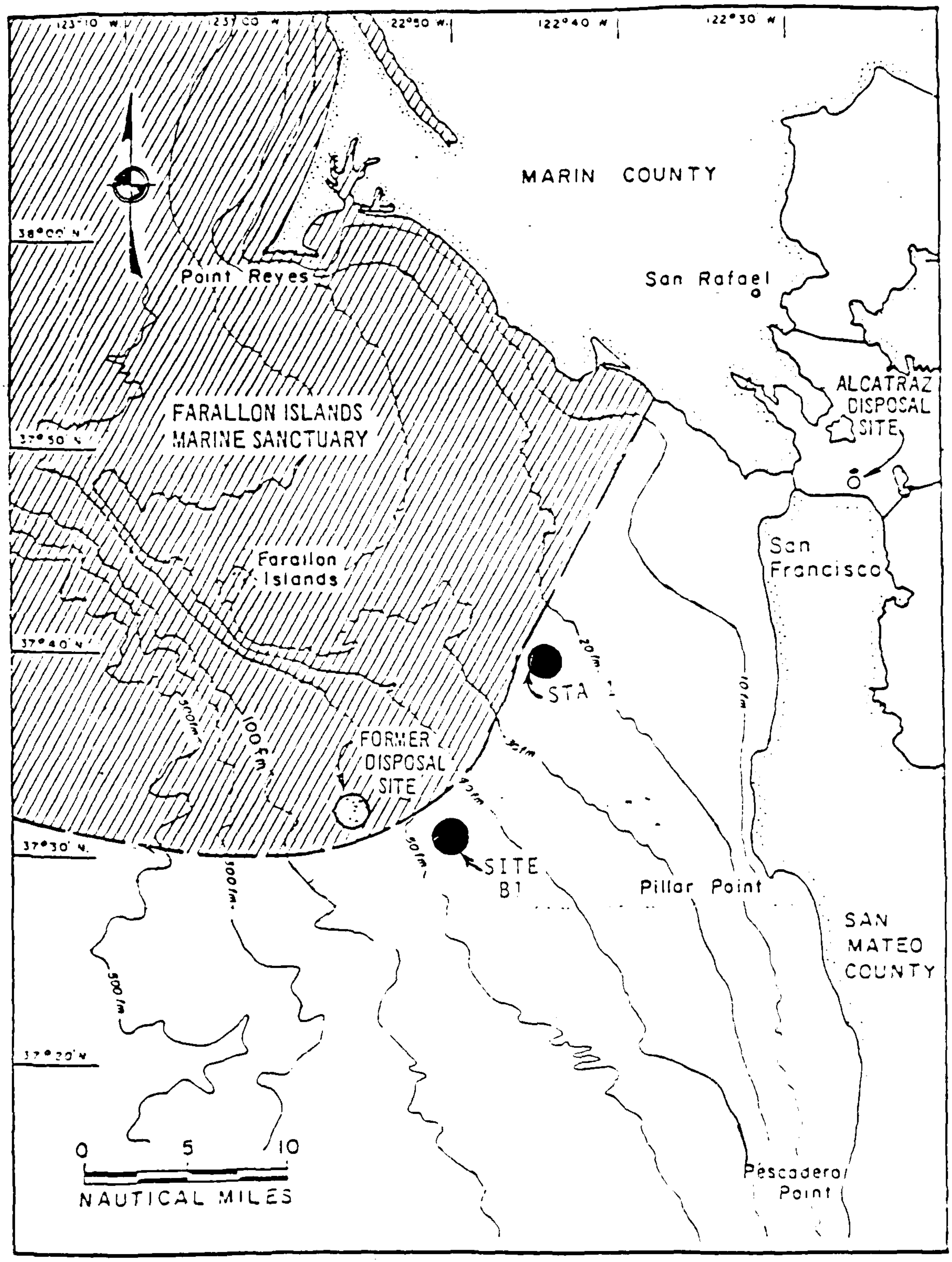
3. November 15, 1987 -- U.S. Army Corps of Engineers, San Francisco District receives Final Coordination Act Letter Report from the U.S. Fish and Wildlife Service, Ecological Services.

We would appreciate a formal response to this request at the earliest possible date. If you have questions regarding this request, please contact Ms. Patricia Duff at (FTS) 454-0441. We appreciate your attention to this subject and look forward to receiving your comments and input.

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

Encls



OCEAN DISPOSAL SITES UNDER CONSIDERATION FOR SELECTION UNDER SECTION 103, MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT TO RECIEVE MATERIALS DREDGED FOR THE OAKLAND HARBOR DEEPENING PROJECT.

OCEAN DISPOSAL SITES[1] - LOCATION AND DEPTH

SITE	LOCATION (LAT/LONG)	HAUL DISTANCE FROM GOLDEN GATE BRIDGE (NMI)	WATER DEPTH (FATHOMS)	(METERS)	(FEET)
NEARSHORE SITE					
STATION 1	37°40'00"N; 122°44'00"W	15.6	25-30	46-55	150-180
MIDSHELF SITE					
SITE B1	37°31'16"N; 122°48'32"W	24.9	45-50	82-91	270-300

1 One of these sites will be selected for receipt of dredged material for the Oakland Deep-Draft Navigation Project under Section 103 of the Marine Protection Research and Sanctuaries Act, and EPA's Ocean Dumping Regulations and Criteria (40 CFR 220-225, 227-229).

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Division of Ecological Services
2800 Cottage Way, Rm. E-1803
Sacramento, California 95825

May 5, 1987

Mr. Rod Chisholm, Chief
Environmental Branch
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: CE - Oakland Inner Harbor Deep Draft Navigation Improvements, Alameda County, California - Notice of Intent to Prepare a Supplemental Environmental Impact Statement

Dear Mr. Chisholm:

We have reviewed your Notice of Intent to prepare a draft supplemental environmental statement for this project and provide the following comments.

Our primary concern is the impacts of dredge spoil disposal on valuable in-Bay and ocean fish and wildlife resources. Previously, we stated that our first priority for disposal of dredged material is upland areas followed by ocean disposal, and then in-Bay disposal at Alcatraz only on the ebb tide. Therefore, we concur with your decision to investigate the use of an ocean disposal site, since ocean disposal was not considered in your final environmental impact statement.

We do, however, recommend that the draft supplemental environmental impact statement include a thorough evaluation of impacts on marine resources of the area, if an ocean site is selected under Section 103 of the Marine Protection Research and Sanctuaries Act. Our concerns regarding the proposed ocean disposal sites were provided to you in our February 24, 1987 planning aid letter.

We appreciate the opportunity to provide comments. For further assistance, please contact Mr. Fred T. Nakaji of my staff at FTS 460-4613.

Sincerely,

James J. McKevitt
Field Supervisor

cc: RD (AFWE) FWS, Portland, OR
ES/BEC, Washington, D.C.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
2800 Cottage Way, Rm. E-1803
Sacramento, California 95825

February 24, 1987

District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, CA 94105

Subject: CE-Oakland Inner and Outer Harbor, Deep Draft Navigation Improvements, Alameda County, California - Review of Proposed Ocean Disposal Sites for Dredged Materials

Dear Sir:

This planning aid letter is provided in partial fulfillment of our FY 87 scope of work. It includes our preliminary analysis of four proposed ocean sites for the disposal of dredged spoils presently being investigated by the Corps of Engineers for both projects. The information contained herein is preliminary in nature and is provided as technical assistance to aid your planning process. It does not constitute our detailed report called for in Section 2 of the Fish and Wildlife Coordination Act. Our analysis is based on project information provided by the Corps of Engineers prior to February 9, 1987.

In response to your staff's request, our analysis concentrates primarily on the impacts of dredged spoil disposal at the four proposed ocean sites (B-1, B-2, B-3 and B-5; Figure 1). A detailed analysis of the use of clamshell dredge, in lieu of a hydraulic cutterhead dredge, at the harbors will be provided in our supplemental Fish and Wildlife Coordination Act report. Fish and wildlife resources at the project areas and within San Francisco Bay are as described in our past Coordination Act report and planning aid letters.

We were asked by your staff to determine which of the four proposed ocean disposal sites would be the most preferable for the disposal of dredge materials from Oakland Inner and Outer Harbors. We have conducted a review of a number of studies with regard to dredging and dredged spoil disposal, including that by Stevenson and Parr (1986). The conclusions, however, are unclear and conflicting as to where ocean disposal should occur. Much of this, we believe, is due to the lack of sufficient information regarding the resources and the impacts of such actions on these resources.

Based on a single sample period (October 1986) Stevenson and Parr indicated that Site B-1 (a shallow water site) would be the most appropriate of the four proposed sites. However, Nybakken et al. (1984) hesitated to choose a site because of the lack of information. He did suggest that "...by going only a little farther (from Stations 1 and 2, Figure 1), it would be possible to dispose of dredged material in very deep water off the edge of the continental shelf and hence avoid involvement with any fishery resource." In turn, the California Department of Fish and Game (Bob Tasto, 1987, personal communication) indicates that the rocky, deep water site (B-4) supports a sablefish (Black Cod) fishery.

A review of existing scientific information on the biota of the area indicates that all sites presently being investigated by the Corps of Engineers provide habitat for finfish and shellfish species of commercial and sport significance, and the food organisms on which they depend. Although the sites may vary, somewhat in species abundance and diversity, they all seem to support a significant fauna. Therefore, the disposal of 9.3 million cubic yards of dredged spoils from Oakland Inner and Outer Harbors, at any one of the proposed sites, will have an adverse effect on these resources.

Based on Stevenson and Parr's preliminary findings, we would agree with their conclusion that disposal of dredged materials at Site B-1 would be the least detrimental to the biota of the sites under investigation. This was based on the "...relatively low fish abundance, low biomass of the most highly utilized benthic food resources, and the absence of brooding dungeness crab." However, we must remember that the basis for their conclusion was a single survey conducted in October 1986. The study does not take into consideration seasonal or year-to-year variations of vertebrate and invertebrate faunal populations and diversity. In addition, it does not include a survey of very deep water sites off the continental shelf.

We hesitate, at this time, to recommend any of the proposed sites for dredged spoil disposal, especially in view of (1) the lack of sufficient information on the biota of the sites (all proposed sites and very deep water sites), (2) the large amount of dredged materials (9.3 million cubic yards) which will be disposed of at a designated site, and (3) the uncertainty of the long-term effects of such disposal on the biota. We can, however, assume that the initial effects of dredge spoil disposal at the proposed sites would be adverse on the benthic communities through burial. This would in turn adversely affect other species further up the food chain. The Corps' own study (1975) showed that dredged material released from a barge fill directly below the path of the barge, distributed somewhat unevenly, and deposited at an average depth of one foot. This occurred with the release of only 4,000 cubic yards of material. We believe the effects of 9.3 million cubic yards will be significantly greater in magnitude and duration.

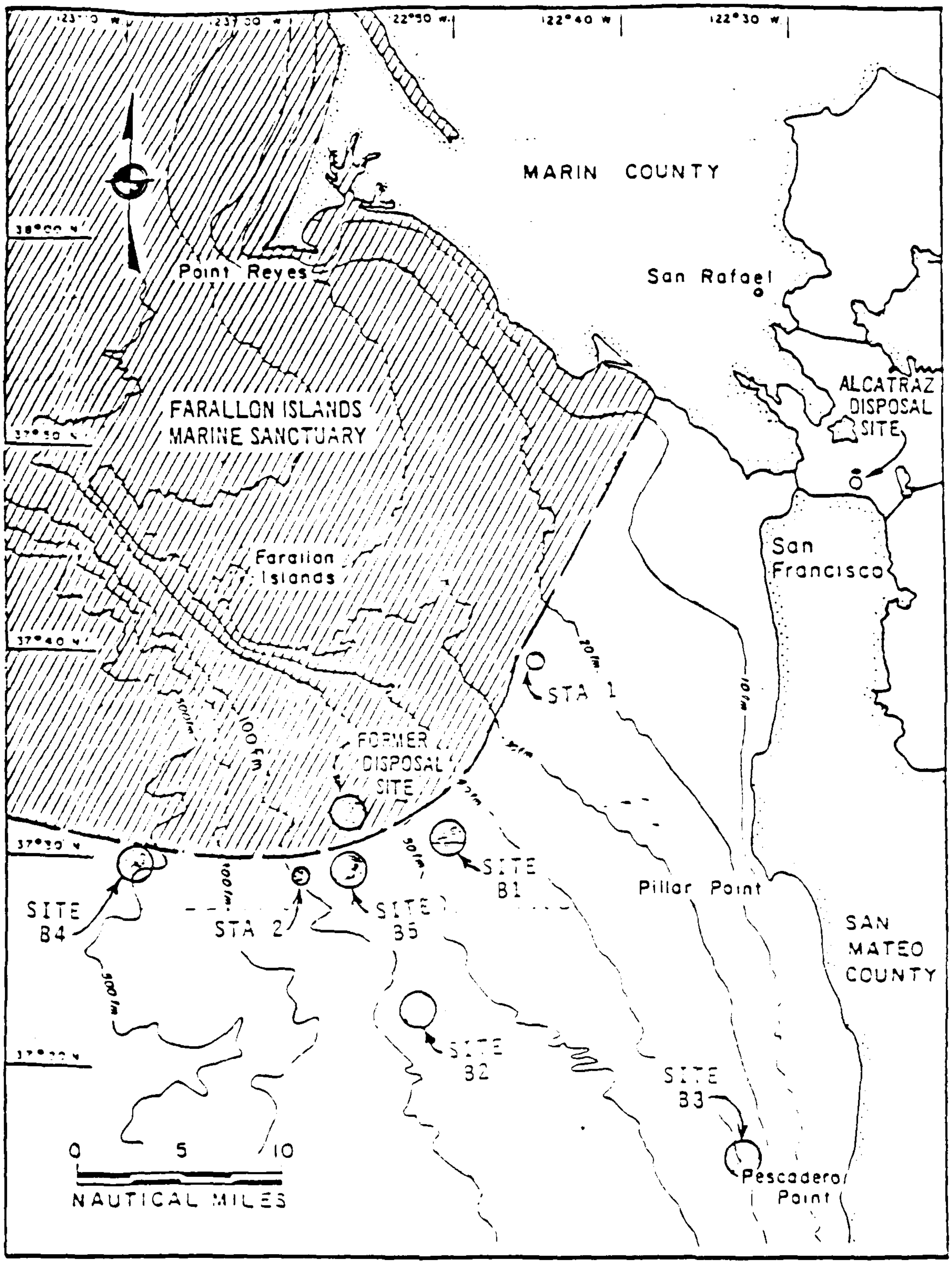


FIGURE 1: OCEAN DISPOSAL SITES UNDER CONSIDERATION FOR DESIGNATION

In order to eliminate as much of the adverse effects of dredged spoil disposal on the valuable marine resources of the area, we believe Stevenson and Parr's study (Kennitic Laboratories, Inc.) for the Corps of Engineers should be (1) expanded to consider seasonal variations of faunal composition and dynamics, (2) extended to encompass at least 3 years of sampling, and (3) expanded to include several extremely deep water sites beyond the continental shelf. Until this is done, we believe it is premature to select a ocean disposal site. In addition, the Corps of Engineers should conduct a post-disposal monitoring study to determine the long-term effects of dredged spoil disposal at the selected site.

We appreciate the opportunity to provide input to your planning process. For further assistance regarding this letter, please contact me at FTS 460-4613.

Sincerely,

Fred T. Nakaji

Fred T. Nakaji
Acting Field Supervisor

CC: ARD (FWE), FWS, Portland, OR
CDFG, Menlo Park, CA
Attn: Bob Tasto
NMFS, Santa Rosa
Attn: Jim Bybee

REFERENCES

California Department of Fish and Game. 1987. Bob Tasto, personal communication.

Corps of Engineers. 1975. Dredge disposal study, San Francisco Bay and Estuary. Appendix L. ocean disposal of dredged material.

________________. 1975. Dredge disposal study, San Francisco Bay and Estuary, Appendix M, dredging technology.

Environmental Protection Agency. 1982. Environmental Impact Statewment (EIS) for the San Francisco Bar dredge material disposal site designation.

Nybakken, James et al. 1984. Baseline survey and selection for ocean disposal, Gulf of the Faralones.

Stevenson, Marty and Terence D. Parr. 1986. First season testing program, baseline physical and biological analysis of potential ocean disposal sites. Conducted for the Corps of Engineers. Kennetic Lab., Inc.

Towill Inc. 1986. Bathymetric Survey of Five Sites Off the Coast of California, prepared for the Corps of Engineers.

Wild, P.W. and R.N. Tasto. 1983. Life History, Environment, and Mariculture Studies of the Dengeness Crab, *Cancer magister*, with Emphasis on the Central Valifornia Fishery Resource. California Department of Fish and Game. Fish Bulletin 172.

40

INTRA-ARMY ORDER FOR REIMBURSABLE SERVICES

For use of this form, see AR 37-108 and AR 37-110; the proponent agency is USAFAC.

1. RECEIVING OFFICE CONTROL NUMBER

☐ FUNDED ☐ AUTOMATIC

2. ORDER
a. NUMBER: E86 87 3010
b. DATE: 26 Nov 86

3. CHANGE ORDER
a. NUMBER:
b. DATE:

4. TO BE PERFORMED BY (Command, Installation or Activity), ADDRESS (Include ZIP Code), AND AUTOVON NUMBER

Division of Ecological Services
U.S. Fish & Wildlife Service
2800 Cottage Way, Room E-2727
Sacramento, CA 95825

5. ORDERED BY (Command, Installation or Activity), ADDRESS (Include ZIP Code), AND AUTOVON NUMBER

US Army Engineer District, San Francisco
Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

6. DESCRIPTION OF SERVICES TO BE PERFORMED

Oakland Harbor - Deep-Draft Navigation Improvements, Alameda County, CA.

Planning Aid Letter and Final Supplemental Coordination Act Letter Report on the disposal of approx. 4.9 million cubic yards of dredged material in accordance with the attached scope of services.

POC: Don Hancock
FTS: 454-0394

Accounting Classification:

96X3122 Constr Gen CE Civil S96043 BB211 30 5J10 FWLR 321 EE = $5,000.00

96X3121 Gen Invest CE Civil S96043 AD213 03 56Z0 00FW 321 EE = $3,500.00

7a. NAME AND TITLE OF ORDERING OFFICER: William C. Angeloni, Chief, Plng/Engrg Divn
b. SIGNATURE: Robert R Mooney for
c. DATE: 26 Nov 86

ORIGINATING FINANCE AND ACCOUNTING OFFICE APPROVAL

8a. ACCOUNTING CLASSIFICATION: See Block 6
b. AMOUNT: $8,500.00
c. CHANGE: INCREASE AMOUNT ______ DECREASE AMOUNT ______ REVISED AMOUNT ______

9. Services to be performed pursuant to this order are properly chargeable to the appropriations or other accounts indicated above until 30 Sept 87 (Day - Month - Year) the expiration date of this order.

10a. TYPED NAME AND TITLE OF APPROVING OFFICER: ALAN SATO, Ch, Support Branch, Resource Management Office
b. SIGNATURE: [signature]
c. DATE: 12/10/86

ACCEPTING OFFICER

11. THE ABOVE TERMS AND CONDITIONS ARE SATISFACTORY AND ARE ACCEPTED.

a. TYPED NAME AND TITLE OF ACCEPTING OFFICER
b. SIGNATURE
c. DATE ACCEPTED

DA FORM 1 JUN 77 2544 EDITION OF 1 DEC 75 WILL BE USED UNTIL EXHAUSTED.

U.S. GOVERNMENT PRINTING OFFICE: 1983-401-782

SCOPE OF SERVICES

OAKLAND HARBOR
DEEP-DRAFT NAVIGATION IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA

Project Manager: Don Hancock (Outer); Guy Otoshi (Inner), FTS 454-0394

SEIS Coordinator: Patricia Duff, FTS 454-0441

Objective: To provide an additional planning aid letter and final supplemental Coordination Act letter report on the disposal of approximately 4.9 million cubic yards of dredged material from the navigation improvements of Oakland Outer Harbor and approximately 4.4 million cubic yards of dredged material from Oakland Inner Harbor at a designated ocean disposal site.

Project Description: Oakland Harbor is located on the eastern shore of central San Francisco Bay in Alameda County, about eight miles inside the Golden Gate. The existing -35 foot 3.4 mile long Oakland Outer Harbor channel is located immediately south of the San Francisco-Oakland Bay Bridge. The Outer Harbor Channel serves the Seventh Street Terminal, various private and public container terminals, and the Oakland Army Base Terminal. It varies in width from 600 feet to 800 feet and contains a turning basin 950 feet in diameter. The existing -35 foot Inner Harbor Channel provides access to three major container facilities at U. S. Lines, American President Lines, and the Howard terminal. The channel is 600 feet wide with lesser widths between the rock banks at the entrance channel.

Two Plans, Y and Z, are being considered for the proposed Outer Harbor improvement. Both Plans call for deepening the entire one-way channel from -35 feet to -42 feet MLLW. Both would widen the bar channel from 800' to 900', and widen the existing entrance channel from 800 to 1,000 feet. Plan Z retains the dogleg width at 600'. Plan Y widens the dogleg from 600 to 700 feet. Both Plans relocate and increase the diameter of the turning basin from 950 to either 1600 feet (Plan Z) or 1425 feet (Plan Y). Plan Z is the preferred alternative as it would not result in relocation of the Bay Area Rapid Transit (BART) tunnel and less dredging would be necessary. The proposed improvements for the Inner Harbo includes deepening to -42 feet and the dredging of a 1,200-foot diameter turning area at project mile 3.3.

There is no designated ocean disposal site at this time. The former 100-fathom site (SF-7) was located within the Farallon Islands Marine Sanctuary in 1980. The Corps of Engineers, with oversight from the Environmental Protection Agency, is in the process of designating an ocean site for disposal of dredged material which meets the criteria of 40 CFR Part 227. The locations, depths and distances from the Golden Gate of sites being considered are listed in Table 1 and shown in Figure 1. Final designation is scheduled for late January 1988.

The change in disposal locations from the Alcatraz site (SF-11) to the ocean disposal site assumes a change in dredging methods. Alcatraz disposal assumed use of a hydraulic cutterhead dredge in order to economically meet the requirement for slurried disposal. Ocean disposal assumes use of a clamshell dredge. Material would be loaded into barges for transport to the selected ocean disposal site.

Previous Coordination Activities: Information provided by the Fish and Wildlife Service relevant to this project includes the Oakland Outer Harbor Coordination Act Report, dated 1 September 1976 for disposal at Alcatraz on the ebb tide only; the Planning Aid Letter dated 31 January 1986 for unrestricted disposal of dredged materials from Oakland Outer and Richmond Harbors at the Alcatraz disposal site. Additional comments, on ebb tide disposal of dredged materials at Alcatraz, were provided in the Planning Aid Letter for John F. Baldwin Ship Channel dated 25 April 1984 and 14 August 1985. The final Coordination Act Report for Oakland Inner Harbor was furnished by Fish and Wildlife Service in April 1984. Disposal of dredged material at the Alcatraz site was discussed.

Corps Furnished Data: The dredge material is characterized as 38% sand, 21% silt, and 40% clay. Elutriate tests, on samples consisting of greater than 20% fine grain material by weight, have been conducted and indicate that the material would meet state water quality criteria after dilution. Suspended particulate bioassays and two types of solid phase bioassay and bioaccumulation testing are in progress to determine if material meets the criteria for ocean disposal. Preliminary test results will be available by the end of December, 1986. The final report of the bioassay tests will be provided to the Corps by the third week in Februrary, 1987.

Statement of Services: 1. Provide a planning aid letter and a supplemental letter report which discuss the disposal of dredged material from both Oakland Inner and Outer Harbors into a designated ocean disposal site. Results of the bioassay tests will be provided by the Corps to FWS as soon as they are available so that they may be considered in the final supplemental letter report.

2. Coordinate data and reports developed with the State Fish and Game and National Marine Fisheries Service, and other agencies as appropriate. Letters should be obtained by FWS from other agencies describing their concurrence in the FWS data and reports, or providing other views, and this should be appended to the FWS report furnished to the Corps.

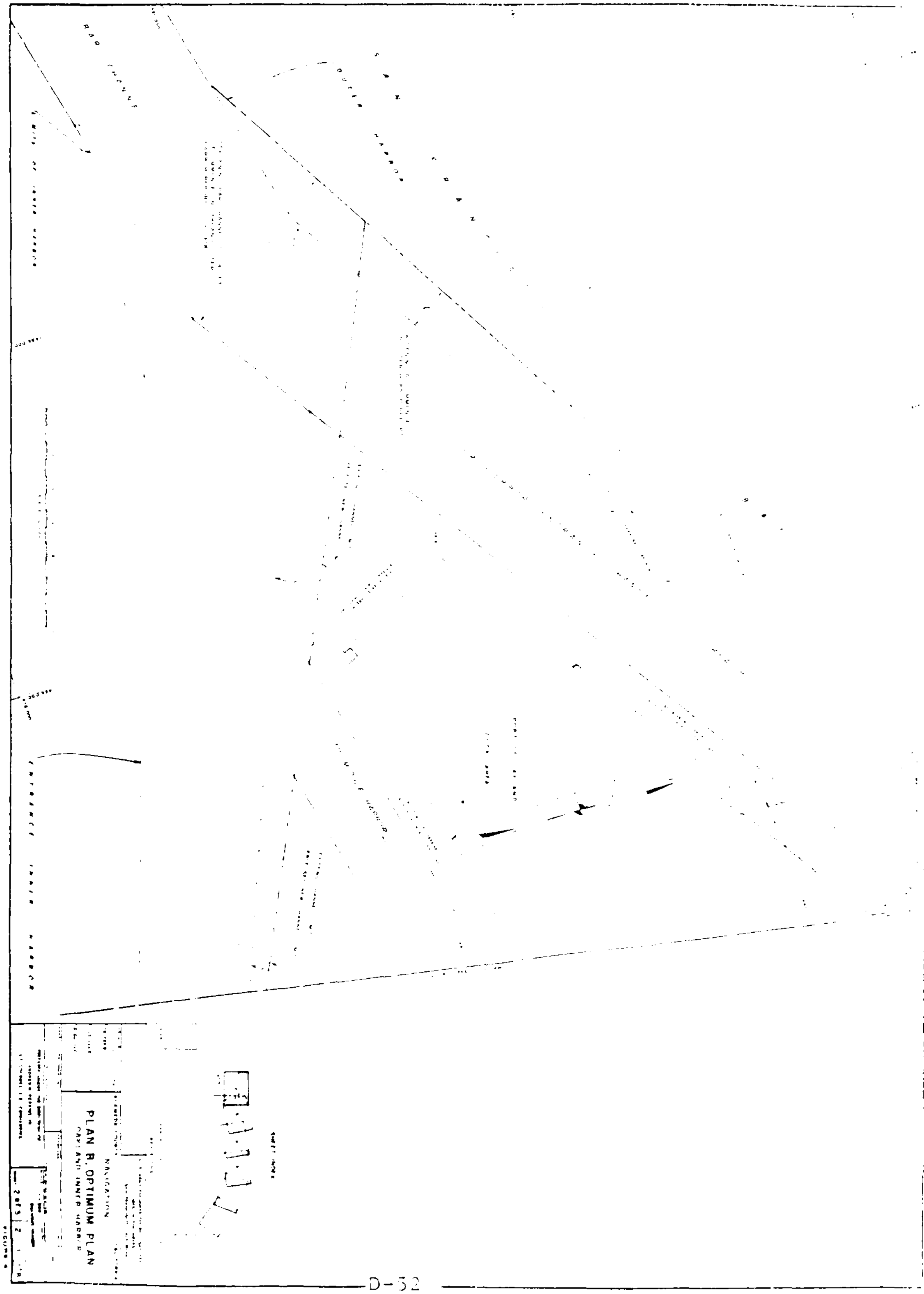
Checkpoint Dates, Meetings and Reviews:

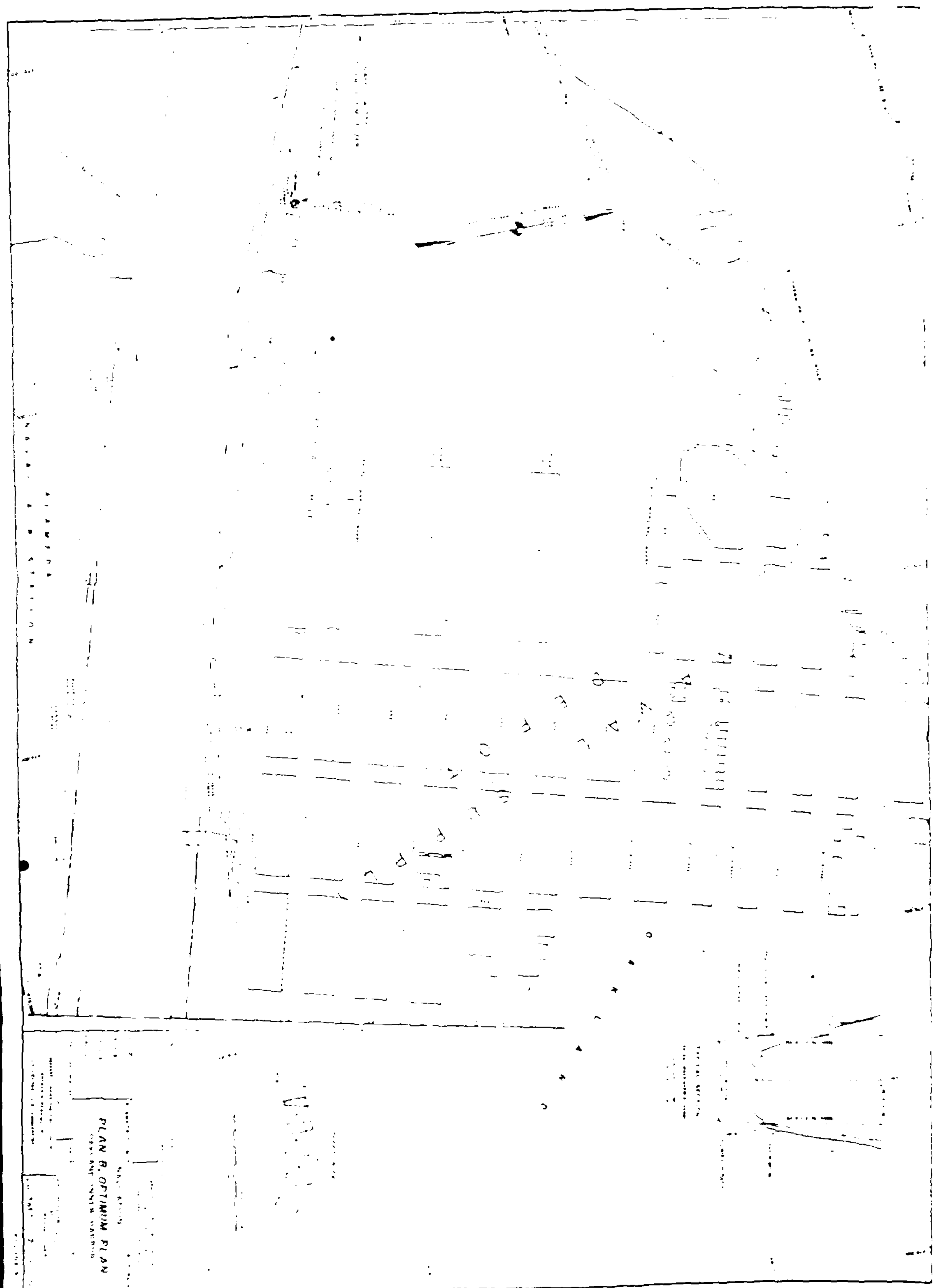
Checkpoint 1: January 23, 1987 Submit Planning Aid letter

Checkpoint 2: March 15, 198~~6~~7 Submit Final Supplemental Letter Report

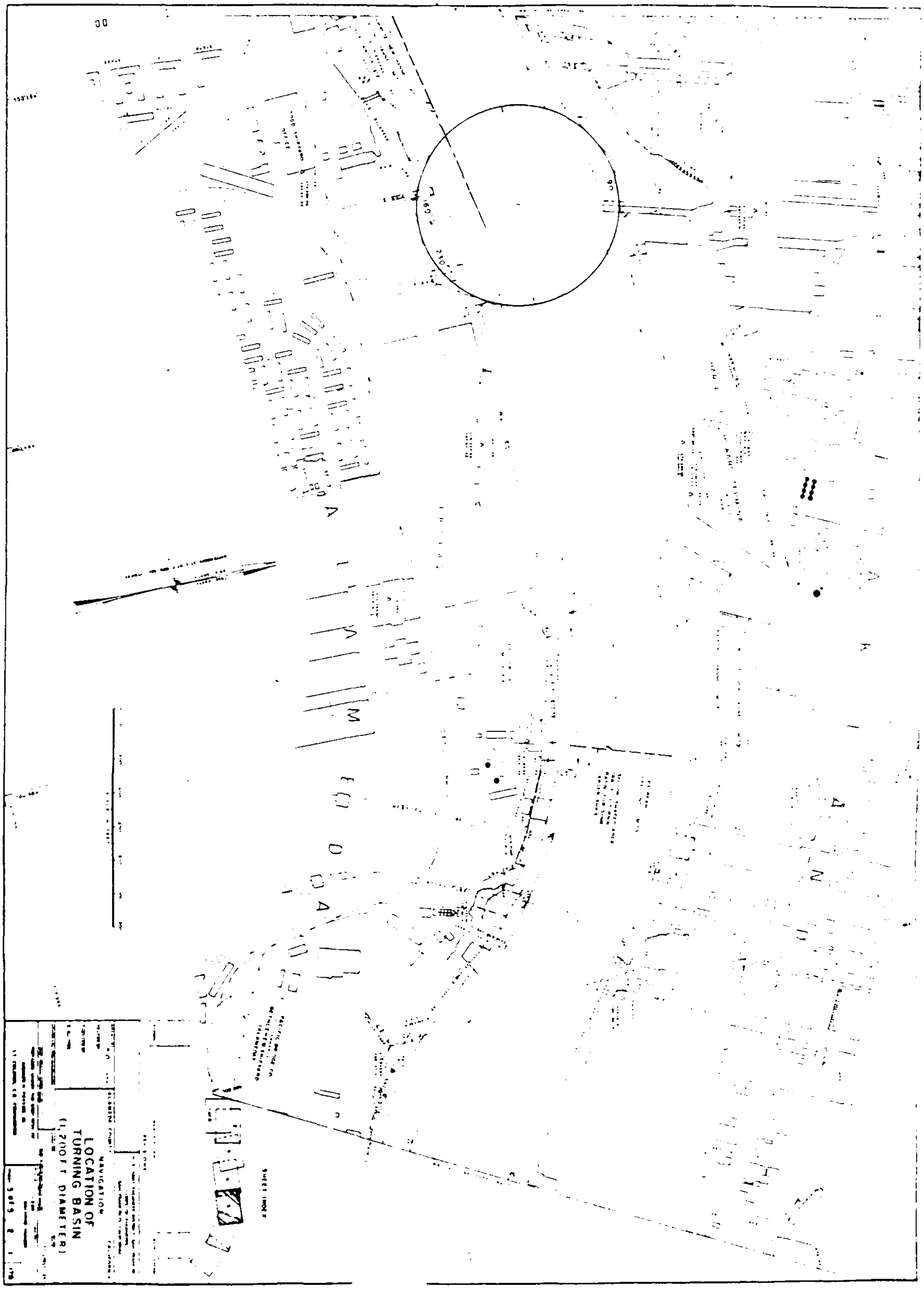
Attend Public Meeting: Between May - June 1987

Funds Available: $8,500

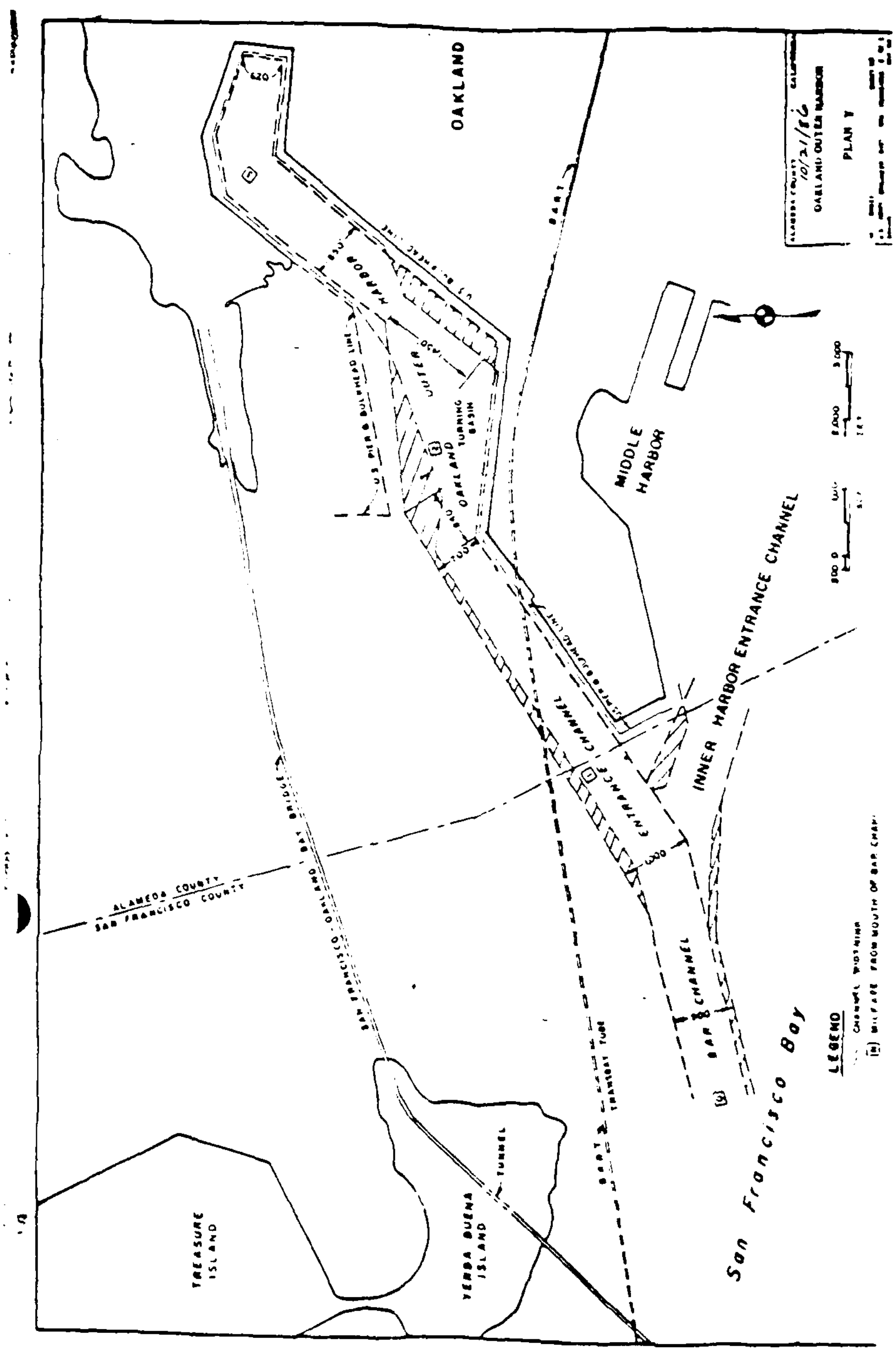

NAVIGATION
PLAN R, OPTIMUM PLAN

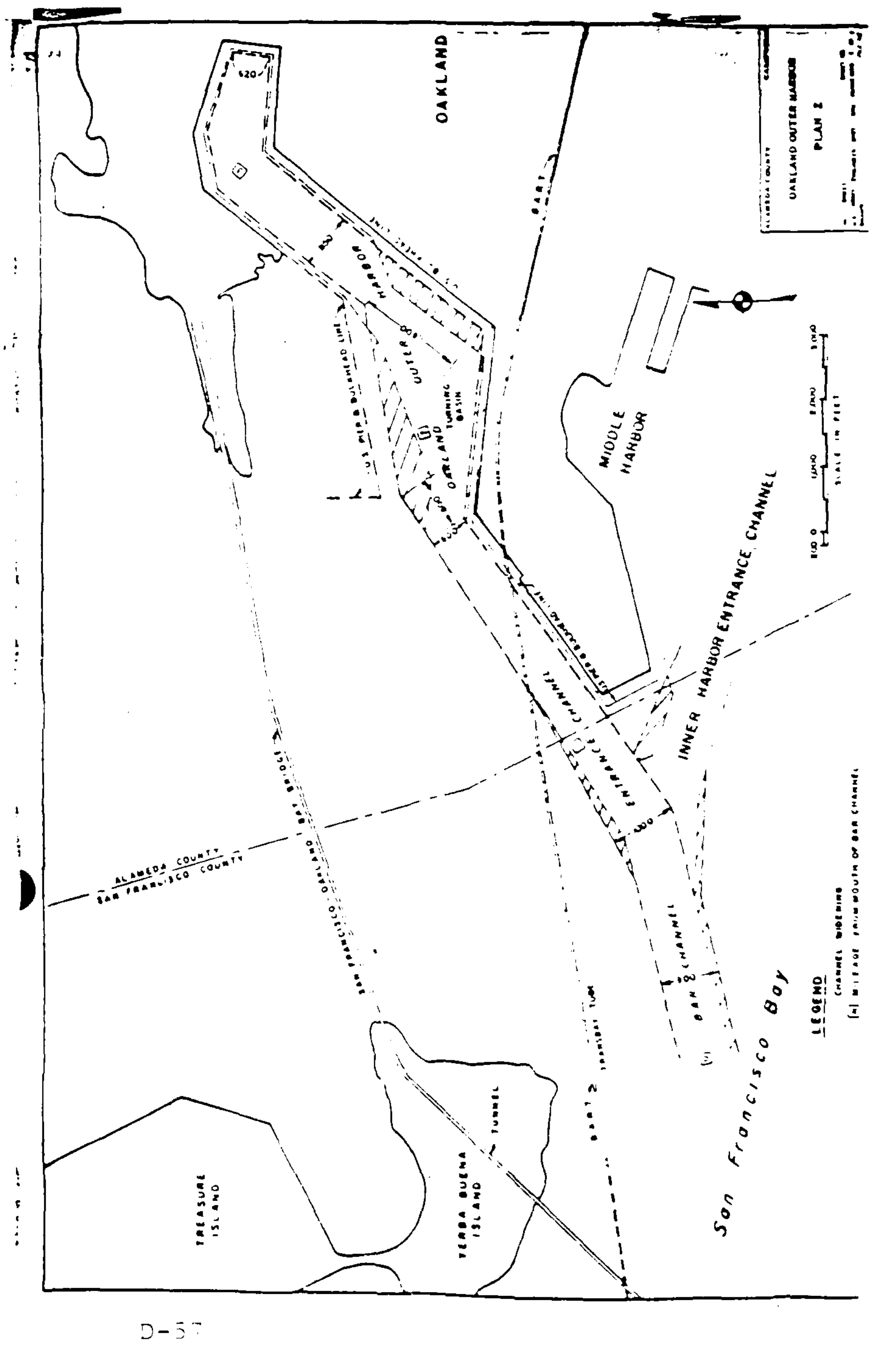

PLAN B, OPTIMUM PLAN

PLAN B, OPTIMUM PLAN
ALAMEDA NAVAL AIR STATION



NAVIGATION
LOCATION OF
TURNING BASIN
(1,200 FT DIAMETER)


OAKLAND
OAKLAND OUTER HARBOR
PLAN V
OUTER HARBOR
OAKLAND TURNING BASIN
BART
MIDDLE HARBOR
INNER HARBOR ENTRANCE CHANNEL
ENTRANCE CHANNEL
BAR CHANNEL
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
SAN FRANCISCO - OAKLAND BAY BRIDGE
TREASURE ISLAND
YERBA BUENA ISLAND
TUNNEL
San Francisco Bay
LEGEND



OAKLAND
OAKLAND OUTER HARBOR
PLAN 2
MIDDLE HARBOR
INNER HARBOR ENTRANCE CHANNEL
ENTRANCE CHANNEL
BAR CHANNEL
OUTER HARBOR
TURNING BASIN
BART
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
SAN FRANCISCO OAKLAND BAY BRIDGE
TREASURE ISLAND
YERBA BUENA ISLAND
TUNNEL
San Francisco Bay
LEGEND
SCALE IN FEET

TABLE 1: ALTERNATIVE SITES

SITE	LOCATION (LAT/LONG.)	DISTANCE FROM GOLDEN GATE (NMI)	WATER DEPTH (FATHOMS)
NEARSHORE SITES			
SITE B3	37°16'06"N; 122°31'00"W	32	35-45
STATION 1	37°40'00"N; 122°44'00"W	13	25-30
MIDSHELF SITES			
SITE B1	37°31'16"N; 122°48'32"W	22	45-50
SHELF-BREAK SITES			
STATION 2	37°29'00"N; 122°57'22"W	28	80-155
SITE B2	37°22'46"N; 122°50'11"W	30	60-80
SITE B5	37°29'39"N 122°55'12"W	26	60-75
DEEP-WATER SITES			
SITE B4	37°30'00"N 123°08'00"W	34	450-550

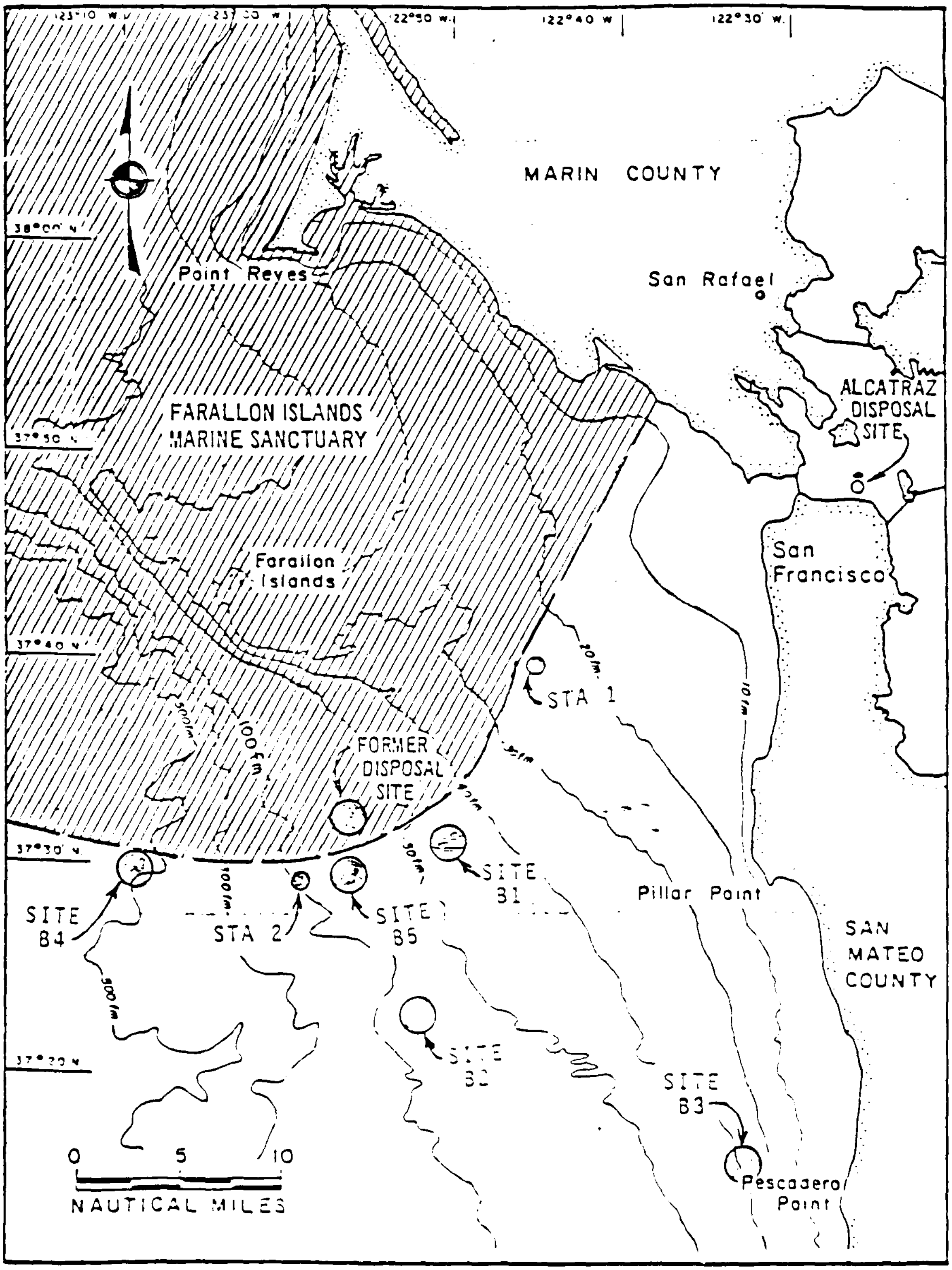


FIGURE 1: OCEAN DISPOSAL SITES UNDER CONSIDERATION FOR DESIGNATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
2800 Cottage Way, Room E-1803
Sacramento, California 95825

January 31, 1986

District Engineer
San Francisco District Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: CE - Unrestricted Tidal Disposal at Alcatraz; Oakland Outer and Richmond Harbors, San Francisco Bay, California

Dear Sir:

This planning aid letter is provided pursuant to our FY 86 scope of work. It addresses our concerns regarding the impacts on fish and wildlife of dredged spoil disposal at the Alcatraz open-water disposal site without tidal restrictions. The letter was prepared under the authority, and in accordance with the provisions, of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). The analysis is based on information provided by the Corps of Engineers prior to January 17, 1985.

Our recommendations are based on the Fish and Wildlife Service's Mitigation Policy (Federal Register 46:15, January 23, 1981) which provides internal guidance for establishing appropriate compensation for projects under our purview. Under this policy, resources are divided into four categories to assure that recommended compensation is consistent with the fish and wildlife values involved. These resource categories cover a range of habitat values from those considered to be unique and irreplaceable, to those believed to be of relatively low value to fish and wildlife.

The overall biological productivity in the subtidal habitat within the navigation channels is relatively low. The benthic community is unstable due to shoaling, periodic maintenance and prop wash from deep draft vessels. As such, species diversity and abundance are less than in the undisturbed areas of the Bay. Therefore, we have designated the habitat to be impacted in Oakland Outer and Richmond Harbors as Resource Category 4. The mitigation goal is to minimize loss of habitat value. We do not have sufficient data on the Alcatraz disposal site to determine the Resource Category.

DESCRIPTION OF THE PROJECTS

Oakland Outer Harbor

The existing navigation project consists of a 35-foot deep (at mean lower low water), 800-foot wide entrance channel. The channel extends from deep waters of San Francisco Bay across a shoal area southeast of Yerba Buena Island before narrowing to 600 feet at the beginning of the turning basin (Figure 1). The upper turning basin narrows to a 950-foot wide channel and continues to the head of Oakland Outer Harbor.

The proposed harbor improvement plan includes deepening, from -35 feet to -42 feet mean lower low water (MLLW), and widening of the channel from the Inner Harbor Channel junction to the Oakland Army Base. The widening will provide a turning basin of about 1,800 feet in diameter.

About 4.9 million cubic yards of bottom sediments will be removed by hydraulic dredge to obtain the desired dimensions. The sediment will be dumped at two different dredge spoil disposal sites depending on the pollutant levels of the sediments. Highly polluted sediments will be transported to Site SF-7 at 100 fathoms in the ocean, whereas less polluted material will be dumped at Site SF-11 south of Alcatraz Island in San Francisco Bay. This determination will be based on the U.S. Environmental Protection Agency's dredge disposal criteria for Region IX. Presently, it appears that about 15 percent of the sediments will be taken to the 100-fathom site. Deepening and widening of the channels will increase dredge spoil disposal from annual maintenance dredging from about 230,000 to 310,000 cubic yards.

Richmond Harbor

The existing navigation project extends from deep water in San Francisco Bay to the Port of Richmond (Figure 2). The channel is maintained at a depth of -35 feet MLLW, except at its terminus in the upper Santa Fe Channel where the depth decreases to -30 feet MLLW. The width of the navigation channel is 600 feet for most of its length. At Point Potrero, however, the channel flares into a turn and then continues at a width of 850 feet in a northerly direction to the entrance of the Santa Fe Channel.

Proposed improvements for the 1.5-mile long channel consist of deepening of the channel from -35 to -41 feet MLLW, and excavating a new turning basin at the Old Ford Channel to assure navigational safety. The turning basin will have a turning radius of 1,425 feet. The Inner Harbor Channel width will be constricted from 850 feet to 740 feet due to berth widening.

About 5.0 million cubic yards of sediment will be excavated by clamshell dredge during a 2-year construction period. Thereafter, dredge spoils from maintenance dredging will increase from about 430,000 to 630,000 cubic yards (average annual). Since the sediment analysis indicated that the materials will not exceed the Environmental Protection Agency's criteria for disposal of dredged material in inland waters, all dredged material will be disposed of in deep water at the Alcatraz site.

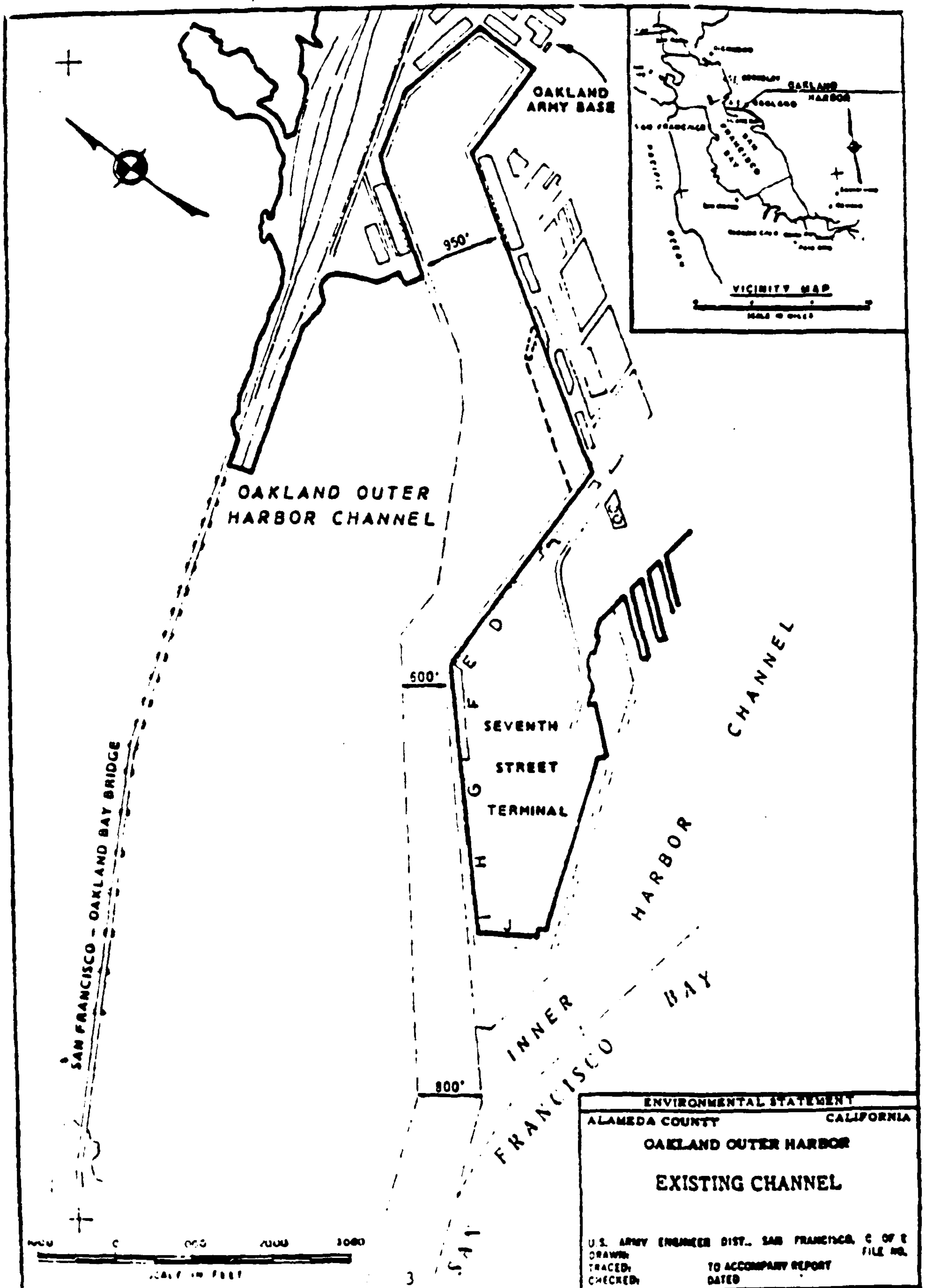
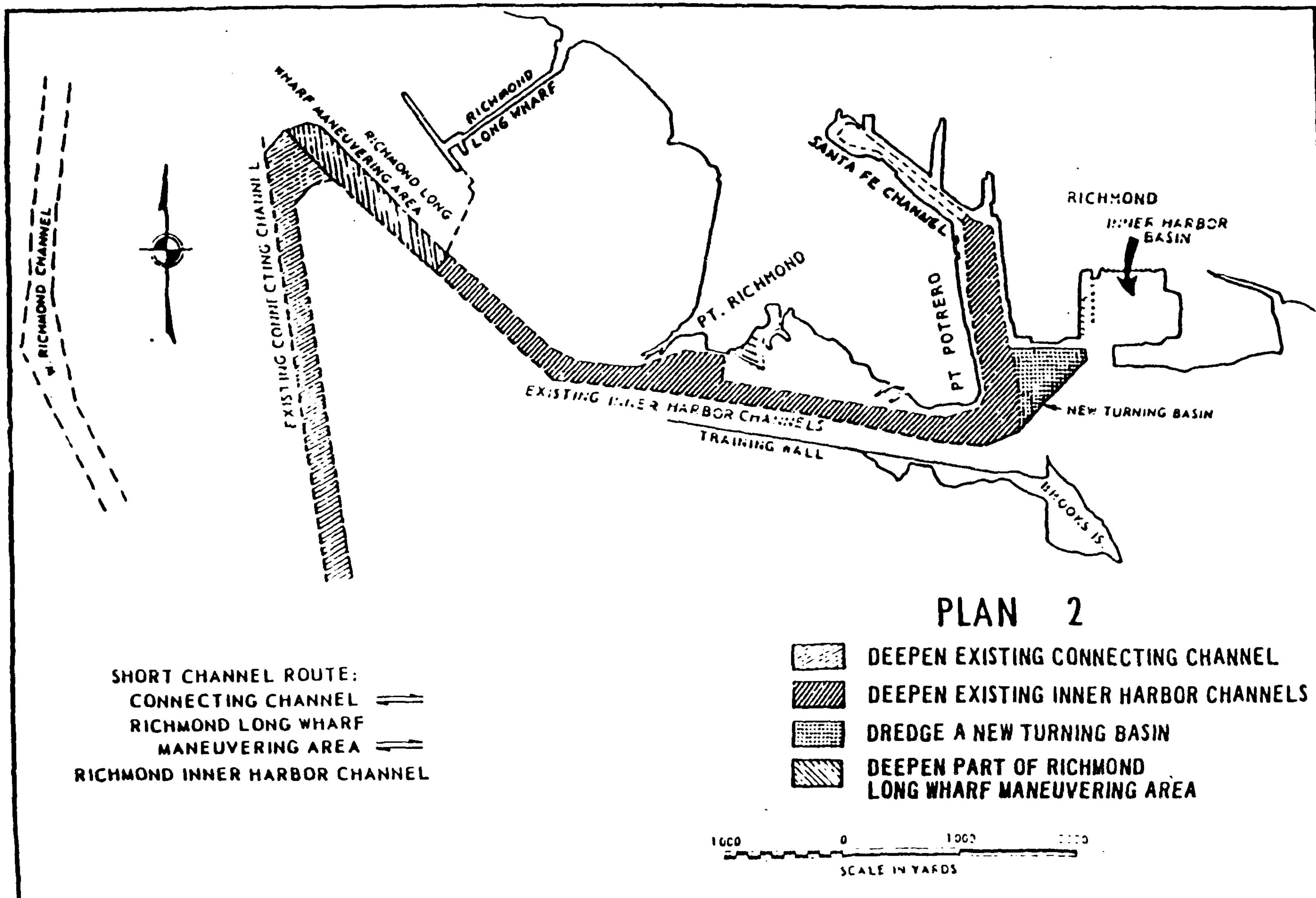

OAKLAND ARMY BASE
OAKLAND HARBOR
VICINITY MAP
950'
OAKLAND OUTER
HARBOR CHANNEL
600'
SEVENTH
STREET
TERMINAL
INNER HARBOR CHANNEL
SAN FRANCISCO BAY
800'
SAN FRANCISCO - OAKLAND BAY BRIDGE
SCALE IN FEET
ENVIRONMENTAL STATEMENT
ALAMEDA COUNTY
CALIFORNIA
OAKLAND OUTER HARBOR
EXISTING CHANNEL
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN:
FILE NO.
TRACED:
TO ACCOMPANY REPORT
CHECKED:
DATED

FIGURE 1


W. RICHMOND CHANNEL
EXISTING CONNECTING CHANNEL
WHARF MANEUVERING AREA
RICHMOND LONG
MANEUVERING AREA
RICHMOND
LONG WHARF
PT. RICHMOND
SANTA FE CHANNEL
PT POTRERO
RICHMOND
INNER HARBOR
BASIN
NEW TURNING BASIN
EXISTING INNER HARBOR CHANNELS
TRAINING WALL
BROOKS IS.
PLAN 2
DEEPEN EXISTING CONNECTING CHANNEL
DEEPEN EXISTING INNER HARBOR CHANNELS
DREDGE A NEW TURNING BASIN
DEEPEN PART OF RICHMOND
LONG WHARF MANEUVERING AREA
SHORT CHANNEL ROUTE:
CONNECTING CHANNEL
RICHMOND LONG WHARF
MANEUVERING AREA
RICHMOND INNER HARBOR CHANNEL
1000
0
1000
SCALE IN YARDS

FIGURE

GENERAL CONCERNS

Effects of Dredging and Spoiling on Biological Resources

Fish and Wildlife resources in the project area are typical of those found in the saline portions of San Francisco Bay. Channel modifications and continuous human disturbances, however, have degraded the wildlife values of the project area.

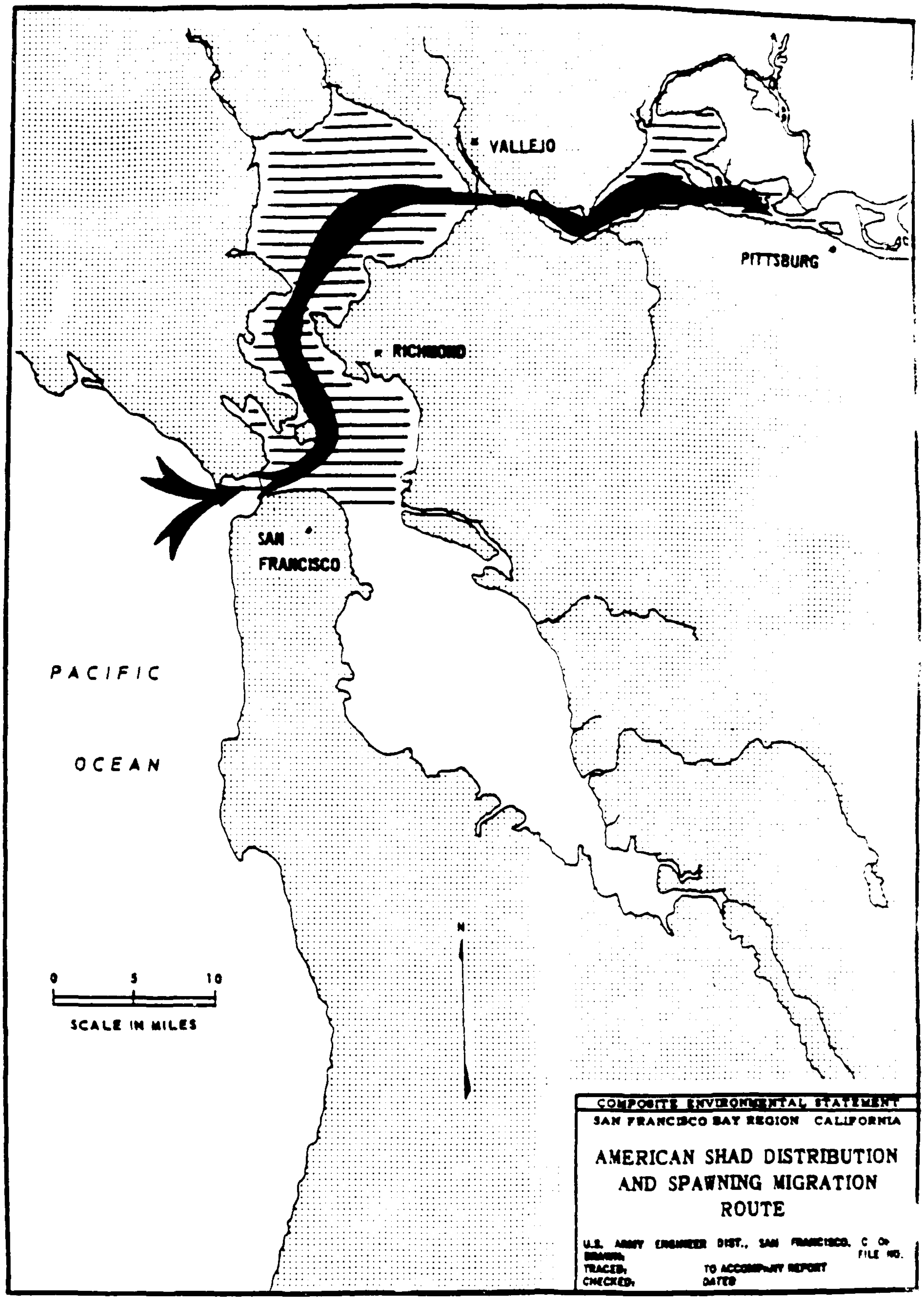
Many plants and animals occupying the water column of the Central Bay also utilize the harbor. Phytoplankton form the basis of the food chain in the Bay. Zooplankton form the next trophic level in the food chain. These tiny animals consume phytoplankton which, in turn, are eaten by juveniles of many sport and commercially important fish such as striped bass and salmon.

Benthic organisms are also very important in the Bay ecosystem. A diverse assemblage of benthic species inhabit the Central Bay, which reflects the close connection of this area with the ocean environment and relative stability in the deeper portions of the Bay.

Variables such as natural, physical, chemical and biological disturbances impact benthic populations. In addition, however, benthic organisms are routinely disturbed or removed from the channel by maintenance dredging operations and prop wash from deep-draft vessels. Bottom disturbances at the dredge site cause severe impacts on benthic organisms below and on the surface. Mortality rates due to dredging (clamshell and hydraulic suction dredges) are probably high. Furthermore, organisms that survive dredging impacts probably die on the barges enroute to the disposal site. Also, routine dredging of navigation channels prevents the benthic community of annelids, molluscans, and arthropods from attaining the same species diversity and abundance as non-disturbed, deep waters of the Bay.

At the dump site, the loss of benthic organisms is caused by smothering from clumps of sediment that settle on the bottom. Consequently, benthic populations are relatively unstable in this area due to the continuous dumping of dredged material.

Nektonic species such as fish are mobile; however, their diversity and abundance in the harbors could be reduced if conditions are not as suitable as those in the adjacent areas. There is presently no information available to indicate that a difference in fish composition exists between the harbors and the Bay. Adult fish probably can avoid the direct impacts of dredging operations. However, this does not imply that they are not subject to some stress as a result of temporarily reduced dissolved oxygen and higher turbidity levels. It is expected that fish species found in adjacent areas of the Bay, including anadromous forms which only pass through, enter and use the harbors at some time during their life cycles (Figure 3). Also, the larval stages of marine and estuarine fish species may be subject to stress if they are present in areas that are being dredged.



SOURCE: Delisle, G. 1966.

FIGURE 3

The mammals of the Bay, which include sea lions, seals and porpoises, probably do not utilize the harbors to any extent due to human activity. Waterbirds utilize the harbors just as they do the rest of the Bay. Some species of gulls, terns, grebes and cormorants are present in the harbors all year, while others are seasonal visitors. Waterfowl, mainly diving ducks such as scaup and canvasback, use the open water habitat for resting and feeding.

In San Francisco Bay, the dungeness crab, bay shrimps, and Pacific herring are of high commercial value (Figures 4, 5, and 6). Shrimp and Pacific herring are harvested in the Bay. Gravid Pacific herring cast their roe onto the shallow substrate of the Central Bay and San Pablo Bay in waters ranging up to 15 feet deep. Although the dungeness crab is harvested in the ocean, the Bay is utilized as a nursery area for a major portion of the central California coast crab population. Post-larval stages move into the Bay in May-June and leave the Bay by the following September. As such, it's possible that the dumping of large amounts of material at Alcatraz and associated turbidity can adversely impact this commercially-important species.

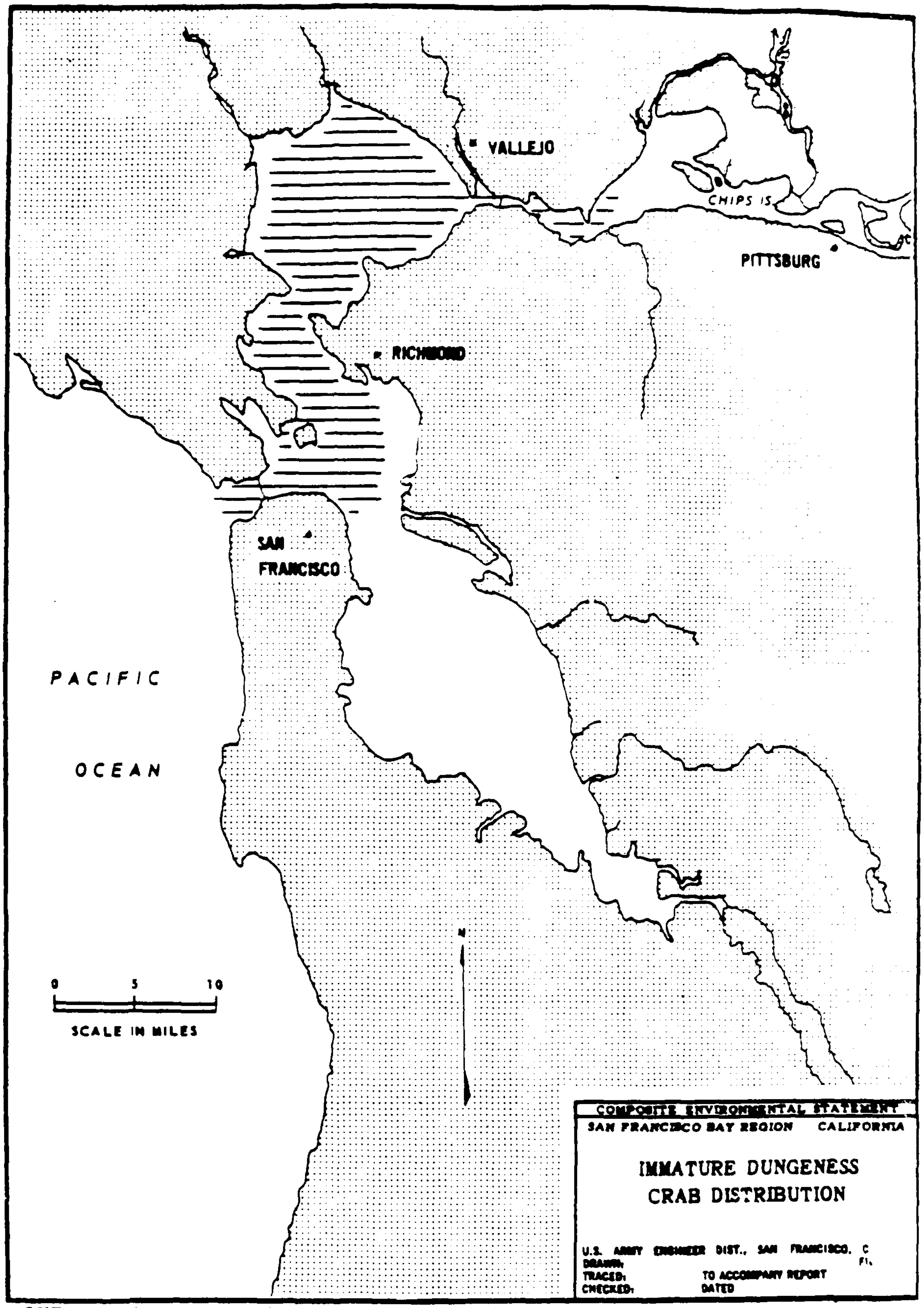
Various species of shellfish occur throughout the Bay (Figures 7, 8). There are some commercially-harvestable populations of clams and oysters in the Bay. Dredging of navigation channels, dumping at Alcatraz, and recirculation of sediment back into the Bay system results in higher than normal levels of turbidity. This would severely impact clams, oysters and other shellfish which are filter feeders and sessile; they would be subject to extreme stress from excessive amounts of sediment.

The shallow areas of the bay, including the intertidal areas, are considered the most biologically productive areas in terms of biomass. During high tides, the shallow bottom areas serve as feeding areas for a variety of fish species, and on the ebb tide, the tidal flats are used extensively by shorebirds in search of food on or just below the surface. Since most of the sediments tend to settle in shallow areas, above normal levels could adversely impact populations of benthic organisms.

Effects of Sedimentation (General)

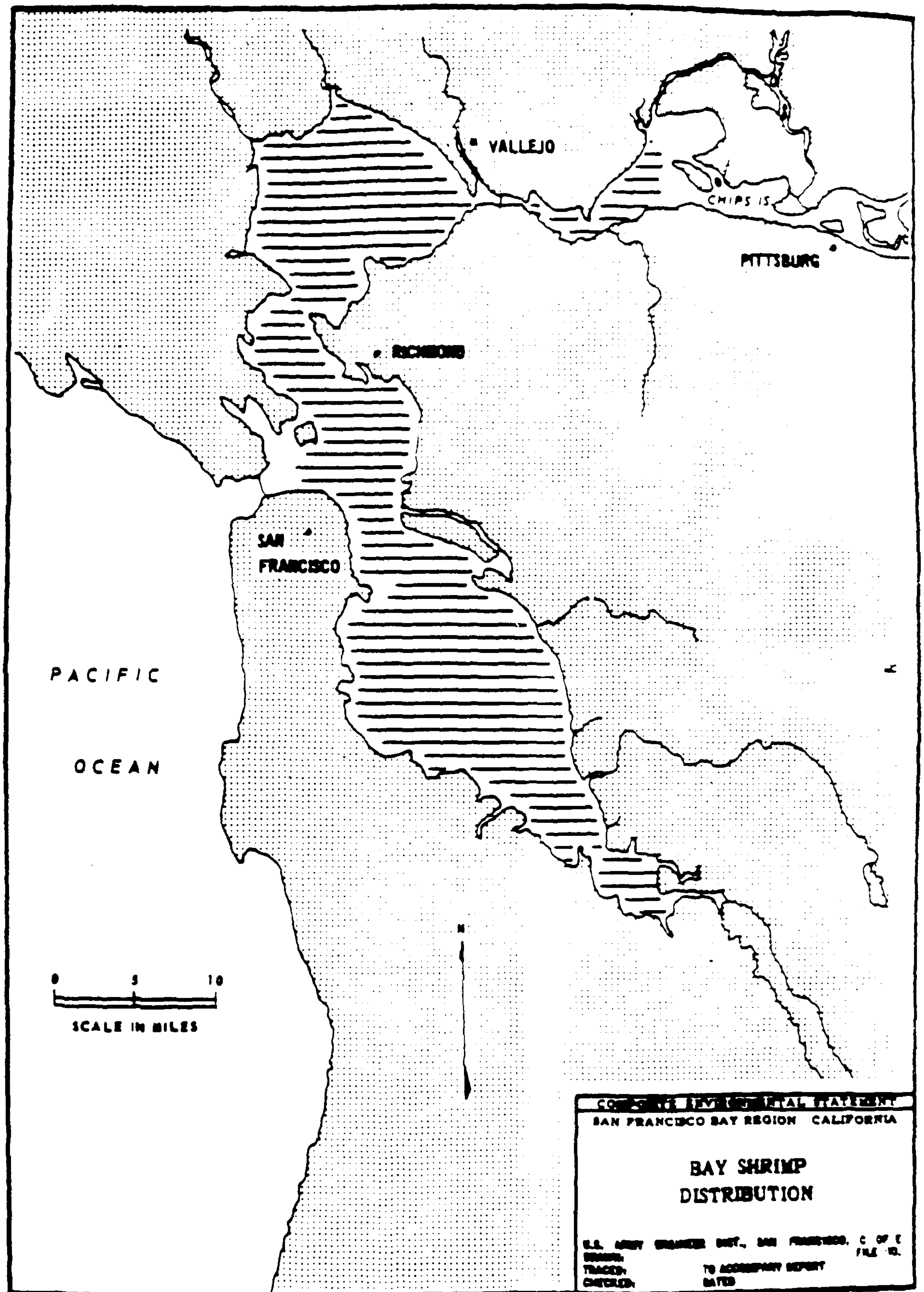
San Francisco Bay covers an area of about 460 square miles (294,000 acres) and a drainage area of 62,920 square miles, or about 40 percent of the total area of California. Seventy percent of the Bay is less that 18 feet deep and about 20 percent is over 29 feet deep.

In San Francisco Bay, sediments enter the Bay from the land via the drainage system. It circulates, accumulates and eventually part of it is transported to the Pacific Ocean. The volume of sediment inflow to the Bay has been estimated by several investigators. As shown in Table 1, estimates range from 8.2 million cubic yards to 10.5 million cubic yards annually. While these estimates were based on different assumptions and years, they provide an indication of sediment inflow to the Bay each year. Based on these studies, it was also estimated that 4.2 to 8.1 million cubic yards of sediment flow out to the ocean, and about 2.4 to 5.2 million cubic yards remain in the Bay (Figure 9). A large part of the sediment remains in the Bay for a number of years. It is deposited, then



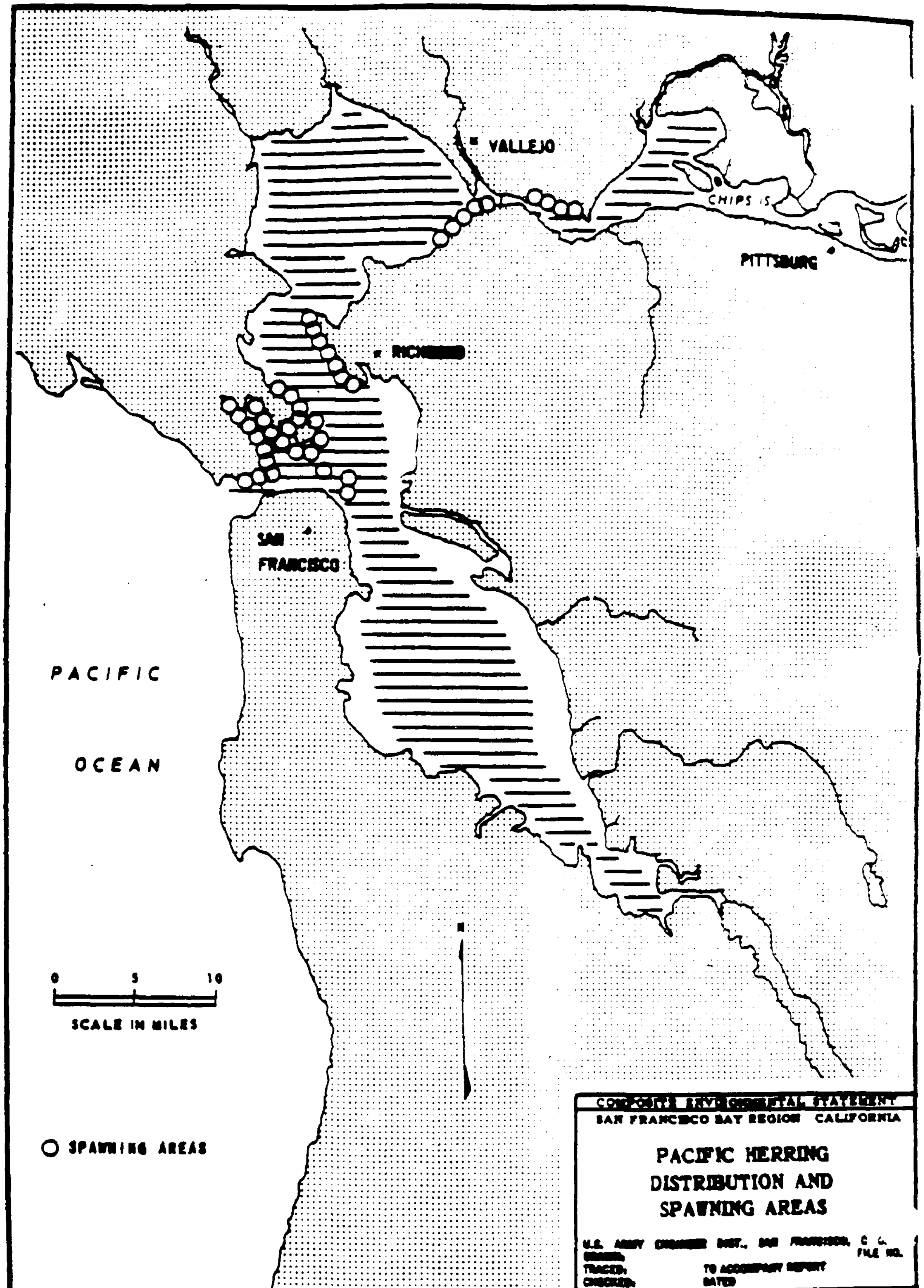
SOURCE: Delisle, G. 1966.

FIGURE 4



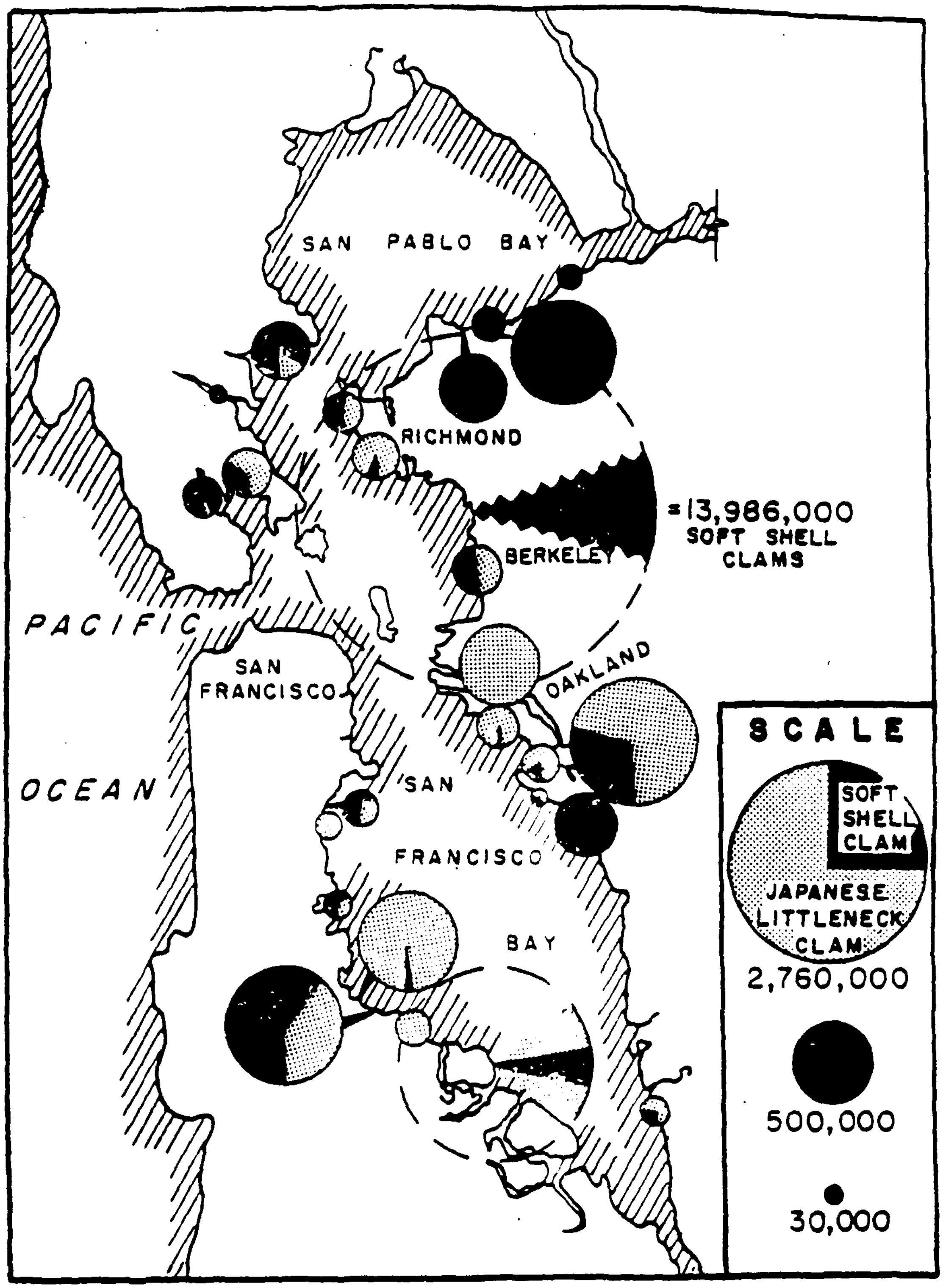
Source: Delisle, G. 1966.

FIGURE 5



SOURCE: Delisle, G. 1966.

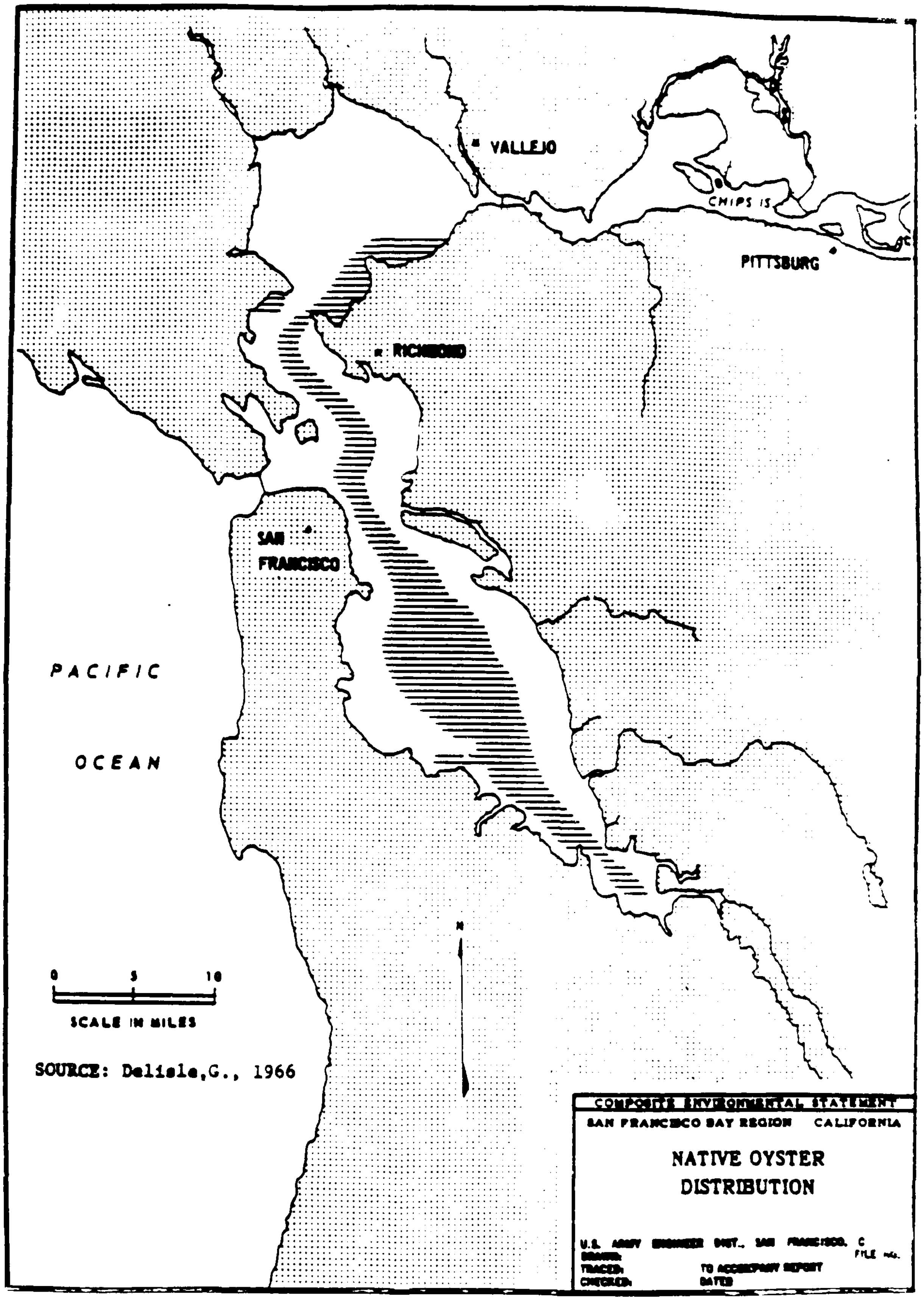
FIGURE 6



Major clam beds in intertidal zone of San Francisco Bay, 1967. Area of circle is proportional to estimated adult population.

Source: Wooster, T.W. 1968.

FUGURE 7



VALLEJO
CHIPS IS.
PITTSBURG
RICHMOND
SAN FRANCISCO
PACIFIC
OCEAN
N
0 5 10
SCALE IN MILES
SOURCE: Delisle,G., 1966
COMPOSITE ENVIRONMENTAL STATEMENT
SAN FRANCISCO BAY REGION CALIFORNIA
NATIVE OYSTER DISTRIBUTION

FIGURE 8

TABLE 1

ANNUAL SEDIMENT INFLOW-OUTFLOW AND DEPOSITION VOLUMES FOR SAN FRANCISCO BAY SYSTEM

Investigator	Inflow Delta	Inflow From Other Tributaries	Total Inflow	Sediment Outflow	Sediment Deposition
	(Millions of Cubic Yards)				
Gilbert (1917) predicted					
Prior to 1850	2.0				
1850-1914	23.0				
Present	8.0				
Grimm (1931)	5.75				-5.4*
Corps of Engineers (1954)					
Existing	3.36				
Future w/controls	1.97				
DWR (1955)					
Existing	4.0				
Future w/controls	3.0				
U.S.G.S. (1961)					
From 1957-1959	7.2	1.6	8.8		
Present	6.9	1.1	8.0		
Smith (1963)	7.04	1.195	8.235		5.2
Corps of Engineers (1965)	8.13	1.43	9.56	4.2	5.2
Krone (1966)					
By year 1960	8.1	2.4	10.5	8.1	2.4
By year 1990	4.3+	2.4	6.7		
By year 2020	3.0+	2.4	5.4		

* Considers only North Bay.

\+ Based on Delta Water Diversions.

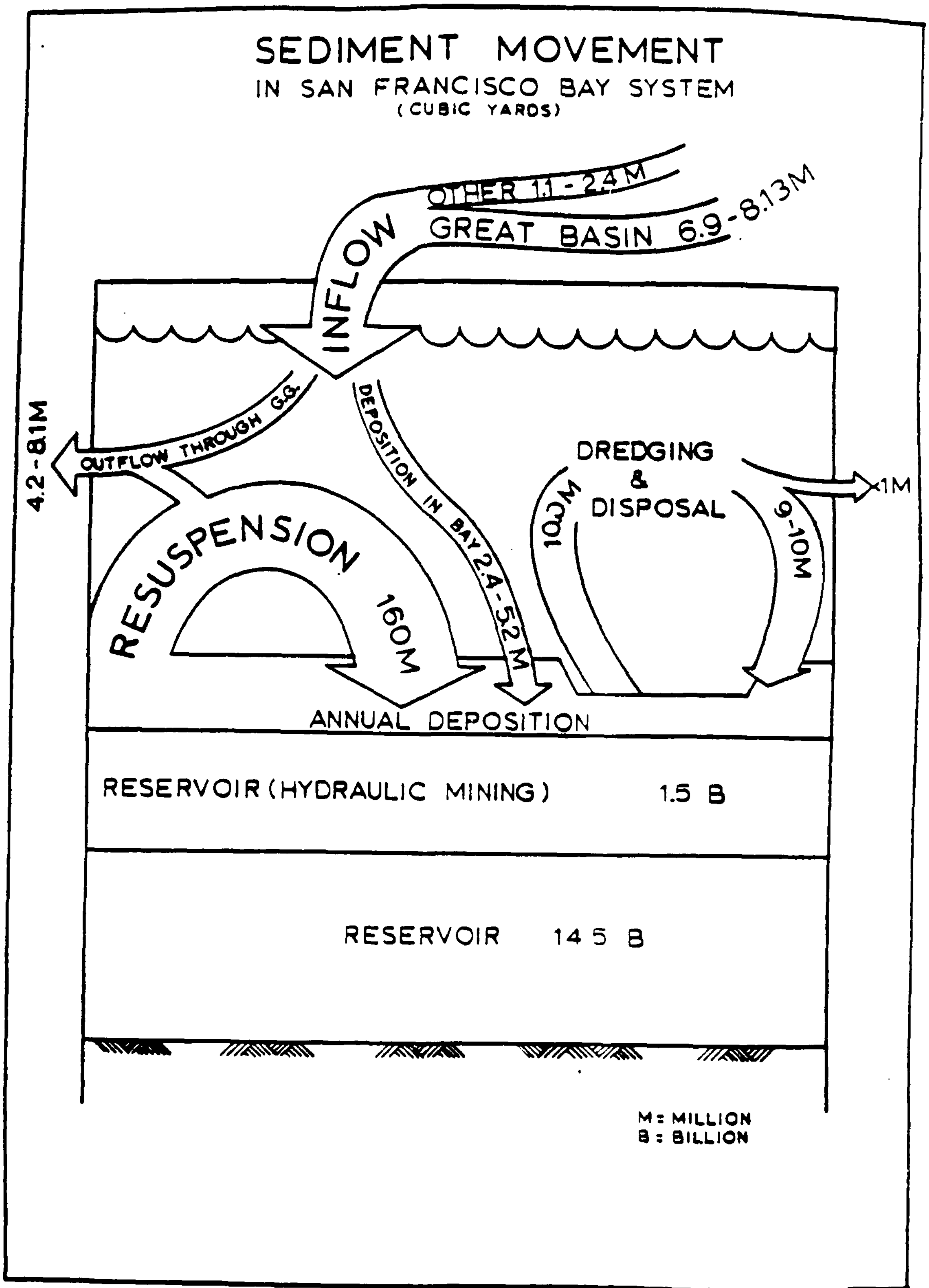

SEDIMENT MOVEMENT
IN SAN FRANCISCO BAY SYSTEM
(CUBIC YARDS)
OTHER 1.1 - 2.4 M
GREAT BASIN 6.9 - 8.13 M
INFLOW
4.2 - 8.1 M
OUTFLOW THROUGH G.G.
DEPOSITION IN BAY 2.4 - 5.2 M
DREDGING & DISPOSAL
10.0 M
9 - 10 M
1 M
RESUSPENSION
160 M
ANNUAL DEPOSITION
RESERVOIR (HYDRAULIC MINING) 1.5 B
RESERVOIR 14.5 B
M = MILLION
B = BILLION

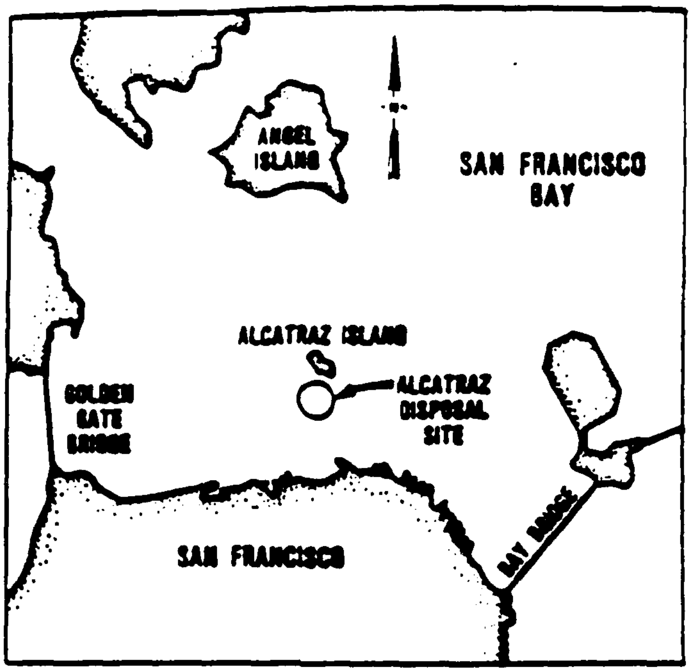
FIGURE 9

resuspended, recirculated and redeposited elsewhere, and eventually transported out of the Bay system. As such, it appears that of about 10 million cubic yards of sediment entering the Bay each year, approximately 6 million cubic yards are transported to the ocean; about 4 million cubic yards remain in the Bay.

Two other factors affect sedimentation in the Bay: annual dredging and disposal operations, and resuspension of bottom sediments due to tidal and wind-induced currents. According to the Corps, about 10 million cubic yards of Bay sediments are dredged annually by the Federal government and private interests. Most of this is deposited in three open water disposal sites: Alcatraz, San Pablo Bay and Carquinez Straits. Deposition from civil and military projects at Alcatraz is about 3.5 million cubic yards annually. Not to be overlooked, however, is the additional one million cubic yards of spoil (authorized by the Corps of Engineers) for disposal at Alcatraz by private interests. Consequently, out of an estimated 10 million cubic yards of spoil generated annually by maintenance dredging projects in the Bay, about 50 percent is dumped at Alcatraz.

According to the Corps, the Alcatraz site has been used for over 90 years as a disposal site (Figure 10). Historically, depths within the site have ranged from 100 to 160 feet. The 2,000-foot diameter site is located in a high-energy area. Strong currents eventually transport most of the material deposited on the bottom out to the ocean. In recent years, however, consolidated material, along with concrete, rubble and debris have been detected in the eastern part of the site (Figure 11). This, of course, raised the question regarding the future use of this site as a disposal area for material dredged from navigation channels in the Bay. Studies indicated that depths in the eastern portion of the site have decreased to as little as -28 feet below mean lower low water (MLLW). A minimum of -40 feet is required for navigation. This problem was discussed in the Division Engineer's response to the Department of the Interior's official comments on the construction of Phase II of the John F. Baldwin Ship Channel (letter dated August 16, 1984). In the letter, it was stated that the tip of the mound was recently dredged to -40 feet MLLW to remove the hazard to navigation, and that information, as to the cause and how the site might be managed in the future, will be studied by the Corps. Currently, disposal of dredged material is authorized in the western one-half of the Alcatraz site. However, we understand that dredged material from Phase II of the John F. Baldwin Ship Channel will be deposited in the northern section at depths of 70 feet or greater (Figure 12).

Model studies conducted by the Corps indicated that about 47 percent of the dredge spoils disposed of at Alcatraz are transported out of the Bay when dumped on all tidal cycles (Table 2). Open water disposal, however, results in material being transported back into the Bay for circulation and deposition. As shown in Table 2, about 53 percent of the material (about 2.5 million cubic yards) that is dumped at Alcatraz on all tides returns to the Bay. The Corps has estimated that about 10 percent of the dredged material (about 500,000 cubic yards) dumped at Alcatraz may reenter the same channels dredged or enter other channels in the Bay.



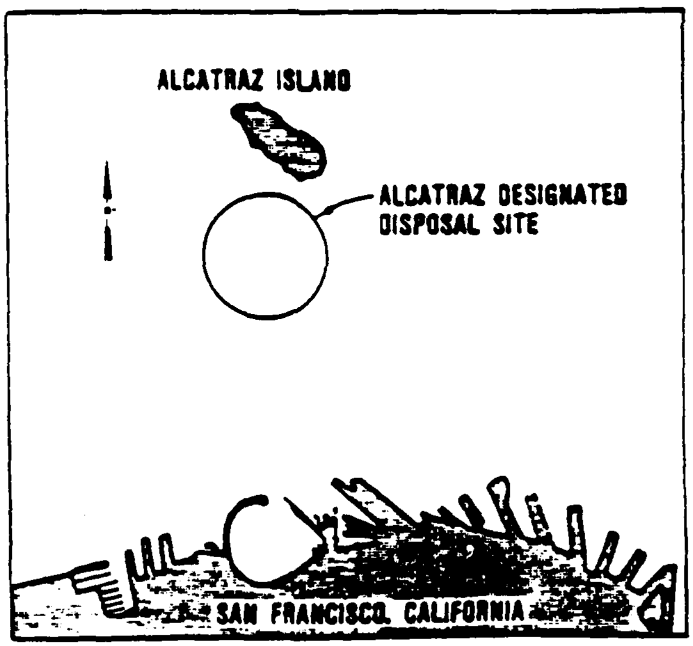


Figure 10 Location of Alcatraz disposal site

ALCATRAZ DISPOSAL SITE

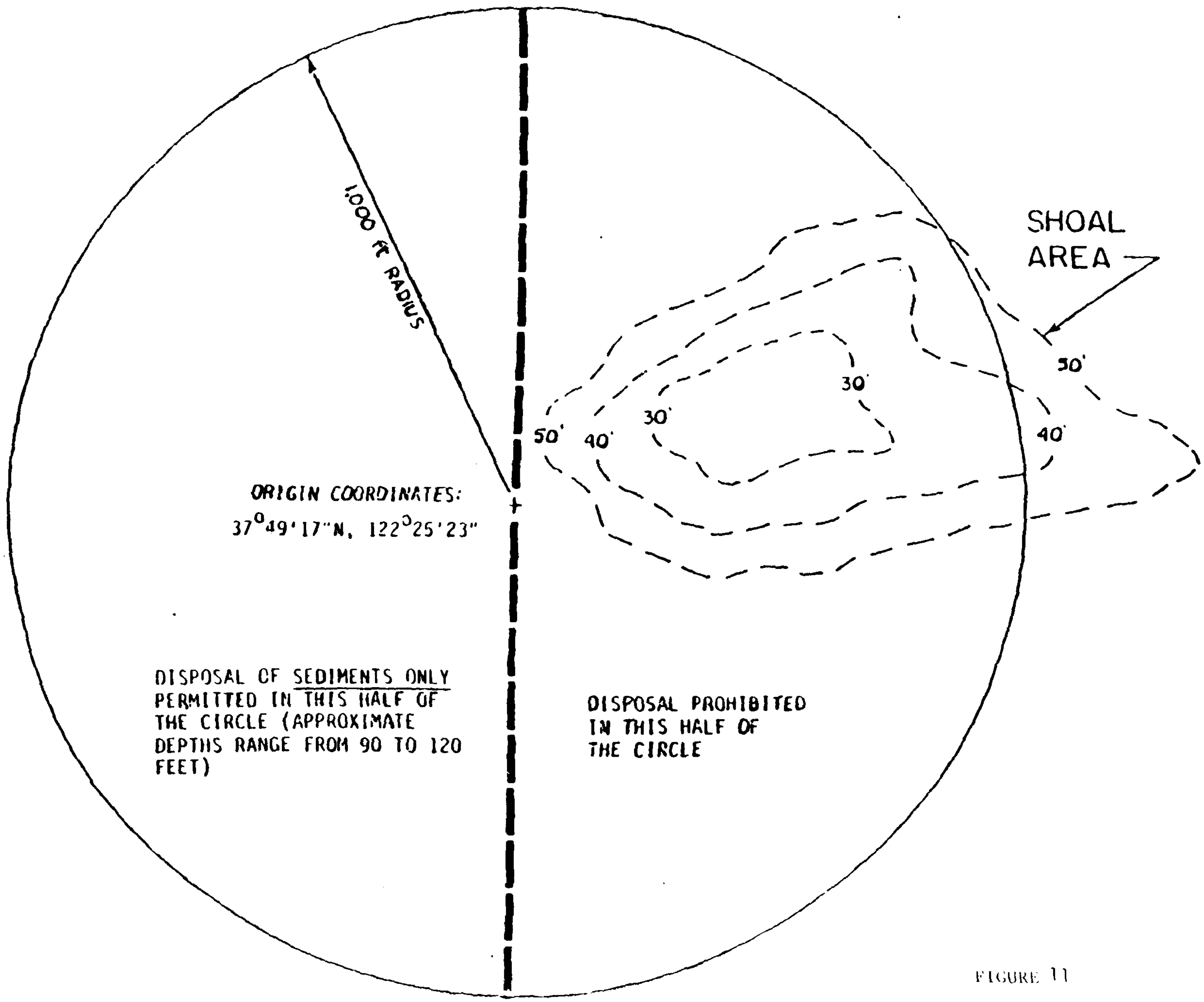


FIGURE 11

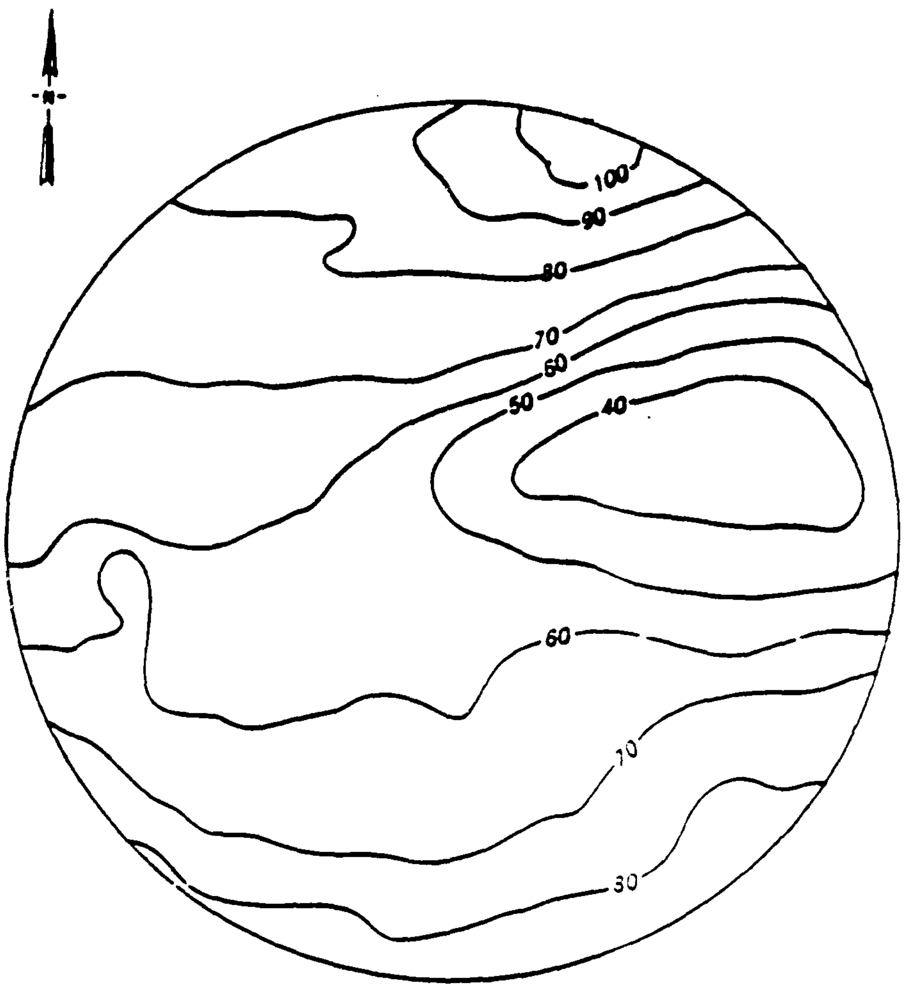


Figure 12 **Alcatraz Disposal Site Bottom Contours (in ft) from the 12 April 1985 survey** (Corps of Engineers)

Table 2. Unrestricted tidal disposal at Alcatraz site

Percent of dredged Material	Area of deposition
47	Outside the Bay
1	Extreme south end of Bay
21	Between S.F. Airport and Bay Bridge
27	Central Bay
3	San Pablo Bay
1	Carquinez Strait

The results of model studies conducted by the Corps also indicated that about 30 percent of the material would leave the Bay if it was released during the strongest 1-hour of the ebb tide. Presumably the amount would be less if the material is released during one full cycle of ebb tide.

The Corps has stated that under natural conditions, about 170 million cubic yards of sediments are recirculated and redistributed within the Bay system each year, or about 466,000 cubic yards per day. Most of the sediment settles in the shallower areas of the Bay. Attempts to evaluate impacts of the estimated 10 million cubic yards of dredging, done annually by the Corps and private interests, would be rather meaningless unless we know the range of suspended solid levels from the natural background and compare it to various levels associated with dredging and spoiling at Alcatraz.

We have already provided our views relating to project-induced impacts of dredging on aquatic organisms within the project channels, as well as those associated with dumping at Alcatraz on all tides, in our analysis of the John F. Baldwin Ship Channel Project.

Maintenance dredging conducted in the Bay each year disturbs and redistributes sediments equal to the amount of new sediments flowing annually into the Bay system, about 10 million cubic yards. This, alone, adversely impacts benthic and other aquatic organisms which inhabit the Bay. This situation, however, is compounded by the deposition of spoils at Alcatraz. Dredged material that is carried back into the Bay settles mainly in shallow areas. As indicated, most of the large navigation channels are located within this area such as the Central Bay and south to the San Francisco Airport (Figure 13). We agree that maintenance dredging redistributes existing sediment within the system. However, disposal of dredged sediments in the Bay brings back material into circulation that would otherwise be retained in the channels. This has the effect of increasing turbidity levels and lowering dissolved oxygen levels in the channels and shallow portions of the Bay.

PROJECT-RELATED CONCERNS

Effects of Unrestricted Tidal Disposal at Alcatraz: Oakland Outer and Richmond Harbor Project

Our analysis of the Oakland Outer Harbor Project was provided in our September 1, 1976 report. In the report, we did not recommend that spoiling be done only on ebb tides. However, our views regarding unrestricted disposal

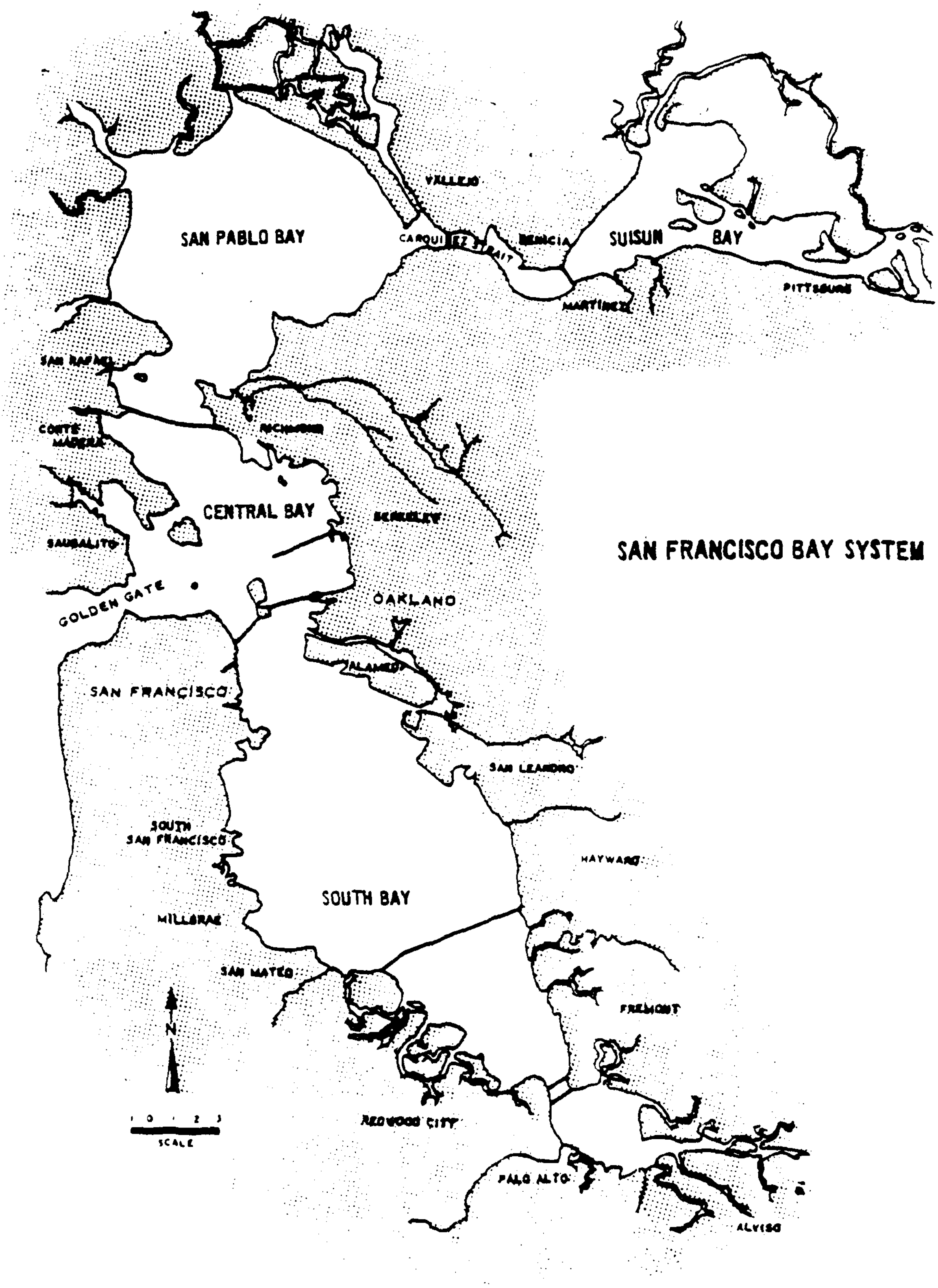

SAN FRANCISCO BAY SYSTEM
SAN PABLO BAY
VALLEJO
BENICIA
SUISUN BAY
PITTSBURG
MARTINEZ
SAN RAFAEL
RICHMOND
CENTRAL BAY
BERKELEY
SAUSALITO
GOLDEN GATE
OAKLAND
ALAMEDA
SAN FRANCISCO
SAN LEANDRO
SOUTH SAN FRANCISCO
HAYWARD
SOUTH BAY
MILLBRAE
SAN MATEO
FREMONT
N
SCALE
REDWOOD CITY
PALO ALTO
ALVISO

FIGURE 13

of dredged material at Alcatraz was clearly stated in our letters of April 25, 1984 and August 14, 1985 on the John F. Baldwin Ship Channel Project, Phase II and Phase III respectively. Our recommendation has not changed, we recommend again that disposal be done only on ebb tides.

We believe that it would be of little benefit to evaluate the impacts of dumping dredged material from one or two projects. More realistically, we should evaluate the cumulative impacts of increased sedimentation from all major navigation projects in or near Central Bay, particularly since dumping at Alcatraz on all tides have similar impacts on aquatic organisms in the Bay. A forecast of new dredging and increased maintenance with disposal at Alcatraz is shown in Table 3.

Table 3. New and maintenance dredging proposed by the Corps, San Francisco Bay (million cubic yards)

Project Name	New	Estimated Additional Maintenance
John F. Baldwin Ship Channel, Phase II	8.1	+ 80,000
John F. Baldwin Ship Channel, Phase III	12.0	+2,000,000
Oakland Inner Harbor	4.2	+ 70,000
Oakland Outer Harbor	4.9	+ 88,000
Richmond Harbor	5.0	+ 200,000

Maintenance dredging accounts for an estimated 4.5 million cubic yards of dredged material dumped at Alcatraz each year. About 3.5 million cubic yards is from navigation projects maintained by the Corps and the remaining one million is from projects authorized by the Corps.

During the next 8 years, about 34 million cubic yards of material will be dumped at Alcatraz of which 53 percent will return to the Bay system. The Corps has stated that even though the amount of material to be dumped at Alcatraz will increase at least 3 times during construction of these projects, the Bay system is capable of assimilating this material during project construction. While this may be true, we do not believe that biological resources can stand this increase without serious harmful effects. With this amount of new material plus annual maintenance, we would expect a decline in biological productivity, even though temporary, within the navigation channels and shallow portions of the Central Bay.

Economics of Spoil Disposal

We agree that the cost of dredged spoil disposal is very important in the selection of disposal sites and timing of disposal. This is understandable since it represents a major part of the total project cost and determination of the benefit-cost ratio. However, environmental costs are not mentioned. Those mentioned include only the added cost of project construction and maintenance if dredged materials are disposed on ebb tides only. We believe that the impacts of sedimentation, due to new dredging projects planned for the next 8 years, plus annual maintenance dredging and dumping at Alcatraz, could adversely impact fish and wildlife resources of the Bay significantly. As such, we cannot concur in the Corps' approach to the problem of continued justification of dumping at Alcatraz on all tidal cycles merely because project costs would be less.

We believe a comparative analysis should be conducted of ebb tide only disposal at Alcatraz and deposition at all tides. It should include the reduction in maintenance dredging cost which would occur with reduced sediment deposition in the navigation channels with ebb tide only disposal. We would hope that this information will be available for us to evaluate.

Economic data on the value of fish and wildlife resources in the Bay is available in various reports. However, there is an absence of studies that evaluate the impacts of sedimentation on fish and wildlife populations, harvest, and associated economic value. A study of this type may be costly; however, it may be necessary if fish and wildlife resource values have to compete in economic terms with the added cost of ebb tide disposal at Alcatraz. We hope that this will not be necessary.

Detecting changes in biological resources have always been difficult. This is particularly true in estuarine systems which are subject to the economic vagaries of the commercial fishery as well as environmental changes that affect their well being. As such, we are placed in a position of using biological data without a comparable base to evaluate the impacts of sedimentation on fish and wildlife resources in economic terms.

RECOMMENDATION

The Service has never considered in-Bay disposal as adequate or acceptable relative to preserving fish and wildlife resources in the Bay. Our basic position has always been that first priority for disposal of dredged material should be in upland areas followed by ocean disposal. Only if these alternatives are not feasible should open-water disposal in the Bay be considered and then on ebb tides only. Although we have recommended ebb tide disposal for material dredged from Richmond Harbor, this should not be construed as being an acceptable way to dispose of large amounts of dredged material in the long term. If disposal at Alcatraz is decided upon in lieu of these more environmentally acceptable alternatives, disposal should be done only during the ebb flow of the tide.

We appreciate the opportunity to provide input to your planning process for these projects. For assistance, please contact Mr. Wally Wiest at 8-460-4613.

Sincerely,

James J. McKevitt

James J. McKevitt
Field Supervisor

cc: Reg. Dir., (AHR), Portland, OR
Dir., CDFG, Sacramento, CA
NMFS, Tiburon
EPA, San Francisco, (Lilly Wong)

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Environmental Branch

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2800 Cottage Way Rm E-2727
Sacramento, California 95825

2 3 DEC 1985

Dear Mr. McKevitt:

We are writing to provide you with information related to your supplemental letter report for disposal activities for our navigation improvements for Richmond and Oakland Outer Harbors at the designated Alcatraz disposal site (SF-11).

As you know, we are presently conducting a number of investigations related to the accumulation of material at the Alcatraz site. To bring you up to date for the Alcatraz disposal site, we have (1) characterized the physical and chemical composition of the mound (chemical analysis is enclosure 1); (2) performed bioassay tests using material from the mound (draft final report is enclosure 2); (3) collected prototype current data; (4) implemented math model tests to simulate disposal from instantaneous dump (enclsoure 3) and to determine the critical shear stress for erosion as well as erosion rates for various sediment types at various liquidity indices; and (5) will continue to monitor the area of the Alcatraz site including areas outside of its present boundaries. Although the accumulation of material has not diminished, we are still awaiting results from the studies described in (4) above that will facilitate our ability to manage the disposal of dredged material at the Alcatraz site.

In addition to the Alcatraz studies, we are also continuing our ocean disposal site investigation offshore San Francisco, initiating work with our Waterways Experiment Station (WES) in coordination with local expertise on a sediment transport model, monitoring the designated two north bay sites at San Pablo Bay and Carquinez Straits, and will initiate reviews and studies of alternate disposal options including land disposal, sand re-use, and an open-water South San Francisco Bay disposal site. As we compile information from these studies, management measures will be developed with the objective to maintain long-term use of the Alcatraz site for the suitable disposal of dredged material.

At this time, as indicated in our Scope of Work for the disposal of dredged material from Richmond and Oakland Outer Harbors, we have contracted with WES for determining erodability of various types of sediments. This study is not scheduled for completion until April 1986. Results of this study are expected to contribute to management measures ensuring long-term use of the Alcatraz site for dredged material disposal. Data from model tests simulating disposal from instantaneous dump are available and a report on the model test is

2 3 DEC 1985

enclosed (Enclosure 3). The results are limited to the instantaneous response of sediments, comprised of fine grain (silts and clays) and coarse grain (sand) materials, and to the general conclusion that the higher the rate of dumping, the higher the potential for burial. Also enclosed is a synopsis of the testing being performed related to short-term fate of material dumped at the Alcatraz site referred to in paragraph 3. of the report (Enclosure 4), since it is related to your recommendation for ebb tide disposal.

Lastly, we have also enclosed for your information our Division's response, dated 15 August 1984 (Enclosure 5), to the Department of the Interior's official comments on the construction of Phase 2 of the John F. Baldwin Ship Channel related to disposal at the designated Alcatraz disposal site.

We look forward to continued coordination on the disposal of dredged material in San Francisco Bay and to receiving your input to our two navigation projects, Richmond and Oakland Outer Harbors.

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

Enclosures

CF:
Proj Files
SPNPE Rdg
SPNPE-R Rdg
~~SPNPE-R~~
SPNPE-P (Erlich)
SPNPE-D (Hancock)

TONG/jw
SPNPE-R
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CHISHOLM
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ANGELONI
SPNPE

U.S. DEPARTMENT OF INTERIOR, U.S. FISH AND WILDLIFE SERVICE

Endangered Species Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE

SACRAMENTO ENDANGERED SPECIES OFFICE
2800 Cottage Way, Room E-1823
Sacramento, California 95825-1846

In Reply Refer To: NOV 12 1987
1-1-83-F-40

Mr. William C. Angeloni
Chief, Planning/Engineering Division
U.S. Army Corps of Engineers
211 Main Street
San Francisco, California 94105-1905

Subject: Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Design Memorandum Number 1 and Supplemental Environmental Impact Statement, Alameda County, California

Dear Mr. Angeloni:

In response to your November 2, 1987, letter, we have reviewed the referenced documents and the final report entitled: **California Least Tern Foraging and Other Off Colony Activities Around Alameda Naval Air Station During 1986**. We agree with your conclusion that the proposed project is not likely to affect the least tern or other listed species in the area. Thus, reinitiation of formal consultation will not be necessary.

Please contact Peter Sorensen of my staff at FTS 460-4866 if you have any questions on this matter.

Sincerely,

David L. Harlow

for Gail C. Kobetich
Field Supervisor

cc: Field Supervisor, Eclogical Services, Sacramento, CA (ES-S)

2 November 1987

Environmental Branch

Mr. Gail Kobetich, Field Supervisor
Endangered Species Office
U. S. Fish and Wildlife Service
2800 Cottage Way Rm. E-1823
Sacramento, California 95825

Dear Mr. Kobetich,

The enclosed final report, "California Least Tern Foraging and Other Off Colony Activities Around Alameda Naval Air Station During 1986", is submitted in compliance with Section 7 (c) of the Endangered Species Act (16 U.S.C. 1531-1543c) and the regulations found at 50 CFR 402. Based on the foraging studies performed during 1984-1986, we have determined that deepening the Oakland Harbor channels is not likely to affect the least tern or other threatened or endangered species. Your concurrence with this determination is requested. Questions regarding this determination should be directed to Mr. Lester Tong (FTS) 454-0433.

Also enclosed for your information is a copy of the Draft General Design Memorandum Number 1 and Supplemental Environmental Impact Statement for the Oakland Harbors deep-draft navigation improvement project. This document addresses ocean disposal of dredged material, and was forwarded to you under separate cover along with a copy of the Corps' endangered species coordination letter to the National Marine Fisheries Service, dated October 2, 1987. Please note the end of comment period on the Draft SEIS is November 2, 1987.

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

Enclosures (2)

TONG/lt/5433
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2 Nov 1987

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CESPN-PE-[illegible]

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
SACRAMENTO ENDANGERED SPECIES OFFICE
2800 Cottage Way, Room E-1823
Sacramento, California 95825-1846

March 31, 1987

Mr. William G. Angeloni
Chief, Planning/Engineering Division
U.S. Army Corps of Engineers
211 Main Street
San Francisco, California 94105-1905

Subject: Proposed Designation of an Ocean Site to Receive Material Dredged from San Francisco Bay (Case No. 1-1-87-SP-274)

Dear Mr. Angeloni:

As requested by letter from your agency dated March 3, 1987, you will find attached a list of listed, endangered, and threatened species (Attachment A) that may be present in the subject project area. To the best of our knowledge no proposed species occur within the area. The list is intended to fulfill the requirement of the Fish and Wildlife Service to provide a list of species under Section 7(c) of the Endangered Species Act, as amended. Please see Attachment B for your requirements.

Upon completion of the Biological Assessment (see Attachment B), should you determine that a listed species is likely to be affected (adversely or beneficially), then your agency should request formal Section 7 consultation through our office at the letterhead address.

If the Biological Assessment is not initiated within 90 days of receipt of this letter, you should informally verify the accuracy of this list with our office.

Should you have any additional questions regarding this list or your responsibilities under the Act, please contact Dr. Jack Williams at (916) 978-4866 or FTS 460-4866.

Thank you for your interest in endangered species, and we await your assessment.

Sincerely,

Gail C. Kobetich

Gail C. Kobetich
Field Supervisor

Attachments

cc:
Chief, Endangered Species, Portland, OR (FWE-SE; Attn: Ralph Swanson)
Field Supervisor, Ecological Services, Sacrmento, CA (ES-S)
U.S. Environmental Protection Agency, 215 Fremont Street, San Francisco, CA 94105 (Attn: W-5-3; Pattrick Cotter)

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED DREDGE MATERIAL RECEIVING SITE FROM SAN FRANCISCO BAY
(Case No. 1-1-87-SP-274)

Listed Species

Birds

California brown pelican, _Pelecanus occidentalis californicus_ (E)

Proposed Species

None

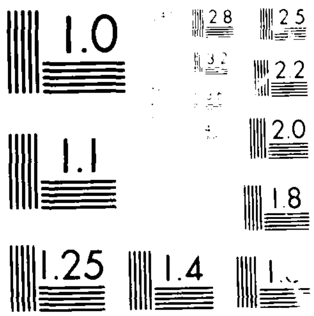
Candidate Species

None

(E)--Endangered (T)--Threatened (CH)--Critical Habitat
(1)--Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.
(2)--Category 2: Taxa for which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 7/11

UNCLASSIFIED F/G 13/2 NL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ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(A) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; 2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continue existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after determining the action may affect a listed species; and 3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) Biological Assessment--Major Construction Activity 1/

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an onsite inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present; a review literature and scientific data to determine species' distribution, habitat needs, and other biological requirements; interviews with experts, including those

---

1/ A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)C).

U.S. DEPARTMENT OF INTERIOR, MINERALS MANAGEMENT SERVICE

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
PACIFIC OCS REGION
1340 WEST SIXTH STREET
LOS ANGELES, CALIFORNIA 90017

In Reply Refer To
MMS - Mail Stop 300

Ms Joanne Brion
Associate, Planning
& Economics
ESA Planning and
Environmental Services
760 Harrison St.
San Francisco, CA 94107

Dear Ms Brion:

The following statement has been developed by our staff in response to your recent request for information from the Minerals Management Service regarding the U.S. Army Corps of Engineers' Ocean Disposal Site Designation in the San Francisco District.

* Proposed sites which are acceptable or unacceptable:

We have reviewed the locations of the alternative sites supplied in your letter of December 29, 1987. Listed below are the correct block numbers associated with the site coordinates supplied to us and determination of site acceptability or unacceptability in relationship to future oil and gas development. The occurrence of a newly proposed site, Site 1M, is noted. We find site 1M acceptable as a feasible alternative for the disposal of uncontaminated dredge materials. Based on the alternatives currently proposed, the MMS at this time recommends consideration of Site 1M, Site B1, or Site D1 as the preferred alternative.

Site	Leasing Block Number	Acceptable/Unacceptable
1	332	Unacceptable
1M	377	Acceptable
2	504	Unacceptable
B1	463	Acceptable
B1A	552	Unacceptable
B2	639	Unacceptable
C1	335	Unacceptable
D1	590	Acceptable

* Incompatibility of ocean disposal and mineral resource development and extraction.

Placement of dredge spoil sites may conflict with future leasing of oil and gas blocks. Environmental concerns expressed by the California Coastal Commission and the California Secretary of Environmental Affairs in their comments to the Draft EIS for the Proposed Outer Continental Shelf Oil and Gas Lease Sale Offshore Central California, OCS Sale 73, lead us to believe that the State of California may object strongly to any future development of oil and gas reserves within blocks containing dredge spoils. As a consequence, high potential blocks might not be developed. While the actual impact of not developing one high potential block cannot be quantified until the exact quantity of hydrocarbons present is determined, we estimate that impacts of such non-development would be significant.

* Monetary value for each of the leasing blocks in question.

  The monetary value of a particular lease block cannot be determined until the exact quantity of hydrocarbons present is known. This quantification process occurs during the post lease phases of exploration, delineation, and development of a leased block.

* Probable leasing schedule and likelihood that a lease sale will occur in the near future for each of the leasing blocks in question.

  All alternative dredge spoil sites in question are located within leasing blocks that comprise part of the Central California Planning Area. This area is included in the current Five Year Outer Continental Shelf Oil and Gas Leasing Program which was finalized and approved in July 1987. The current schedule calls for a lease sale in the Central California Planning Area (proposed Sale 119) in May 1989.

If you have any further questions concerning this matter, please contact Alex Watt at 213-894-6747.

Sincerely,

James W. Sutherland
for
William F. Grant
Regional Director

U.S. DEPARTMENT OF INTERIOR, NATIONAL PARK SERVICE

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEER
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

December 23, 1987

Office of Counsel

Brian O'Neill
National Park Service
Fort Mason
San Francisco, California 94123

Dear Mr. O'Neill:

This is in response to your letter to William Angeloni dated of November 12, 1987 in which you requested that the Corps apply for a permit from the National Park Service (NPS) for its navigation projects in the vicinity of Alcatraz Island. For the reasons described below, we must decline to do so.

We have reviewed the statutes and regulations upon which you base your request, and we do not concur that a permit is required. 16 U.S.C. § 460bb-3(c) provides:

> The authority of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements on land and, or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary [of the Interior] and the Secretary of the Army and which are consistent with both the purpose of sections 460bb to 460bb-5 of this title and the purpose of existing statutes dealing with water and related resource development.

The language "mutually acceptable" implies that Congress intended that the two Secretaries would resolve any conflict in their authorities by mutual agreement, not by permits.

You appear to base your requirement for a permit on 36 C.F.R. Part 3--Boating and Water Use Activities. This Part prohibits a number of activities in NPS waters such as operating a vessel under the influence of alcohol, allowing a person to ride on gunwales, or surfing in swimming areas. It does not prohibit dredging, discharging dredged material, or core sampling.

We would be happy to meet with you to discuss our activities and responsiblities under Federal law.

Sincerely,

Galen H Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

United States Department of the Interior

NATIONAL PARK SERVICE

GOLDEN GATE NATIONAL RECREATION AREA

FORT MASON, SAN FRANCISCO, CALIFORNIA 94123

IN REPLY REFER TO:

L30 (WR-GOGA)

November 12, 1987

William Angeloni
Chief, Planning and Engineering Division
Army Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

Dear Mr. Angeloni:

It has come to our attention that dumping and/or core sampling and removal of dredged material by the Corps of Engineers in the waters near Alcatraz Island may be occurring within the boundary of the Golden Gate National Recreation Area. All such activities are prohibited on park land except when a permit has been issued. The National Park Service holds exclusive federal jurisdiction at Alcatraz from the island to 300 yards beyond the low-water line around the island.

If any of your activities fall within our jurisdiction we request that you cease them until we have had an opportunity to consider your request for a permit through the appropriate procedures.

Please contact my office at 556-2920 to initiate a permit request.

Sincerely,

Brian O'Neill

Brian O'Neill
General Superintendent

code of federal regulations

Parks, Forests, and Public Property

36

PARTS 1 TO 199

Revised as of July 1, 1987

CONTAINING
A CODIFICATION OF DOCUMENTS
OF GENERAL APPLICABILITY
AND FUTURE EFFECT

AS OF JULY 1, 1987

With Ancillaries

Published by
the Office of the Federal Register
National Archives and Records
Administration

as a Special Edition of
the Federal Register

U.S. DEPARTMENT OF INTERIOR, OFFICE OF THE SECRETARY

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 85/474

MAY 22 1985

Lieutenant General E. R. Heiberg, III
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Heiberg:

Thank you for the letter of March 15, 1985, requesting our views and comments on the proposed report of the Chief of Engineers, other pertinent reports, and the final environmental statement for Oakland Inner Harbor, Alameda County, California.

Our review did not surface any conflicts with programs or missions of the Department; therefore, we have no objection to the findings and recommendations discussed in your report.

Sincerely,

Bruce Blanchard, Director
Environmental Project Review

U.S. DEPARTMENT OF TRANSPORTATION, COAST GUARD

U.S. Department of Transportation

United States Coast Guard

Commanding Officer
U. S. Coast Guard
Marine Safety Office
San Francisco Bay

Bldg 14
Coast Guard Island,
Alameda, CA 94501-5100
(415) 437-3073

16601
11 SEP 1991

Colonel Galen Yanagihara
District Engineer
San Francisco District
U. S. Army Corp of Engineers
211 Main Street
San Francisco, CA 94105

Dear Colonel Yanagihara:

Thank you for the 27 August briefing arranged by Major Clow regarding ocean disposal of dredged material. It was helpful to learn that the new site would generate only about a half dozen additional transits per day, mostly of tugs towing tandem barges. I can now comfortably comment on the sites with respect to ensuring that the chosen site has minimal adverse impact on navigation safety. This letter also serves as my response to the letter sent to me on 27 July by your consultant, Ms. Joanne Brion of ESA.

I have no objection to the sites except that Station 1 should be moved to the edge of the *precautionary area*. I don't believe dumping operations in the precautionary area and traffic lanes indicated on NOAA chart 18645 would be contrary to the international standards that established these areas; however, such operations would perhaps unnecessarily add to the complexity of navigating. In this area major traffic lanes converge in an often fog enshrounded area with few reference points for piloting.

My primary recommendations are that you require holders of dumping permits and your contractors to adhere to vessel traffic routes and the Coast Guard advisory traffic services as follows:

> Traffic Separation Scheme (TSS) - Adhere to the traffic flow established by the internationally sanctioned TSS, in a manner to minimize crossing channels. For example to use site B1 the tug and tow should proceed down the outbound lane in the southern traffic lane, turn right to B1 and dump the load, and return via the inbound lane of the western or main traffic lane. To transit the opposite route would require the tug and tow to cross lanes, increasing the risk of colliding with oncoming traffic in both traffic lanes.
>
> Movement Reporting Systems - Participate in both the Vessel Traffic System operated in the bay and rivers, and the Offshore Vessel Movement Reporting System which extends 38 miles offshore of Mount Tamalpais. These systems are described on Enclosure (1). Although these systems are voluntary they are used by over 90% of the deep draft vessels including tugs with tows.

A low cost aid to safe navigation would be to install radar reflectors high on a mast of tugs or barges to possibly increase the vessel's probability of being detected by other radars. This may help in marginal situations when rougher weather creates a sea return image on radar, or when there is relatively little radar reflecting area above the waterline.

Lastly, I recommend that you impose conditions and permits on contracts to ensure prompt and adequate action in the event of a parted towing line or loss of power or steering. This could include requiring immediate reporting of casualties to the Vessel Traffic Service and giving the District Engineer or Captain of the Port the option of dispatching tug assistance at the permittee or contractor's expense. This would help avoid a too common situation where the master of a vessel hesitates to call for assistance while the "window of opportunity" for obtaining assistance may be lost.

I look forward to seeing the draft Environmental Impact Statement on this project and ask that you also forward a copy to the Commander (m) of the Eleventh Coast Guard District. And please accept a hearty welcome to the Bay Area; I look forwarding to meeting you soon.

Sincerely,

David Zawadzki

DAVID ZAWADZKI
Captain, U. S. Coast Guard
Commanding Officer
Marine Safety Office
San Francisco Bay

Encl: (1) Description of OVMRS (for offshore) and VTS (for bay rivers)

Copy: Ms. Joanne Brion, ESA
USCG VTS San Francisco
CCGD11 (m) Long Beach

BAT/PORTOPS

Vessel Traffic Service

SAN FRANCISCO VESSEL TRAFFIC SERVICE

The purpose of the U.S. Coast Guard's Vessel Traffic Service is to enhance maritime safety by providing the masters and pilots of vessels with up-to-date information on the identification and intentions of other vessels and directly related information including weather, aids to navigation, etc. Participation in the service is voluntary but encouraged for commercial and Naval vessels, as the quality of information available from the service is largely dependent upon input from participating vessels.

The Vessel Traffic Service maintains radar surveillance over the seaward approaches to San Francisco and within San Francisco Bay from Point San Pablo to the San Mateo-Hayward Bridge. A vessel movement reporting system monitors vessel movements beyond the radar coverage area as far inland as Stockton and Sacramento. The Vessel Traffic Service (call sign "SAN FRANCISCO TRAFFIC") maintains a continuous guard on Channel 13 (156.65 MHz), the Bridge-to-Bridge radiotelephone frequency, and Channel 16 (156.8 MHz), the National Distress, Safety, and Calling frequency. After communications have been established, the abbreviated call sign "TRAFFIC" may be used.

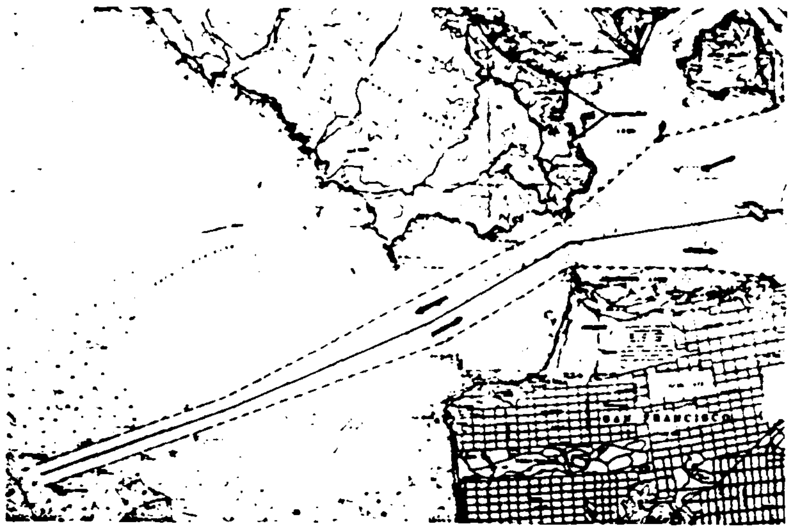
Masters and pilots should inform Vessel Traffic Service when entering the system, or when preparing to get underway, of their destination, route, pilot designator, deepest draft, and other information if significant. They also should advise of any changes as they occur. The Vessel Traffic Service may request position reports in those areas beyond radar coverage or in the event of radar malfunction.

As the Vessel Traffic Service is designed primarily for use by larger vessels which are subject to the Bridge-to-Bridge Radiotelephone Act. Recreational boaters are not encouraged to "check in" to the system. However, recreational boaters with Channel 13, by maintaining a listening watch on that frequency, can be aware of the movements of ships and tugs throughout the San Francisco Bay and Delta. Recreational boaters should also bear in mind that in an emergency situation they are most likely to make contact with a commercial vessel on Channel 13 as it is the pilots' working frequency.

The fact that Vessel Traffic Service continuously monitors Channel 13 provides all users of the water (including recreational boaters) with an alternative source of information and assistance should an emergency develop and attempts to contact the Coast Guard on Channel 16 prove unsuccessful. The Vessel Traffic Service can shift to (but does not monitor) VHF-FM Channels 12, 18A and 22A.

Details and instructions for participating in the system are contained in VTS Publication 16630.3, Operating Procedures, San Francisco Vessel Traffic Service. It is available from Commanding Officer, Coast Guard Vessel Traffic Service, Yerba Buena Island, San Francisco, CA 94130-5078. Telephone (415) 556-2950.

Enclosure (/)



Nautical Chart of Approach to San Francisco Bay with the Traffic Separation Scheme Superimposed (not for navigational use).

TRAFFIC SEPARATION SCHEMES

To increase the safety of navigation, routes incorporating traffic separation have been established in the approaches to San Francisco Bay and within the Bay. They are shown on all current National Ocean Service charts. In the interest of safe navigation, it is recommended that through traffic use such routes. The routes which are intended for use by all vessels are NOT mandatory and do NOT give any special rights to vessels using them. General principles for navigation in Traffic Separation Schemes are as follows:

a. The International Regulations for Preventing Collisions at Sea or Inland Rules, as appropriate, must be observed at all times.

b. Vessels should proceed in the appropriate traffic lane in the general direction of traffic flow for that lane.

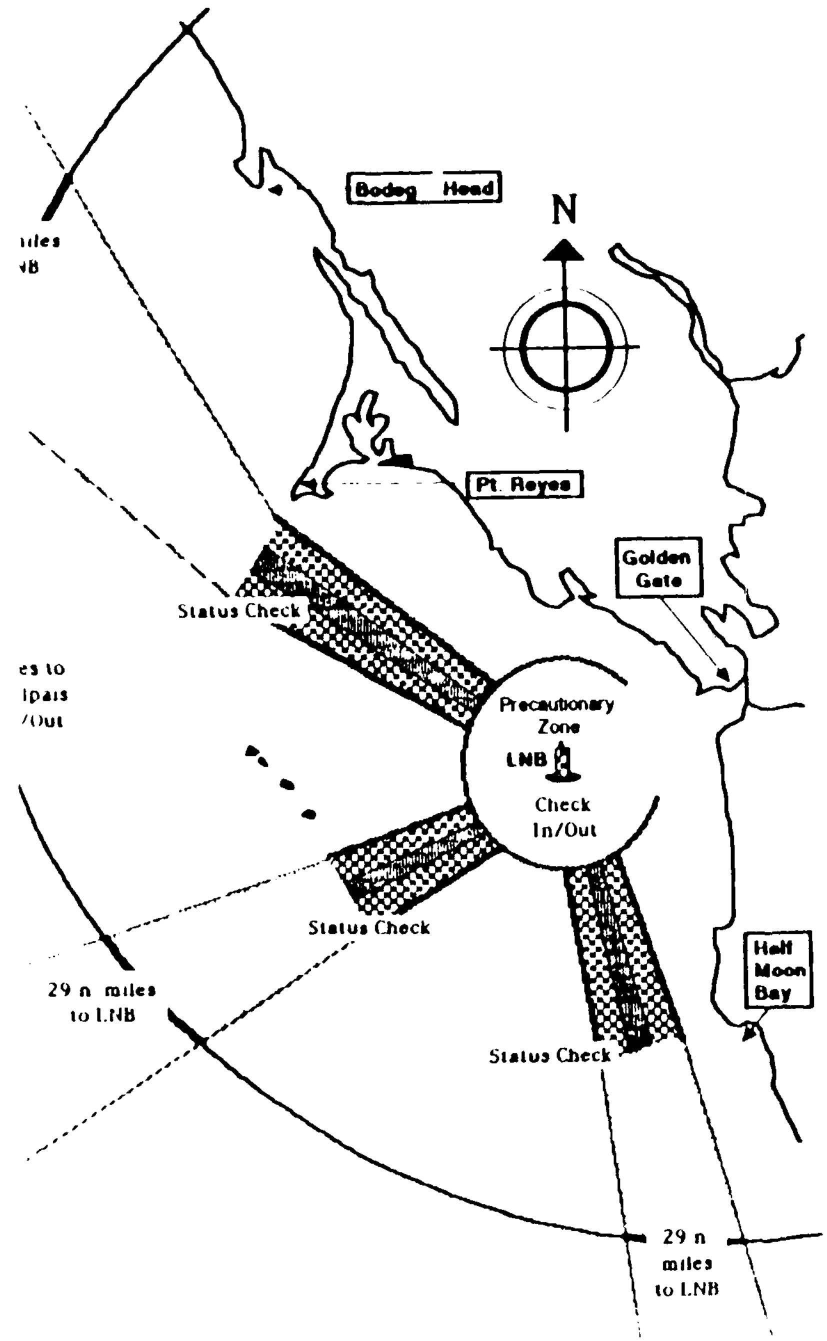
c. Vessels entering or leaving traffic lanes should normally do so at the ends of the lanes. When necessary to enter or leave from either side, vessels should do so at as small an angle to the general direction of traffic flow as practicable.

d. Vessels should avoid crossing traffic lanes, but if obliged to do so, should cross as nearly as practicable at right angles to the general direction of traffic flow.

e. Other than by a crossing vessel or a vessel joining or leaving a lane, the separation zone or line should not be crossed except in cases of emergency to avoid immediate danger.

f. Vessels not using a traffic separation scheme should avoid it by as wide a margin as possible.

g. Vessels otherwise authorized to fish, may fish within traffic lanes and separation zones but shall not impede the passage of any vessel following a traffic lane. Operators of fishing vessels should pay close attention to the section of this Chapter which is entitled "The Narrow Channels of San FRancisco Bay".



San Francisco Offshore Vessel Movement Reporting System

Beginning December 1, 1986, the U S Coast Guard will operate an Offshore Vessel Movement Reporting System (OVMRS) as a service to all vessels transiting the ocean approaches to San Francisco Bay, California, U S A The OVMRS will aid in detecting potential close encounters and improve communications by providing the names of transiting deep draft vessels Although participation is voluntary, the US Coast Guard *urges all vessels transiting the ocean within the OVMRS area to participate as follows*

- Vessels over 300 gross registered tons and vessels with tows (referred to as "deep-draft" vessels) should actively participate by reporting their movements to the Coast Guard's Vessel Traffic Service (VTS)

- All vessels should listen to VTS broadcasts of deep-draft vessel transits in their area, and navigate and communicate appropriately, identify your vessel and your intentions to approaching vessels

OVMRS Area. The OVMRS applies to vessels transiting ocean waters within a 38 n mile radius of Mount Tamalpais (37° 55.8' N, 122° 34.6' W) The distances of this radius from the San Francisco Approach Lighted Horn Buoy (or LNB for Large Navigation Buoy, U S Coast Guard Light List No 360, 37° 45' N, 122° 41.5' W) measured seaward beyond each of the three charted Traffic Separation System lanes are Northern, 41 n miles, Main (Western), 29 n miles, Southern, 29 n miles

Responsibilities of Deep-draft Vessels. Before entering the OVMRS area from sea or from San Francisco Bay, deep-draft vessels will call the Coast Guard's San Francisco Vessel Traffic Service on VHF FM channel 16 Switching to channel 12, the vessel reports it's type, name, position, route, speed, and estimated time of arrival at either the LNB if the vessel is inbound, or the seaward radius of the OVMRS if the vessel is outbound VTS will broadcast this report Upon reaching the seaward end of one of the Traffic Separation System lanes, approximately halfway in the transit, the vessel will report an update of its progress to VTS After an initial call on channel 16, VTS will broadcast the status of all participating deep-draft vessels on channel 12 on the hour and half hour

Responsibilities of All Vessels. By monitoring the radio transmissions of vessels reporting into the OVMRS, as well as scheduled broadcasts, listeners will be informed of participating deep draft vessel movements All vessels should communicate their identity and intentions to other vessels operating in their vicinity *The OVMRS is only an information service* The conduct of mariners will still be governed by agreements reached by communicating between vessels, good seamanship, and the International Rules of the Road

U.S. ENVIRONMENTAL PROTECTION AGENCY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

215 Fremont Street

San Francisco Ca 94105

Colonel Galen H. Yanagihara
District Engineer
U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Dear Colonel Yanagihara:

Thank you for the opportunity to discuss the Port of Oakland Deep-draft Navigation Improvement Project with you on Monday, February 8, 1988. As agreed in our conversation, I am writing to reiterate EPA's concerns about the possible MPRSA Section 103 ocean dredged material disposal site designation for the project.

EPA was hopeful that the discussion and meetings held with the Port of Oakland and the Federal, state, local, and environmental representatives would lead to a resolution of the site designation issue. I believe we have all shown a willingness to try to resolve these issues in a reasonable manner.

However, EPA continues to have significant concerns about the COE's preferred alternative of 1M as the 103 site for the 7 Million cubic yards. Comparative environmental impact analysis has not been adequately addressed. In light of the resources agencies overwhelming recommendation that the B1 sites were less environmentally sensitive, EPA cannot conclude that the 1M site is acceptable.

The following topics need to be resolved to expedite designation of an acceptable ocean disposal site:

- Comparative fisheries data on major fishing grounds and impact analysis;
- Proximity to the Farallon Islands National Marine Sanctuary;
- Modelling data for site radius which USGS agreed to review:
- Transport of disposed dredged material based on bottom drifter, current and dye studies;
- Cost evaluation of disposal at the site based on information obtained from the dredging community;
- Contractor's report on site selection;
- Adequate sediment and bioassay/bioaccumulation test results from discreet locations within the proposed dredging area and the results of these studies; and
- Evaluation of additional safety and vessel tracking information in the Zone of Siting Feasibility.

Much of the above information is detailed in our DEIS letter to you of December 7, 1987. We are committed to work together to resolve these issues. Please call me if you need further clarification.

Sincerely,

Harry Seraydarian,
Director, Water Management Division

January 14, 1988

Plan Formulation Branch

Mr. John Wise
Acting Regional Administrator
U. S. Environmental Protection Agency
Region 9
215 Fremont Street
San Francisco, California 94105

Dear Mr. Wise:

In your letter of December 7, 1987, you requested a copy of Appendix C of the Oakland General Design Memorandum (see 12, General Comments, page 5). This Appendix, Groundwater Monitoring Program, was prepared under contract to the Corps by GEO/RESOURCE CONSULTANTS, INC.

Please note that the main object of the contract was to provide a program to monitor the Merritt/Posey aquifer. This report indicates that salt water intrusion into this aquifer will only increase if there is an increase in pumping, or draw down of the present system. Dredging will have no impact on the aquifer. Subsequent meetings with the Regional Water Quality Control Board have determined that this aquifer is of no viable resource, and since the Navy is presently monitoring this aquifer, our efforts should be shifted to monitoring the Alameda formation. It has been recommended, therefore, that the program set forth in the monitoring plan not be implemented.

Coordination with the Board and the Alameda County Flood Control District, in conjunction with the Navy's monitoring program, has produced a scaled down monitoring program, expected to be in place by spring of this year. The details of this program will be supplied to you later this month. Should you have any questions, please contact Mr. Ken Harrington, task manager (974-0369), or Dennis Thuet, project manager (974-037?) of my staff.

Sincerely,

William Angeloni
Chief, Planning/Engineering Division

Enclosure

Cf: Project Files (Oakland)
CESPN-PE Rdg
CESPN-PE-R (DUFF)
CESPN-PE-D (HARRINGTON)
CESPN-PE-P (THUET)

December 30, 1987

Environmental Branch

Mr. John Wise
Acting Regional Administrator
U. S. Environmental Protection Agency
Region 9
215 Fremont Street
San Francisco, CA 94105

Dear Mr. Wise:

This letter is in regards to the Section 103 of the Marine, Protection, Research and Sanctuaries Act of 1972 (MPRSA) as it applies to the Oakland Harbor Deep-draft Navigation Improvement Project. On October 20, 1987, I requested your concurrence on my designation of an offshore site for disposal of dredged material. I am writing to address your concerns as expressed in the letters of 24 November and 7 December, 1987, and to enlist your support in resolving these issues. I am very concerned that unnecessary delay in designation of an ocean disposal site will have serious repercussions on the scheduled deepening of the Oakland Harbors as authorized by Congress (Water Resource Developement Act of 1986) and subsequently on the local economy. Additionally, I feel that much of the supplemental information requested may be more detailed than necessary to make your determination or that the information may not be germane to EPA's responsibilities pursuant to Section 103(c) of MPRSA. Enclosed with this letter is a response to each specific concern raised in the letters of 24 November and 7 December, 1987.

By exercising Corps authority under the Section 103, I can pursue selection of an ocean disposal site for a given project when there is no feasible alternative EPA-designated site. The suggested phasing of the Oakland Harbor Deepening Project pending future designation of an ocean disposal site under Section 102 of the MPRSA is not practicable. A Record of Decision, signed by the Division Engineer, at the completion of the Final SEIS and General Design Memorandum process, is required prior to construction of any part of the project. Segmenting the disposal plan within the NEPA process is unacceptable. Additionally, most of our efforts to date are coincident with data collection and analysis we have undertaken to support site designation under Section 102 of MPRSA. No other effort is being undertaken to select a dredge material disposal site offshore of San Francisco by our respective agencies.

I request your personal review of the attached responses to the letters of 24 November and 7 December (Enclosure 1) and involvement in resolving any remaining issues. I believe that my selection of Site 1M for dredge material disposal from the Alcatraz Site under the Oakland Harbor Deepening Project is based on sound factual data and fully complies with the Ocean Disposal

Regulations and procedural guidance. I hope that we can resolve these issues and that we can receive your timely concurrence in the site designation process. However, if your concurrence can not be attained by February 1, 1988, I intend to seek waiver through 40 CFR Part 225.3 in order to avoid the substantial economic impacts.

I am available to meet with you to discuss any concerns you may have. Please contact me at 974-0358 to make the necessary arrangements. Thank you for your personal attention to this matter.

Sincerely,

Enclosures

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

cc:

Walter Abernathy, Executive Director, Port of Oakland
E. C. Fullerton, Regional Director, National Marine Fisheries Service
Patricia Sanderson Port, Regional Environmental Officer, Department of the Interior
Pete Bontadelli, Acting Director, California Department of Fish and Game

Information [40 CFR 225.2(a)] Requested by Letter, Dated November 24, 1987.

1. The request for a "detailed" description of the biological environment at the proposed disposal site needs clarification. A detailed description of the biological environment is presented in Baseline Survey and Site Selection for Ocean Disposal, Gulf of the Farallons (Nybakken, et al, 1984) and is referenced in the Draft SEIS and is available at our office. A succinct description of the biological environment is presented in the text of the Draft SEIS (pp. SEIS 17-18, SEIS25, SEIS 52-54). A brief description of the biological environment of the broader surrounding region is presented in the text supported by several referenced studies. A specific itemization of any required descriptive biological information that EPA feels has been omitted from the Draft SEIS and referenced material, should have been provided to the Corps.

2. Numerical modeling of disposal and subsequent resuspension of dredge material at Site 1M has been undertaken to support EPA designation efforts under Section 102 of of the MPRSA. This work has been referenced in the SEIS. The joint technical guidance of the Corps and the EPA, General Approach to Designation Studies for Ocean Dredge Material Disposal Sites (hereafter referred to as General Approach Guidance) omits any reference to mathematical modeling. Modeling can be a useful tool to predict the fate of disposed material at a given site in the absence of hard data. Speculative modeling of general use dredge material may be helpful in the Section 102 designation process at Site 1M. However, in the case of material dredged from the Alcatraz Disposal Site and transported to Site 1M, copious data is available. The material being dredged and transported to Site 1M has not dispersed or been resuspended by currents in a much higher energy environment, the Alcatraz Disposal Site. With maximum currents at Site 1M being a small fraction of the tidal velocities experienced at Alcatraz, and with measured rates of erosion of the material relative to current speeds available from physical test data, it can be determined that dispersion and transport of the material will be insignificant. The data that we have on the Alcatraz material is more reliable than predictive models.

3. A description of physical oceanographic conditions in the project area was also presented in the Draft SEIS (pp. SEIS 22, SEIS 48-52) and a detailed description was referenced in Nybakken et al (1984). As discussed in 1. above, a "detailed" description of the oceanographic conditions at the proposed disposal site, beyond that already included or referenced in the SEIS, requires specific itemization by EPA.

Enclosure 1

4. The twofold comment related to consideration of additional alternatives, including a deep water alternative (off the continental shelf) and designation of a site in accordance with Section 102 of MPRSA, is of special concern. Each alternative will be addressed separately:

Deep water alternative: 40 CFR 228.5(e) states "...wherever feasible, designate ocean dumping sites beyond the edge of the the continental shelf..." The General Approach Guidance developed jointly by the Corps and the EPA establishes a procedure to determine a Zone of Siting Feasibility (ZSF). Following the General Approach Guidance and considering operational and economic constraints, the ZSF has been established as a 24 nautical mile (nmi) radius from Pt. Bonita. Unfortunately, the Gulf of the Farallons is the only locale on the West Coast where an off-the-shelf site can not be found within 24 nmi of the shoreline. The same ZSF has been established to support designation of a site under Section 102 of MPRSA. The final ZSF Analysis Report for both the designation under Section 102 and the specification of a site under Section 103 is attached and will be included as an Appendix of the Final SEIS. Because any site beyond the edge of the continental shelf lies outside the perimeter of the ZSF, use of the such a site is not feasible and an off-the-shelf site need not be given further consideration as a candidate site. If there is fundamental disagreement on our efforts to facilitate designation of a site under Section 103 of MPRSA, any ocean site designation action is likely to suffer extensive delays.

Designation of a site under Section 102 of MPRSA: Work undertaken by the Corps of Engineers as a cooperating agency to support EPA designation of a site under Section 102 of MPRSA continues. Delays in studies to date have been predicated on the need to address disposal of large quanties of material at the site (56 million yds^3) and modeling the types of material to be discharged at the site. Cumulative, physical impacts would be significantly greater for the general use disposal site than for a site specifically for a given project. The Section 103 process is available to the Corps of Engineers when there is no EPA-designated site for dredged material disposal as is the case for the Oakland project. Delaying this project and causing undue economic losses to the Port of Oakland and the Bay economy, by not exercising the Corps of Engineers' authority to specify disposal under Section 103, would be irresponsible.

Additionally, many of the comments in the two EPA letters imply a basic disagreement with work accomplished by the Corps of Engineers to support the Section 102 site designation. The Section 103 conclusions as presented in the SEIS are concomitant to the completed work. If our differences cannot be accommodated without major revisions to the completed work, the Section 102 designation is likely to suffer indefinite delays. Our contracts do not include reiteration of completed studies and our budgets do not include funding for additional studies. It is essential that we reach agreement in these areas.

5. The present testing program for the Alcatraz disposal site is presented in Attachment 1. The results will be provided upon its availability. However, existing data from tests performed on material from the surface of the Alcatraz site have not indicated unacceptable environmental effects. Also, it should be noted that all material disposed at the Alcatraz site has already been evaluated and found acceptable for open-water disposal, albeit based on the regulatory process in effect at the time evaluated. If dredged material at the Alcatraz site, a composite of all dredging projects in the central and southern portions of San Francisco Bay, was found to be unacceptable for ocean disposal, it would be very unlikely that many major dredging projects would contain less "contaminated" or more environmentally acceptable material. Thus, ocean disposal for Bay sediments would not be appropriate. There is no reason to anticipate that unacceptable effects in the marine environment from disposal of dredged material removed from the Alcatraz disposal site will occur.

The testing described in Attachment 1 for the Alcatraz site does not reflect the desired program itemized in Section D. of Attachment A of the December 7, 1987 letter, which includes extensive sediment chemistry to be performed under the Section 301(h) protocols for effluent limitations related to NPDES permits and 15-20 cores. Data collection for the purpose of building a data base should not be imposed as a requirement for determining the suitability of an ocean disposal site. The extent of testing requested in Attachment A of your 7 December letter has no bearing on the statutory requirement for evaluating potential to cause environmentally unacceptable effects in the marine environment. Although attaining a laboratory standard for data accuracy and precision is laudable, the Section 301(h) protocols are not appropriate for dredged materials.

6. The comment related to analysis of sediment chemistry and sediment toxicity for the material (from Oakland Harbor) proposed for disposal at the Alcatraz site is not applicable to the determination of compliance with the Section 103 of MPRSA action. However, reasonable sediment characterization in accordance with 40 CFR Part 227.13 has been presented in the Draft SEIS. The material can only be transported to the site for disposal if found acceptable for ocean dumping after evaluation pursuant to 40 CFR Part 227.13. The request for concurrence pursuant to the Section 103 of MPRSA site specification included the subsequent maintenance dredging from Alcatraz, equivalent to accumulated material resulting from disposal of Oakland Harbor maintenance dredging. Sediment testing will be required prior to each maintenance dredging episode as a part of the continuing evaluation process. Please note that the requested concurrence was for specification of Site 1M as a disposal site for discharge of 2.7 million cubic yards of dredge material from the Alcatraz Site. If comment 6. is intended to address direct ocean disposal of dredged material from Oakland Harbor, the analysis of potential effects has been presented in Appendix A of the Draft SEIS.

7. A discussion of potential impacts to biological resources, including potential effects on the pelagic and benthic environments, in the ocean was furnished in the Draft SEIS (pp. SEIS 69, SEIS 73, SEIS 74). A similar discussion was presented for disposal at the Alcatraz site, but impacts within the Bay are not relevant to the determination of compliance with the Section 103 of MPRSA action. If EPA requires greater detail than provided in the SEIS in order to concur with disposal of dredge material at site 1M, the level and particulars of that detail should have been specified. Under Section 103(b) of the MPRSA, ocean disposal criteria for reviewing and evaluating site designations affecting the civil works program of the Department of the Army are the five general and eleven specific criteria specified in 40 CFR Part 228. These have been explicitly addressed within the SEIS.

<u>Sediment and Water Quality Comments found in December 7, 1987 letter</u>

1. The Corps of Engineers is presently further evaluating the test results from the Oakland Harbor project in relation to ocean disposal. Additional statistical analyses are being performed and will be available in late January 1988. The interpretation of the data will be presented in the Final SEIS.

2. The chemical and biological tests presented in the Draft SEIS (pp. SEIS 63-72; and Appendix A) were reviewed by technical specialists from the Waterways Experiment Station and were found to be adequate to indicate environmental acceptability, not to ensure

avoidance of significant impacts. The finding of suitability of the material is evaluated from a representative characterization of the project area. The long stretches of the Oakland estuary is maintained annually to the existing authorized depth of 35 feet. There are no known areas of significant concentration of toxic contaminants within the Oakland estuary. There are, however, two areas within the proposed turning basin in the Inner Harbor suspected of contamination. As a result of comments from the Regional Water Quality Control Board on the Draft SEIS, additional testing is being performed for the areas adjacent to Schnitzer Steel and Alameda Gateway (previously utilized by Todd Shipyards). Due to the number of variables that may be involved, a complete understanding of sediment toxicity is a topic of extensive on-going research beyond the scope of this project. Based on the present level of knowledge of dredged material effects and the tests performed to date, the dredged material from Oakland Harbor has been found to be acceptable for ocean disposal.

3. Testing of material from the Alcatraz site is presently underway. Attachment 1 herein outlines the testing program at the Alcatraz disposal site. The information will be used to determine whether or not ocean disposal of the material is acceptable. Data from this testing will be available in late January 1988.

4. Background chemistry data has been presented in the Draft SEIS (pp. SEIS 48, SEIS 50; and Appendix A). Although background chemical data characterizes the dredged material, the information is not necessary in making the determination of environmental impacts. Bioassay and bioaccumulation data have been furnished to evaluate the potential for effects. Based on the biological test data, environmental effects can be assessed. Chemistry data only provides an inventory of constituent concentrations with no relation to potential for environmental effects. Values reported for chemistry data related to dredged material have been customarily reported in wet weight. Dry weight values have not been previously required and are not essential in the evaluation of effects. Quality assurance/quality control information for chemistry data is also immaterial in determining environmental effects.

5. a. "The chapter on the Affected Environment (in the Draft SEIS) is basically a narrative description of the offshore environment, rather than a scientific analysis based on an adequate data base." 40 CFR Part 225.2(a)(3) calls for a description of the characteristics of the proposed disposal site for receiving dredged material. The inference of the phrase "a scientific analysis based on an adequate data base" is that an extensive, comprehensive and long-term effort be accomplished before a determination of

acceptability can be granted. EPA's position on this comment should be specifically stated. The authorized project construction does not allow for funding and scheduling a long-term data collection program as may be envisioned in your comment.

5. b. "No baseline surveys of the ocean disposal site are presented in the Draft SEIS (p. 52) that include information on physical oceanography, sediment quality, or biological resources for any of the alternative sites. Much of this kind of information is currently being developed by the COE for the ocean site designation under Section 102 of MPRSA." The reference to the baseline survey is confusing. The objective of collecting baseline data at the site is to detect potential changes that may result in the vicinity of the disposal site as disposal occurs. The only baseline survey scheduled or funded by the Corps of Engineers to support designation of an offshore site under Section 102 is being conducted at Site 1M. Baseline surveys for alternative sites other than Site 1M are not necessary for determining site acceptability pursuant to Section 103 of MPRSA.

5. c. "The level of detail for the proposed MPRSA Section 103 site should be equivalent to the studies conducted and proposed for the MPRSA Section 102 site." Site 1M, the proposed site for receiving 2.7 million cubic yards of dredged material from the Alcatraz disposal site, was selected based on application of 40 CFR Part 228. The level of detail required for site designation in accordance with Section 102 of MPRSA may be significantly different when dealing with waste disposal in general compared to the project specific disposal of dredged material from a known source. The level of detail as presented in the the Draft SEIS and letter, dated October 20, 1987 is sufficient to determine compliance or non-compliance for dredged material disposal at Site 1M.

6. a. "If the SEIS continues to propose an ocean site designation under Section 103 of MPRSA, the COE should commit to immediately dedesignating that site once the MPRSA Section 102 site is selected and available for use." The disposal plan for the entire project must be accommodated in order that project construction can be implemented in the most efficient manner. The appropriations of funds by Congress will be based on that plan. If EPA identifies a general use ocean disposal site other than Site 1M in the future, the Corps of Engineers will consider whether or not disposal at such site is consistent with project authorization and appropriations.

6. b. "Other alternatives and dredging options should include an analysis of deeper ocean disposal sites off the continental shelf (in excess of 100 fathoms)." Based on available information, an

acceptable site can be located within the zone of siting feasibility (ZSF) bounded by the OVMRS radar net. Site 1M is one such environmentally acceptable site for disposal of dredge material. This is clearly presented in the Draft SEIS. This comment, in effect, opposes the ZSF determination based on the General Approach Guidance. A site off the continental shelf is outside of the ZSF and therefore, does not need to be included as a candidate site. The ZSF Analysis Report will be included as an Appendix to the Final SEIS. The Corps of Engineers must weigh all relevant factors, including safety, costs and environmental acceptability, in making a reasoned determination.

6. c. "Differences in cost figures should be clearly explained and substantiated. Potential mitigation costs should also be taken into account. This information is critical in deciding whether this disposal option (direct ocean, Alternative #4) is the least-damaging, practicable alternative." The estimated costs presented in the Draft GDM/SEIS have been described. Substantiation of cost information is proprietary as the Government estimate could be compromised at the time of bid preparation. The intricacies of dredging cost estimating can be discussed orally. In addition, the identification of an appropriate ocean disposal site for dredged material is based on environmental acceptability, not on the least-damaging, practicable alternative.

6. d. "An analysis of upland disposal for at least part of the dredged material if the material fails to meet the criteria for Bay or ocean disposal." If material fails to meet the criteria for ocean disposal, the material may not be disposed at the ocean site. An analysis of upland disposal for significantly contaminated material is not germane to the ocean disposal site determination.

7. "The statement 'Direct transport to Site 1M of all of the Oakland material would also be allowed at the contractor's option' (p. iv) indicates that the contractor would, in effect, manage the disposal of dredged materials." The referenced sentence will be deleted from the Final SEIS. EPA's comment 6. c. indicates a preference for direct ocean disposal. Comment 7. implies that direct ocean disposal should be dismissed. Based on the suitability of the preferred ocean disposal site, disposal of either 2.7 million cubic yards of dredged material from Alcatraz or 7.0 million cubic yards from Oakland Inner and Outer Harbors was determined to be acceptable. The only significant difference between the use of the site is the source of the dredged sediments from Oakland or Alcatraz, and the amounts from each. The direct ocean disposal (with Site 1M) has been evaluated as an implementable alternative plan. Based on our analyses, both alternative plans are environmentally acceptable. From the comments on the Draft SEIS, there also appears to be a public preference for

direct ocean disposal. As a potentially acceptable plan, the availability of Site 1M to receive dredged material from Oakland Harbor should also be concurred upon by EPA pursuant to Section 103 of MPRSA. Upon review of our requested Section 103 action, by letter, dated October 20, 1987, the alternative of direct ocean disposal of dredged material from Oakland Harbor should be included with our request.

8. "The SEIS should evaluate the potential impacts on biological resources and water quality in this time frame, including all cost/benefit analyses." This comment does not relate to the requested 103 concurrence, but will be addressed in the Final SEIS.

9. "Mitigation to offset and/or prevent adverse impacts at the dredging locations has not been presented. The SEIS should discuss the use of silt curtains and site monitoring of the water column at the dredging sites. NMFS states that 'approximately 124 acres of shallow, subtidal habitat will be converted to maintained channel habitat.' The SEIS should discuss mitigation for this impact." No mitigation measures related to the proposed disposal as described for the requested 103 concurrence have been identified. Specific site monitoring activities have also not been identified by resource agencies. Potential for mitigation related to modification of subtidal habitat will be discussed in the Final SEIS.

10. "There appear to be several discrepancies throughout the document and the GDM regarding the project's cost/benefit analyses. Mitigation costs should also be included for all alternatives. In addition, costs to Bay and ocean fishing enterprises from the potential loss of fisheries resources in the short- and long-term should be included in the SEIS." This comment does not relate to the requested 103 concurrence, but will be addressed in the Final SEIS.

11. "The economic comparison between ocean disposal sites should have included a cost comparison as well as a mileage (e.g., steaming time) comparison in the economic analysis. The SEIS should present cost figures substantiated by a detailed discussion." This comment does not relate to the requested 103 concurrence, but will be addressed in the Final SEIS. As discussed in 6. c. above, a detailed description of dredging costs is proprietary. If such information receives wide circulation, the Government estimate would be compromised at the time of bid preparation.

ATTACHMENT 1

ECOLOGICAL EVALUATION TESTING
ALCATRAZ DISPOSAL SITE

I. SAMPLES

A. Total Cores - 16 taken to proposed depth (-72 feet, MLLW)

B. Composites - 16 cores were composited into 4 samples

II. BULK SEDIMENT - CHEMICAL ANALYSES

A. Chemistry:

1. Antimony
2. Cadmium
3. Copper
4. Lead
5. Mercury
6. Nickel
7. Chlorinated pesticides
8. PCB's
9. PAH's
10. TOC

B. Grain size

III. BIOASSAYS (Reference site: Site 1M; Control: clean sand, Pacific NW)

A. Suspended Particulate Phase Bioassay

1. Bivalve larvae
2. *Acanthomysis sculpta*
3. *Citharicthys stigmaeus*

B. Solid Phase Bioassay

1. *Rhepoxynius abronius*
2. *Macoma nasuta*
3. *Nephtys caecoides*

C. Bioaccumulation

1. 10-day test on clams and worms in B. above
2. Following chemistry:
   a. Antimony
   b. Cadmium
   c. Copper
   d. Lead
   e. Mercury
   f. Nickel
   g. Chlorinated pesticide scan
   h. PCB's

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

24 NOV 1987

In Reply
Refer To: W-7

Colonel Galen H. Yanagihara
District Engineer
U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, California 94105-1905

RE: Proposed Designation of an Ocean Disposal Site Under Section 103 of the Marine Protection Research and Sanctuaries Act for the Oakland Inner and Outer Harbor Improvement Project

Dear Colonel Yanagihara:

EPA Region 9 has reviewed the Army Corps of Engineers' (Corps) public notice (October 20, 1987) on the notice of intent to use an ocean disposal site under Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA), and the Draft Supplemental Environmental Impact Statement (DSEIS) for the Oakland Inner and Outer Harbors deep-draft navigation improvement project (September 1987). In a letter dated October 20, 1987, you requested EPA concurrence on the designation of the ocean dredged material disposal site [40 CFR 225.2(d) and 40 CFR 228.4(e)(2)] identified in the public notice. Most of the information presented for EPA's evaluation is contained in the DSEIS which describes the proposed project.

At this time, EPA Region 9 cannot concur on the MPRSA Section 103 site designation proposed in the public notice. We have identified topics of major concern that have not been addressed in the DSEIS or in the public notice.

The procedures for designation of sites [40 CFR 228.4(e)(2)] require that "...the District Engineer shall, in consultation with EPA, select a site in accordance with the requirements of §§ 228.5 and 228.6(a)." The general and specific criteria of these two sections of EPA's Ocean Dumping Regulations have not been discussed adequately in the DSEIS.

Specifically, under 40 CFR 225.2(a) we request the following information:

1. Detailed description of the biological environment at the proposed disposal site;

2. Modeling information and data to predict the movement of the anticipated 31 million cubic yards of dredged material proposed for disposal at the site over the 50 year life of the project;

3. Detailed description of physical oceanographic conditions in the project area;

4. Consideration of additional alternatives, including a deep water alternative in water off the continental shelf and designation of a site under Section 102 of MPRSA;

5. Complete analysis of sediment chemistry and sediment toxicity for the material proposed for disposal compared to the proposed ocean disposal site;

6. Complete analysis of sediment chemistry and sediment toxicity for the material proposed for disposal compared to the Alcatraz disposal site; and

7. Detailed description of potential impacts to fisheries outside the Golden Gate and within San Francisco Bay.

EPA must use information presented in 40 CFR 225.2(a) and 228.4(e) to determine whether the proposed project meets the criteria for evaluating environmental impact under 40 CFR 227.4. These criteria include:

"1. No unacceptable adverse effects on human health and no significant damage to resources of the marine environment;

2. No unacceptable adverse effects on the marine ecosystem;

3. No unacceptable adverse persistent or permanent effects due to the dumping of the particular volumes or concentrations of these materials; and

4. No unacceptable adverse effect on the ocean for other uses as a result of direct environmental impact."

Given the information presented in the DSEIS and the public notice, EPA cannot determine whether disposal at the proposed site will cause unacceptable environmental impacts. EPA Region 9 will be unable to concur on the proposed site designation under Section 103 of MPRSA until adequate information has been provided.

Our detailed comments on the proposed Section 103 site designation will be incorporated into the comments on the DSEIS. If you have any questions on our concerns, please contact Patrick Cotter, at 974-0257.

Sincerely,

Harry Seraydarian

Harry Seraydarian
Director
Water Management Division

cc: Keith Quan, Port of Oakland
Roger James, RWQCB
Alan Pendleton, BCDC
Fred Nakaji, USFWS
Bob Tasto, CDFG
James Bybee, NMFS

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

16 November 1987

Environmental Branch

Mr. Harry Seraydarian, Director
Water Management Division
U. S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Dear Mr. Seraydarian,

We are writing in reply to your 5 November 1987 letter requesting a 30-day extension to the comment period for the Notice of Intent to Use Ocean Disposal Site under Section 103 of the Marine Protection, Research and Sanctuaries Act and the Draft Supplemental Environmental Impact Statement (EIS) for the Oakland Inner and Outer Harbors Deep-Draft Navigation Project.

We must respectfully deny your request for the 30-day extension to the 45-day comment period on the Draft Supplemental EIS for the Oakland Harbor project authorized by the Water Resources Development Act of 1986 (P. L. 99-662). However, we will grant an additional 15 calendar days from the end of the formal 45-day comment period beginning 9 November 1987. This would allow your comments on the Draft Supplemental EIS to be submitted no later than 25 November 1987. Our construction schedule is based on a May 1988 start. Delays to this scheduled start would be detrimental to the local sponsor's stated needs. It is our intent to be as responsive to the needs of the local sponsor as possible.

The ocean disposal site designation process assesses potential sites within an area in which practicable sites are located. This area can be constrained based on cost, operational (equipment or safety), or critical environmental factors. This site designation process must be performed before any project disposal alternative can be evaluated. We have evaluated all appropriate disposal alternatives for the Oakland Harbor project in the Draft Supplemental EIS. Your comments on the Draft Supplemental EIS will be addressed in the Final

Supplemental EIS. In response to our Notice of Intent to Use Ocean Disposal Site under Section 103 of Marine Protection, Research and Sanctuaries Act, we expect your agency to indicate our compliance, or non-compliance, with the criteria for the designation of the recommended ocean disposal site. In accordance with 40 CFR 225.2(b), your regulations clearly state that there is a 15-day period in which you can request additional information for your determination. We did not receive any request for such additional information. In addition, we are not aware of any statutory requirement for additional time to review the initial Notice.

Your letter has suggested that a meeting be held to discuss the complexities of the project. We agree that a meeting should be held to discuss your concerns and to facilitate a better understanding of the two separate actions in order that your comments on the Draft Supplemental EIS and determination of compliance can be expedited.

Sincerely,

Galen H Yanagihara

Galen H Yanagihara
Colonel, Corps of Engineers
District Engineer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

5 NOV 1987

Colonel Galen H. Yanagihara
U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105-1905

ATTN: Environmental Branch

RE: Public Notice (October 20, 1987) for the Notice of Intent to Use Ocean Disposal Site under Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) and the Draft Supplemental Environmental Impact Statement for the Oakland Inner and Outer Harbors Deep-Draft Navigation Improvement Project.

Dear Colonel Yanagihara:

The Environmental Protection Agency (EPA) Region 9 has initiated its review of the above referenced public notice (PN) and Draft Supplemental Environmental Impact Statement (DS).

As you know, EPA is required to review the PN in accordance with Section 102 of the MPRSA [40 CFR 225.2(a-e) and 227.4(a-d) of the Ocean Dumping Regulations]. In addition, Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA) require that EPA review and comment on the DS.

Based on a preliminary review of the PN and DS, EPA has several concerns about the information on sediment toxicity and chemistry at Oakland Inner and Outer Harbors and the Alcatraz Disposal Site. In addition, we have several questions regarding the PN and its relationship to the disposal options included in the DS. We are concerned about proceeding with a site designation under Section 103 of the MPRSA before all practicable disposal alternatives are fully analyzed and considered as required by NEPA.

At this time, EPA cannot accurately judge the disposal options' environmental impacts and their consistency with site selection criteria in the MPRSA and the Ocean Dumping Regulations. We believe it would be premature to proceed with a site designation under Section 103 before we receive further information on the project's sediment testing program and the DS's disposal options.

EPA is interested in making a well-informed decision on the proposed action's environmental impact and consistency with the MPRSA criteria and the Ocean Dumping Regulations (40 CFR 227.4). Accordingly, we request a four-week extension of the comment period (to December 7, 1987) for the DS and the PN to allow for a more thorough review of the disposal options and supporting data. We would like to meet with you and/or your staff to discuss these issues and the timeframe for proceeding with our review of the DS and the subsequent determination of consistency with the site selection criteria. If you have any questions regarding our request, please call me at 974-8115, or ask your staff to call Rick Hoffmann, Office of Federal Activities, at 974-8191.

Sincerely,

Harry Seraydarian

Harry Seraydarian
Director
Water Management Division

cc: San Francisco Bay Regional Water Quality Control Board (Attn: Mike Carlin)
U.S. Fish and Wildlife Service-Sacramento (Attn: Fred Nakaji)
National Marine Fisheries Service (Attn: James Bybee)
Bay Conservation and Development Commission (Attn: Joan Lundstrom)

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905
October 20, 1987

Environmental Branch

NOTICE OF PUBLIC MEETING

OAKLAND OUTER AND INNER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA
AND
INTENT TO USE AN OCEAN DISPOSAL SITE

The U. S. Army Corps of Engineers, San Francisco District has distributed the Draft Design Memorandum Number 1 and Draft Supplement 1 to the Environmental Impact Statement (SEIS) for Oakland Outer and Inner Harbors, Deep-Draft Navigation Improvements, Alameda County, California. A Notice of Availability of the Draft SEIS was circulated by letter dated September 23, 1987.

Attached with this Notice is a statement of the U. S. Army Corps of Engineers, San Francisco District intent to use an ocean disposal site for the disposal of material dredged from the Alcatraz disposal site, San Francisco Bay as part of the Deep-Draft Navigation Improvements for Oakland Outer and Inner Harbors, Alameda County, California (Enclosure).

It has been determined that a public meeting to address concerns related to the Draft SEIS for the Oakland Harbor project and the intent to use an ocean disposal site for dredged material will be held. The public meeting has been scheduled as follows:

PUBLIC MEETING

DATE: Thursday, November 5, 1987 -- 7:30 P.M.

PLACE: U. S. Army Corps of Engineers, Bay Model

LOCATION: 2100 Bridgeway
Sausalito, California 94965-1753

Information related to either the Draft SEIS or the Intent to Use the Ocean Disposal Site may be obtained by contacting Mr. Brian Walls (415) 974-0444 of the Corps of Engineers.

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

US Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Public Notice

DATE: October 20, 7

NOTICE OF INTENT TO USE OCEAN DISPOSAL SITE
(Section 103, Marine Protection, Research and Sanctuaries Act)

OAKLAND OUTER AND INNER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS

INTRODUCTION

This notice supplements the Public Notice of Availability of the Draft Supplement (SEIS) to the Final Environmental Impact Statements for the Oakland Outer and Oakland Inner Harbor Deep-Draft Navigation Channel Improvements, dated 25 September 1987. The San Francisco District Engineer, under the authority contained in Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 is pursuing use of an ocean disposal site (ODS) offshore of San Francisco, California for the disposal of dredged material from the Alcatraz disposal site in San Francisco Bay related to authorized new work and maintenance dredging of the Oakland Harbor deep-draft navigation channels (from an authorized -35 feet to -42 feet, MLLW). In accordance with 33 CFR Part 209.145(g), this supplemental notice announces the intended use of the ODS identified in the Draft SEIS.

WORK: Disposal of Dredged Material from the Alcatraz Disposal Site related to New Work Deepening and Maintenance Dredging of the Oakland Harbor Project as Authorized by P. L. 99-662, Water Resources Development Act of 1986.

WATERWAY: San Francisco Bay, California and Oakland Outer and Inner Harbor Channels, Alameda County, California

PROJECT LOCATION: Oakland Harbor, San Francisco Bay, California and Offshore San Francisco, Pacific Ocean

Statement on the Status of State Water Quality Certification Under Section 401 of the Clean Water Act

The District Engineer has determined that a State water quality certificate (Section 401 of the Clean Water Act) will not be required for the disposal of dredged material from the Alcatraz disposal site, as described in this notice, since the ODS is outside the limits of State jurisdiction.

Statement on Cultural Resources

Based on review of the most recent published National Register of Historic Places, there are no known sites eligible for or included in the Register within the ODS. Wrecks are known to exist in the vicinity of the ODS but disposal of dredged material would not adversely disturb or otherwise impact marine archaeological resources in the area.

Statement on Endangered Species

Pursuant to Section 7 of the Endangered Species Act (16 U. S. C. 1531) and based on review of the threatened and endangered species listing, a determination of no effect has been made (Draft SEIS).

Statement on the Determination of the Need for and/or Availability of an Environmental Impact Statement

The Draft SEIS was filed with EPA on 25 September 1987 (52 FR 36096) and was distributed to Federal and State agencies, local officials, private interest groups, and other interested parties. A copy of this document may be obtained from the U. S. Army Engineer District, San Francisco, 211 Main Street, San Francisco, California 94105-1905.

The decision whether to use the ODS for dumping of new work and maintenance material from the Alcatraz disposal site will be based on an evaluation of the probable impact including cumulative impacts of the activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which may reasonably be expected accrue from the activity must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the activity will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

The following additional information is furnishing in accordance with Corps of Engineers regulations 33 CFR 209.145(g) and 33 CFR 337.1(a):

1. Description of the Action: The U. S. Army Corps of Engineers proposes disposal of 2.7 million cubic yards of material to be dredged from the designated, San Francisco Bay disposal site located south of Alcatraz Island at an ocean disposal site approximately 16 nautical miles southwest of the Golden Gate Bridge. The removal of material from the Alcatraz site would allow the disposal of 7 million cubic yards from the authorized Oakland Harbor project as well as the expected retention of material at the Alcatraz site. Six and one-half million cubic yards of bottom sediments would be dredged from the Oakland harbor navigation channels and dumped at the Alcatraz disposal site (See the Draft SEIS, sections 2.2 and 2.3 for descriptions of the Oakland Outer and Inner Harbor reaches respectively). An additional 0.5 million cubic yards of material will be dredged from the berthing areas by the Port of Oakland who is the local sponsor. The Oakland channel deepening was approved for construction by the Water Resources Development Act of 1986. A Draft SEIS for the Oakland Harbor project has been prepared because mounding has been detected at the the selected Alcatraz disposal site. Disposal at the Alcatraz site for the Oakland project would result in excessive accumulation of material at the site affecting disposal of dredged material from other navigation and maintenance projects. Thus, prior to the Oakland dredged material disposal, 2.7 million cubic yards of sediment at the Alcatraz site will be dredged and taken to the open ocean for disposal (See the Draft SEIS, section 2.9 - Selected Disposal Plan).

2. Description of Disposal Area: The proposed ocean disposal site is referred to as Site I M in the supplemental environmental impact statement (See the Draft SEIS, section 2.5.2. for a description of the proposed Ocean Disposal Site). It is located 15.6 nautical miles southwest of the Golden Gate Bridge at a depth greater than 150 feet. The center of the site is located at coordinates 37° 38' 42" N; 122° 42' 16" W (1927 datum). The site bottom is comprised of unconsolidated sediment and slopes gently to the southwest. The proposed site has not been designated for use by the Administrator of EPA as provided by Section 102(c) of the Marine Protection, Research and Sanctuaries Act of 1972. A previously interim designated 100-fathom ocean disposal site is located within the Gulf of the Farallons Marine Sanctuary and was removed from the interim list in February 1983. There is no designated ocean disposal site for the region and one is not likely to be designated prior to the scheduled project start; therefore, the Corps has selected this site for use under Section 103 of the Marine Protection, Research and Sanctuaries Act. The site has been evaluated pursuant to the general and specific criteria for site selection (40 CFR 228.5 and 40 CFR 228.6). Details of the evaluation and selection process are contained in the SEIS which has been circulated for public review and comment. The site has no known historic use for dredged material disposal. The disposal of material at the ocean disposal site will occur between the months of April and November. Thereafter, annual maintenance dredging of the Oakland channels will result in Alcatraz material being taken to the ocean disposal site for a period of two to eight weeks per year.

3. Description of Dredged Material: The dredged material is comprised primarily of clays and fine sands. Prior to disposal at Alcatraz sediment from the navigation channels in San Francisco Bay had been tested for contaminants. Sediment exceeding the San Francisco Bay water quality guidelines would not be allowed to be disposed there. Preliminary testing of the Alcatraz material (in 1985 and 1987) indicated that it is environmentally acceptable for disposal at the ocean site. Based on the disposal activities at the Alcatraz site and the potential sources of pollution, the proposed dredged material has not been found to contain any of the materials prohibited under 40 CFR 227.5 in greater than trace amounts. However, additional water quality testing will be performed prior to start of construction and results will be coordinated with the Regional Water Quality Control Board and the Environmental Protection Agency. A discussion of water and sediment quality and the results of bioassays and bioaccumulation tests is included in the Appendix A of the Draft SEIS.

4. General Compatibility of the Material with the Disposal Site. The disposal of approximately 2.7 million c. y. of material at the proposed ocean site, Site 1 M, would not seriously reduce amenities or create hazards to fishing, navigation, shorelines, or beaches. Although mounding is expected, the material is predominantly fine sand and consolidated fine-grained sediments. Deposition is expected to occur upon dumping. Although benthic organisms will recolonize after cessation of disposal operations, long term effects are expected with alteration of bottom substrate and the establishment of bottom communities associated with the fine-grained substrate.

5. Need for Ocean Disposal. The proposed alternative for disposal of dredged material from the Alcatraz site is necessary for the completion of the authorized Oakland Harbor project. Material at the Alcatraz disposal site has been accumulating from numerous disposal activities, including both maintenance and new work dredging projects. The material retention at the Alcatraz site could affect continuing disposal there. The deposition of 7 million cubic yards from the Oakland project is expected to result in accumulation of approximately 2.7 million cubic yards of material. The retention of 2.7 million cubic yards of material at the Alcatraz site would physically aggravate site conditions at Alcatraz, making annual disposal at the Alcatraz site difficult as depths at the site diminish. Removal of material from the Alcatraz site would allow the construction of the Oakland project to proceed as authorized. Because of the expected commercial shipping need for this project, dredging must proceed in a timely manner.

6. Effects of Prohibition of Ocean Disposal. Disposal at Site 1 M is proposed due to reasons stated in paragraph 5 above. If disposal at Site 1 M is prohibited, dredging of the authorized project could not take place without adversely affecting the Alcatraz disposal site. In the event that

this would occur, the inability to maintain San Francisco navigation channels, small boat marinas, and other small projects would result in severe economic hardship. This would adversely affect competitive regional maritime trade. Should the dredging be halted, shoaling of the channel would prevent efficient ship movement and loss of revenue would occur at the commercial port facilities.

7. Environmental Impacts of Ocean Disposal.

a. Esthetics. The disposal of the proposed dredged material at Site 1 M would not result in an unacceptable esthetic nuisance. This is because the dredged material is much denser than sea water and will fall to the bottom upon disposal within the site; no visible turbid surface plume should last for more than a few minutes.

b. Recreational Resources. Although the area adjacent to and including Site 1 M is used for recreation (e.g. sailing and sport fishing), disposal at Site 1 M is not expected to have a long term impact on recreational values. There would be a minor temporary disturbance to recreation during disposal. Boats will have to avoid the disposal barges and the catch success of sport fishing will be affected during disposal. These effects will be limited to the immediate vicinity of the disposal area because the material is expected to settle rapidly. No change in economic values are expected because no long term effects to esthetics or sport fishing are expected.

c. Commercial Marine Resources. Disposal at Site 1 M is not expected to have a long term impact on commercial marine resources (e.g. bottomfish, dungeness crab, salmon) of nearby coastal areas, open ocean areas, or estuarine areas. This is because the proposed dredged material has been found acceptable for ocean disposal and is expected to settle rapidly. In addition, Site 1 M is greater than 150 feet deep. Therefore, the only long term impact expected is the modification of bottom substrate and associated benthic organisms. Long term changes are expected because a different community of benthic organisms will recolonize the newly deposited substrate after cessation of disposal activities.

d. Navigation. Commercial or recreational navigation will not be affected by disposal at Site 1 M since the site is located outside of both the precautionary area and the submarine operating area. In addition, although mounding of material is expected to occur, use of the site is within the normal flow of incoming and outgoing vessel movements.

e. Mineral Resources. There is no known development of mineral resources in the area including and immediately adjacent to Site 1 M. There are no adverse impacts on existing uses. However, initial coordination with the Minerals Management Service, U. S. Department of the Interior indicated that the proposed ODS is within a lease sale block with exploration potential. The use of the disposal site may affect future lease sale, exploration and potential use for oil extraction at this location of the block area.

f. Cultural Resources. Based on a record and literature search, there are no recorded cultural resources in the area including and adjacent to Site 1 M.

g. Water Quality. Based on preliminary evaluation of test data, no water quality standards would be exceeded as a result of disposal at Site 1 M. Hence, no unacceptable environmental effect would occur. Material is not expected to contain elevated concentrations of contaminants that can be released to the water column. In addition, elutriate tests conducted by the Corps of Engineers on dredged material from the Alcatraz disposal site indicates that low concentrations of pollutants are present and are tightly associated with the sediments. Thus, contaminants are not likely to be released to the water column during disposal. Furthermore, there is a large volume of water available at Site 1 M to rapidly dilute any pollutant concentration in the water column.

Chemical testing and the physical nature of the dredged material indicate that there are no pollutants present in other than trace amounts which may have an adverse affect on humans directly or through food chain interactions. It is unlikely that pathogenic organisms which may cause a public health hazard either directly or through contamination of fisheries or shellfisheries are present in the proposed dredged material.

8. Determination and Finding. The District Engineer has reviewed the environmental documents for the authorized dredging of the Oakland Harbor project, and the Section 103 Ocean Disposal Evaluation Report. He has found that:

a. The proposed transportation of this dredged material for the purpose of disposing in ocean waters at Site 1 M is not expected to unreasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological system, or economic potentialities.

b. No practicable alternative locations and methods of disposal or recycling are available which would have less adverse environmental impact or potential risk to the environment than ocean disposal at Site 1 M.

c. Prohibition of the use of Site 1 M for disposal of the material dredged from the Alcatraz disposal site would adversely affect authorized navigation projects, the economic and industrial development of the region, and foreign and domestic commerce along the West Coast of the United States, as well as indirectly affecting the national security of the United States.

d. Further water quality testing of the material to be removed from the Alcatraz disposal site will be performed. Data analysis and evaluation will be presented in the Final SEIS.

10. The proposed transportation of this dredged material for the purpose of dumping it in ocean waters will be evaluated to determine that the proposed dumping will not unreasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological system, or economic potentialities. In making this determination, the criteria established by the Administrator, EPA pursuant to Section 102(a) of the Marine Protection, Research, and Sanctuaries Act of 1972 shall be applied. In addition based upon an evaluation of the potential effect which the failure to utilize this ocean disposal site will have on navigation, economic and industrial development, and foreign and domestic commerce of the United States, an independent determination will also be made of the need to dump this dredged material in ocean waters, other possible methods of disposal, and appropriate locations for the dumping.

11. Please communicate the information herein to any person(s) known by you to be interested and who did not receive a copy of this notice. Comments on the proposed ocean disposal should be made in writing and mailed to the letterhead address (as found on the front page) and should be received within 15 days from the date of this notice. If you have any questions concerning this notice, please contact Mr. Brian Walls of my staff at (415) 974-0444).

Galen H. Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

17 AUG 1987

In Reply
Refer To: W-5-3

William C. Angeloni, Chief
Planning/Engineering Division
Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, California 94105

Re: Suitability of an Alternative Ocean Disposal Site near the San Francisco Southwest Ocean Outfall Project (SWOOP)

Dear Mr. Angeloni:

Thank you for your letter dated June 24, 1987 regarding the identification of an additional alternative ocean disposal site to be considered in the Gulf of the Farallones Ocean Dredged Material Disposal Site (ODMDS) Environmental Impact Statement (EIS). Inclusion of an alternative ODMDS in the site designation EIS close to the San Francisco SWOOP site is not recommended by EPA Region 9, nor do we recommend that the San Francisco District evaluate an alternative site between the shipping lanes south of the Golden Gate.

The City of San Francisco has applied for a Section 301(h) permit under the Clean Water Act. If such a permit is granted, they must be able to monitor the discharge area accurately to determine compliance with permit conditions and to assess receiving water impacts due to their discharge. Disposal of approximately 50 million yd^3 of dredged materials at the ODMDS site which may be located near the Southwest Ocean Outfall, may significantly interfere with the efforts by Region 9 and the City of San Francisco to accurately monitor potential environmental impacts related to the outfall. In addition, the cumulative effect of the SWOOP project and an ODMDS on biological resources in the nearshore environment can not be predicted accurately at this time. Therefore, Region 9 recommends that the San Francisco District delete this alternative from the list of potential ODMDSs for the Gulf of the Farallones EIS.

EPA Region 9 also recommends that a site located between the shipping lanes south of the Golden Gate be deleted because disposal of over 50 million yd^3 of dredged material may cause mounding, and disposal operations near the traffic lanes may increase the possibility of ship collisions. Region 9 is also concerned that biological resources in the nearshore environment may be affected by designation of an ODMDS in this area.

If you have any further questions on Region 9's recommendations or concerns on these new potential ODMDS alternatives, please contact Patrick Cotter at 974-0257.

Sincerely,

Loretta Barsamian

Loretta Barsamian, Chief
Wetlands, Oceans and Estuaries Branch

CALIFORNIA COASTAL COMMISSION

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN Governor

CALIFORNIA COASTAL COMMISSION
531 HOWARD STREET, 4TH FLOOR
SAN FRANCISCO, CA 94105
(415) 543-8555

October 7, 1987

Colonel Galen H. Yanagihara
Department of the Army
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

RE: CD-49-87, Proposed deepening of Oakland Harbor channels, Alameda County

Dear Colonel Yanagihara:

The Coastal Commission staff has received the material you submitted concerning the above referenced project. The Commission staff concurs with the Corps of Engineers conclusion that the proposed project will not have a direct affect land and water uses within the California Coastal Commission's jurisdiction. Thus pursuant to Section 930.35 (d)(3) of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency regulations no consistency review from the Coastal Commission is required. However, the project could impact resources within the jurisdiction of the San Francisco Bay Conservation and Development Commission, and require consistency review from that agency.

Sincerely,

Peter Douglas
Executive Director

cc. Central Coast District
NOAA
OCRM
Governor's Washington, D.C. Office
Department of Water Resources
BCDC

PD/JRR
0109p

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

September 23, 1987

Environmental Branch

Mr. Peter Douglas, Executive Director
California Coastal Commission
631 Howard Street
San Francisco, California 94105

Dear Mr. Douglas:

The Draft Design Memorandum Number 1 for the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvement Project, including the Draft Supplement I to the environmental impact statement (enclosed), was submitted to the State Clearinghouse for distribution to concerned State agencies for 45-day review and comment on September 23, 1987. The Coastal Commission should receive a copy of this document through the Clearinghouse. The project will deepen the Oakland Harbor channels. Disposal of the Oakland dredged material will occur at the Alcatraz disposal site following preparation of the disposal site by pre-dredging. Dredged material from the Alcatraz site will be disposed at an ocean disposal site located approximately 16 nautical miles from the Golden Gate Bridge.

Pursuant to Section 930.35(d)(3) of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations (15 CFR 930) the Corps of Engineers, San Francisco District has determined that the project will not affect the coastal zone since the dredged material disposal will occur at an ocean site which is in a non-dispersive, deep-water area well beyond the three-mile boundary of state waters. Preparation of a determination of consistency with the California Coastal Plan of 1976 is not required; however, the policies of the San Francisco Bay Plan do apply to this project and coordination with the Bay Conservation and Development Commission has been initiated.

Questions regarding this project or the negative determination should be directed to Ms. Patricia Duff, Environmental Branch (415/974-0441 or FTS/454-0441).

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

CALIFORNIA STATE DEPARTMENT OF PARKS AND RECREATION

HISTORIC PRESERVATION OFFICE

State of California – The Resources Agency
OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. Box 2390
Sacramento, CA 95811
(916) 445-8006

Date: [illegible] ober 198[illegible]

Project No.: COE [illegible]A

TITLE: OAKLAND HARBORS DEEP DRAFT NAVIGATION IMPROVEMENT

The item cited above was received in this office on [illegible] October 1987.
Thank you for consulting us pursuant to 36 CFR 800.

We concur in your determination that this undertaking:

☐ does not involve National Register or eligible properties.
☒ will not affect National Register or eligible properties.

The provisions of 36 CFR 800.7 apply if previously unidentified National Register or eligible resources are discovered during construction.

Contact [illegible] of our staff if you have any questions.

[illegible]

Kathryn [illegible]
State Historic Preservation Officer

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

October 2, 1987

Environmental Branch

Ms. Kathryn Gualtieri
State Historic Preservation Officer
Department of Parks and Recreation,
Office of Historic Preservation
P.O. Box 942896
Sacramento, California 94296-0001

Dear Ms. Gaultieri:

The enclosed draft General Design Memorandum Number 1 and Supplement to the Environmental Impact Statement (SEIS) for the Oakland Harbors deep-draft navigation improvement project is provided for your review and comment. The project was authorized for construction by the Water Resources Development Act of 1986 (P.L. 99-662). Changes in the condition of the selected in-Bay dredge material disposal site have resulted in preparation of the SEIS. The U.S. Army Corps of Engineers, San Francisco District now proposes taking dredged material to an ocean disposal site located approximately 16 nautical miles from the Golden Gate Bridge.

Pursuant to Section 106 of the National Historic Preservation Act and regulations found at 36 CFR 800, the Corps has determined that the project is not likely to affect significant historic resources because the selected ocean disposal site is outside the area considered sensitive for the presence of shipwrecks, the most likely historic resource in the marine environment. Additionally, unusual anomalies indicative of shipwrecks have not been detected by bathymetric surveys, which were conducted for the purpose of determining the geomorphic configuration of the ocean floor in the area of the selected ocean disposal site.

Pursuant to 36 CFR 800.5(b) we request your concurrence with our determination of no effect within 15 days from receipt of this letter. Questions regarding this project should be directed to Patricia Duff of our Environmental Branch, 415/974-0441 or FTS-454-0441.

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

Copy Furnished:
Mr. Christian Gerike, Northwest Information Center, Department of Anthropology, Sonoma State University, Rohnert Park, CA 94928

CALIFORNIA STATE LANDS COMMISSION

State of California

State Lands Commission

Memorandum

To : San Francisco Bay Conservation and
Development Commission
Thirty Van Ness Avenue, Suite 2011
San Francisco CA 94102-6080

Date : February 17, 1988

File No. : SD 87-10-07

From : **STATE LANDS COMMISSION**
1807 - 13th Street, Sacramento 95814

Subject : Consistency Determination No. CN 12-87

This is in response to your letter dated February 4, 1988 regarding the U. S. Army Corps of Engineers dredging project in the Oakland Outer and Inner Harbor which is discussed in BCDC Consistency Determination No. 12-87 that is tentatively scheduled to be heard by you on March 3, 1988.

As you are aware the Corps of Engineers was notified by letter dated November 2, 1987 that portions of the project will involve mineral reserve lands under the jurisdiction of the State Lands Commission. A letter of response from the Corps and subsequent discussions with Corps staff has brought to our attention that the Corps believes that because the express purpose of the project is the improvement of navigation authorized by Congress as an exercise of its dominant right under the commerce clause of the Constitution known as navigational servitude it is exempt from state permitting. Therefore, it is implied that a permit from the State Lands Commission is not required for the subject project because the right of navigational servitude applies to all navigable waters regardless of the ownership of the underlying lands or minerals.

There is, however, a portion of the project consisting of dredging 500,000 cubic yards of material that is being entirely funded by the Port of Oakland because it is for the primary purpose of improving berthing at the Port. Staff of the State Lands Commission believes this portion of the project requires Commission authorization by issuance of a Dredging Permit to the Port of Oakland. The Port has been advised by letter dated February 17, 1988 that a dredging permit is required.

Regarding the disposal site, we would like to take this opportunity to emphasize that the State Lands Commission is concerned with the potential for sloughing off of material from the Alcatraz Disposal Site onto lands the Commission has leased for mineral extraction purposes. Staff believes any alternative disposal sites that may be feasible for disposal of material in conjunction with this project should be analyzed and considered prior to a final decision being made to dispose at the Alcatraz site.

Thank you for the opportunity to comment.

LINDA MARTINEZ
Dredging Coordinator

cc: Port of Oakland
66 Jack London Square
Oakland CA 94607

Roger Golden
U. S. Army Corps of Engineers
211 Main Street, Room 913
San Francisco CA 94105-1905

STATE OF CALIFORNIA—STATE LANDS COMMISSION GEORGE DEUKMEJIAN *Governor*

STATE LANDS COMMISSION
1807 13TH STREET
SACRAMENTO, CALIFORNIA 95814

February 17, 1988

File Ref.: SD 87-10-07

Port of Oakland
66 Jack London Square
Oakland CA 94607

Gentlemen:

The staff of the State Lands Commission has received notice of the San Francisco Bay Conservation and Development Commission's Consistency Determination No. CN12-87 regarding the dredging project in the Oakland Outer and Inner Harbor which is being co-sponsored by you and the U. S. Army Corps of Engineers.

After reviewing the project description, staff has found that the portion of the project requiring the dredging of 500,000 cubic yards of material for the primary purpose of improving berthing at the Port that is being entirely funded by you is subject to authorization by the State Lands Commission.

Therefore, you will need to secure a dredging permit from the State Lands Commission for the use of the State-owned mineral reserve lands involved.

Enclosed is information relative to the Commission's application requirements. Should you require additional information or assistance in preparing the application, please contact me at (916) 322-6375.

Your early response and cooperation in this matter will be appreciated.

Sincerely,

LINDA MARTINEZ
Dredging Coordinator

Enc.

cc: Roger Golden
U. S. Army Corps of Engineers

S. F. BCDC

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

December [illegible], [illegible]

Environmental Branch

Ms. Linda Martinez
State Lands Commission
1807 13th Street
Sacramento, California 95814

Dear Ms. Martinez:

This is in response to your letter dated November 2, 1987 concerning our Oakland Harbors project (Your file reference: SD 87-10-07). Your letter stated that portions of the proposed dredging would involve State land and that the project would require a dredging permit from the State Lands Commission.

Congress authorized deepening the Oakland Harbors by the Water Resources Development Act of 1986 for the express purpose of improving navigation.

In doing so, Congress exercised its dominant right under the Commerce Clause of the Constitution to make reasonable improvements in navigation without the need to apply for state permits. This right is known as the navigation servitude and it attaches to all navigable waters regardless of the ownership of the underlying lands or minerals. See, Hancock V. Train, 426 U.S. 167(1976), and EPA V. State Water Resources Control Board, 426 U.S. 200 (1976).

The Corps of Engineers is required by its own regulations (33 CFR 230) to provide information about the project and its impacts to the State of California for review and comment. Copies of the supplemental environmental impact statement on the Oakland Harbor deepening were sent to the State Resources Agency as well as to the California Department of Fish and Game, Regional Water Quality Control Board, State Historic Preservation Officer, and your office for review and comment. The expiration of this comment period was November 9, 1987. We will also submit request for a Consistency Determination on the proposed project to the San Francisco Bay Conservation and Development Commission.

We welcome and respect the advice of the State Lands Commission and other interested State agencies, but we decline to apply for a permit from the Commission.

Questions regarding the legal aspects of this matter may be directed to Mr. John Eft of our Office of Counsel, (415)974-0365. Other questions may be directed to Ms. Patricia Duff of our Environmental Branch, (415)974-0441.

Jay K. Soper
Executive Engineer

STATE OF CALIFORNIA—STATE LANDS COMMISSION

GEORGE DEUKMEJIAN, *Governor*

STATE LANDS COMMISSION
1807 13TH STREET
SACRAMENTO, CALIFORNIA 95814

November 2, 1987

File Ref.: SD 87-10-07

U. S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco CA 94105-1905

Gentlemen:

The staff of the State Lands Commission has received your draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Draft Design Memorandum No. 1 and Supplement to the Environmental Impact Statement, Alameda County and has found that portions of the proposed dredging described therein will involve State land for which no permit has been issued.

This is to advise that you will need to secure a dredging permit from the State Lands Commission for the use of the state-owned mineral reserve lands involved

Enclosed is information relative to the Commission's application requirements. Should you require additional information or assistance in preparing the application, please contact me at (916) 322-6375.

Your early response and cooperation in this matter will be appreciated.

Sincerely,

Linda Martinez

LINDA MARTINEZ
Dredging Coordinator

Enc.

cc: Port of Oakland
66 Jack London Square
Oakland CA 94607

REGIONAL WATER QUALITY CONTROL BOARD

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

3 March 1988

Environmental Branch

Mr. Roger B. James
Executive Officer
California Regional Water
Quality Control Board
San Francisco Bay Region
1111 Jackson Street, RM 6040
Oakland, CA 94607

Dear Mr. James:

This is concerning the Corps of Engineers proposed navigational improvements for the Oakland Inner and Outer Harbors. You currently have this item on the Meeting Agenda for your March 16, 1988, Board meeting.

All the necessary analysis and report preparation has not been completed and we, therefore, request that this item be "continued" until your next scheduled Board meeting on April 20, 1988.

Your cooperation in this matter is very much appreciated. I hope that this rescheduling will not cause you any inconvenience.

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

March 3, 1988
File No. 2199.9237(TCW)tmh

Mr. William C. Angeloni, Chief
Planning/Engineering Division
Department of the Army
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105-1905

Dear Mr. Angeloni:

Subject: Groundwater Monitoring Program for Monitoring the Impact of the Oakland Inner and Outer Harbors Navigational Improvement Project

The staffs of San Francisco Bay Regional Water Quality Board and Alameda County Public Works Agency have reviewed your proposed groundwater monitoring program for Oakland Harbors Improvement Project, which was transmitted to us February 1, 1988.

We find the proposed program adequate and acceptable. However we would like to make one suggestion: the cable-tool method for drilling be used in well drilling rather than the rotary mud drilling method because the cable-tool method would provide a better definition of soil type.

We request that the monitoring program be initiated as soon as possible and be continued for at least three years. Alameda County Public Works Agency has indicated that they will probably take over the monitoring function after the three years.

We also request that you file quarterly and annual reports with us. Quarterly reports shall be filed within 45 days of the completion of sampling and analysis of each quarter. The first quarterly report shall contain a description and discussion of regional and site geology/hydrology, methods and procedures used in installing, developing and sampling monitoring wells, and methods and procedure used in water analyses as well as the analytical results obtained. Subsequent quarterly reports can be less elaborate and shall present only the procedures and results of groundwater sampling and analysis and groundwater flow pattern. Annual reports shall summerize past four quarters' results and present a discussion and assessment of dredging project's impact on the area's groundwater if appropriate. They should also propose modifications to the monitoring program if the results of monitoring program indicate some modifications is desirable.

Thank you for your cooperation in implementing a groundwater monitoring program. If you have any questions, please call Dr. Teng-chung Wu of my staff at (415) 464-0899.

Sincerely,

Lawrence P. Kolb
for
ROGER B. JAMES
Executive Officer

cc: John R. Monser, Alameda County
Carl Hauge, DWR-Central District
Clyde A. Morns, EPA-Region 9
W. E. Vandenberg, Port of Oakland

February 1, 1988

Plan Formulation Branch

Dr. Teng-Chung Wu
Chief, Municipal Division
California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, California 94607

Dear Dr. Wu:

Enclosed for your review is a copy of our proposed plan for monitoring the Merritt/Posey and Alameda Aquifers during construction of the Oakland Harbor Project. This is in response to our meeting with you and the Alameda County Flood Control and Water Conservation District. The plan attempts to provide the maximum amount of data within the funds available by making use of data generated by the Navy and their monitoring plan and constraining the monitoring program to available property on which the wells can be located.

Implementation will commence upon your concurrence with the plan submitted. Your early review and comments will be appreciated. If you have any questions, or would like to reconvene to discuss the plan, please call either Ken Harrington (405-974-0309) or Dennis Thuet (415-974-0379).

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

Enclosure

CF: Proj. Files (Oakland Harbor w/o encl)
CESPN-PE rdg
CESPN-PE-D (Harrington)
CESPN-PE-R (Duff w/encl)
CESPN-PE-P (Thuet w/encl)

U.S. ARMY CORPS OF ENGINEERS, SAN FRANCISCO DISTRICT

Proposed Oakland Groundwater Monitoring Plan
January 1988

The proposed groundwater monitoring plan has been developed based upon a meeting held between the San Francisco Bay Regional Water Quality Control Board (RWQCB), Alameda County Flood Control and Water Conservation District, Port of Oakland, and the San Francisco District of the U.S. Army Corps of Engineers on 05 January 1988. As a result of that meeting, the Corps of Engineers agreed to consider two possible alternative monitoring programs.

Alternative 1 would consist of installing one well cluster comprised of two wells in the Merritt/Posey Aquifer on the north side of the Oakland Inner Harbor, the monitoring of an old PG&E deep well, State Well No. 1S/4W34R1, and the Corps of Engineers trying to gain access to the old Pan Am deep well, State Well No. 2S/4W5A1, on the Alameda Naval Air Station.

Alternative 2 would consist of drilling a 150-foot well that would penetrate into the Alameda formation near the location of the deep PG&E well, 1S/4W34R1, and installing a well cluster comprised of two wells in the Merritt/Posey Aquifer as well as an attempt to sample and monitor the old Pan Am deep well on the Alameda Naval Air Station.

Alternative 1 has been rejected due to the following circumstances.

a. The old PG&E well, 1S/4W34R1, has not been found. The site of its location, given by a well data sheet of the State of California Department of Water Resources, is currently being regraded by the Port of Oakland for a paved parking area. The ground surface has been scraped and filled. If any metal casing pipe or protective covering existed prior to the regrading they are no longer to be found. According to Mr. William E. Vandenberg of the Port of Oakland, no evidence of any water well was found during the construction activities related to the site grading. Therefore the well can not be monitored. The Alameda County Flood Control and Water Conservation District (ACFCWCD) has as of this time been unsuccessful in securing a boring log of the well from PG&E.

b. The Corps of Engineers has been unable to locate the specific well casing attributed to the Pan Am well. A representative of the Environmental Office of the U.S. Navy's Alameda Naval Air Station was able to show to a representative of the Corps of Engineers the approximate location but was unable to point to its specific location.

Therefore alternative 1 is not considered to be feasible.

Alternative 2 is being pursued. A tentative site currently under consideration by the Port of Oakland and the Corps of Engineers is along the southern edge of the Port of Oakland's yard facilities between Bush and Market Streets and just north of the Embarcadero. This site is being considered for a 150-foot well penetrating into the Alameda formation, and a well cluster in the Merritt Sand consisting of two wells. The Port of Oakland is continuing to evaluate its property holdings for potential well sites farther away from the Inner Harbor channel.

The U.S. Army Corps of Engineers will apply for the necessary permits from the ACFCWCB for the wells to be drilled. The sampling of the wells will be contracted out as will be the drilling of the wells. The wells will be drilled using rotary mud drilling method. Revert will be used in place of bentonite drilling mud. The 150-foot well is planned to consist of 20 feet of 4-inch diameter PVC well screen, sand packed in a 10-inch diameter hole to two feet above the screen with appropriately graded sand. The boring will be logged by an experienced geologist using the unified soil classification system. A 2-foot bentonite seal will cap the sand pack. Four-inch blank PVC pipe, schedule 40, will extend to the ground surface, and the annulus of the well will be grouted with a cement-bentonite grout to prevent the downward infiltration of water from the Merritt/Posey Aquifer. The top of the PVC pipe or well casing will be protected with a section of 6-inch metal casing and a Christy Box. The well shall have a vented protective cap to prevent foreign objects from entering. The top of the casing will be surveyed to MLLW datum.

The two wells of the well cluster will be constructed in similar manner except that the holes will be 50 feet and 30 feet in depth respectively. Each well shall contain a 5-foot length of 4-inch diameter PVC well screen in a 10-inch diameter well boring. A sand pack will be placed around the well screen to 2 feet above the screen. The sand will be appropriately graded for the slot size of the screen used. A two-foot bentonite seal will cap the sand pack. Blank 4-inch diameter PVC pipe will extend to the ground surface, and the annulus of the well will be grouted with a cement-bentonite grout for a sanitary seals. The wells will be completed in the same manner as the 150-foot well. The location of the two well screens will permit sampling the water in the Merritt Sand near the bottom and near the middle of a vertical section of the Merritt Sand.

The wells will be developed by bailing and surging. The wells will be bailed until the water from the wells appears to be relatively clear. After sufficient time to recover, the water level and temperature of each well will be measured and recorded.

The groundwater from each well shall be sampled and tested for chloride ion concentration and total dissolved solids. The water level, temperature, pH, and specific conductance will also be measured at time of sampling. The wells shall be sampled every other month unless significant changes in the measurements appear to be occuring, then sampling shall take place monthly. Should changes appear to be insignificant or not at all, then monitoring may be reduced to once a quarter (once every three months). Prior to sampling each well, all equipment will be decontaminated. An anionic detergent in water solution will be used to wash the equipment. The equipment will then be rinsed with tap water. Prior to purging the water from the wells, in order to obtain a representative sample, the depth to water will be measured. After the wells have been purged of at least three well volumes each and allowed to recover sufficiently to sample, a water sample from each well shall be taken using an appropriate decontaminated sampling device. After the samples have been taken, they will be kept on ice in clear glass sample jars. The wells shall then be measured for temperature, pH, and specific conductance.

Each sample jar or bottle will have a sample tag attached and labled as to job name, date collected, sampler's name, sample identification number, and analyses requested. Each sample jar will be listed on a chain of custody form that will accompany them to the laboratory. The custody form shall contain the job name, sample identification number, date each sample was collected, the name of the sampler, analyses requested, and the signature of the person(s) handling or otherwise having possession of the samples.

The water samples shall be tested at the South Pacific Division Laboratory, Sausalito, California, for total dissolved solids and chloride ion concentration. The maximum holding time for the sample until testing for total dissolved solids to begin shall be timed to 6 days, and limited to 27 days for chloride ion concentration testing to begin.

Upon receipt of the laboratory test results, a brief report shall be written listing the test results and any changes from the previous tests. Any significant over all changes shall be brought to the readers attention. This report shall be provided to the RWQCB and to ACFCWCD.

The wells are planned to be installed in late April 1988, after the Corps of Engineers Record of Decision based upon the Final Environmental Impact Statements for the deepening of the Oakland Inner Harbor and the deepening of the Oakland Outer Harbor, the Final Supplement to the Environmental Impact Statement for the combined Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, and the public response and comments to those reports. The Record of Decision will be signed by the Division Engineer of the U.S. Army Corps of Engineers, South Pacific Division.

The estimated cost for implementing the proposed groundwater monitoring plan is given below. The cost estimate is based on the possibility of taking water samples and measurements every other month for three years with the contingency of performing monthly sampling for one full year. The sampling frequency can always be reduced but seldom are funds available to increase the frequency after the initial funding has been allocated.

a.	Install three (3) wells	$11,500
b.	Remove cutting from site to Acme Landfall, Martinez, Ca.	1,500
c.	Contract for geotechnical firm to coordinate well drilling, inspect well installation, and provide a field report with boring logs.	12,080
d.	Cost for geotechnical firm to perform monitoring for three (3) years.	28,800
e.	South Pacific Division Laboratory, analyses of water samples	15,340
f.	Establishing elevations of well casings by survey.	2,380
g.	Brief report of water quality analyses.	2,400
h.	In-house cost for scoping contract, contract administration and technical supervision.	10,000
	TOTAL ESTIMATED COST	$84,000

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

January 29, 1988
File No. 2198.11 (ADF)

Colonel Galen H. Yanagihara
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94101

ATTN: Environmental Branch

Subject: Corps dredging of the Oakland Inner and Outer Harbors

Dear Colonel Yanagihara:

We have received your September 23 and January 21 letters, in which you request State water quality certification for a proposed Corps dredging project in the Oakland Inner and Outer Harbors. The project would deepen navigation channels to 42 feet below mean lower low water (MLLW) and dispose of about 6.5 million cubic yards of material. This disposal would be in slurry form at the Alcatraz site, with pre-dredging of the Alcatraz site to an ocean disposal site.

Your previous letters included many of the necessary elements for a complete water quality certification package, though we are still awaiting a copy of the final Supplemental EIS. But as noted in our November 18 letter, which commented on your draft SEIS, we have several concerns over the water quality impacts associated with this project. These impacts stem from the effects of the dredging itself upon the Merritt/Posey and Alameda aquifers, as well as from the disposal of dredge spoil in slurry form at the Alcatraz disposal site. This letter concluded that "...the preferred alternative for disposal would be for all dredge spoils to go to a designated ocean disposal site."

I understand that the Corps has been working with the EPA in selecting such a site. But since a suitable site is not yet available, you would probably still need to utilize the Alacatraz disposal site. The above letter also recommended that Waste Dsicharge Requirements be issued to set-up both pre- and post-project monitoring of the water column and sediment at the disposal site, so as to mitigate the adverse effects of this disposal. We therefore request, pursuant to the Clean Water Act Section 404(t), and the State Water Code Section 13263, that you submit a Report of Waste Discharge (ROWD) and a $10,000 filing fee for this project. An application form and a copy of the filing fee schedule are attached.

If you have any questions about this matter, please contact Teng-Chung Wu at (415) 464-0899 or Alan Friedman at (415) 464-0806.

Sincerely Yours,

ROGER B. JAMES
Executive Officer

Attachment: Fee schedule
Report of Waste Discharge

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

21 January 1988

Environmental Branch

Mr. Roger B. James
California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, California 94607

Dear Mr. James:

The Corps of Engineers requests "Water Quality Certification" for the dredging of the Oakland Inner and Outer Harbors and disposal of the dredged material at the Alcatraz dredged material disposal site. The Section 404 (b)(1) Evaluation for the disposal of the dredged material is attached. As stated in our letter of 12 January 1988, our request is that certification for the disposal of the dredged material at the Alcatraz site be furnished no later than 15 March 1988. Certification by the March date is necessary to accommodate the arrival of the new generation, deep draft container vessels scheduled to arrive in Oakland in June 1988.

Numerous studies have been undertaken and copious data are available regarding the aqautic disposal of dredged material. Our Section 404 (b)(1) Evaluation has relied heavily on previous studies to predict effects of the disposal of the dredged material at the disposal site and within the greater San Francisco Bay. Recent specious and highly emotional allegations regarding disposal of dredged material at the Alcatraz site point out a potential need to collate existing data to make it more accessible. Additionally, a program to monitor the disposal of the material from the Oakland Harbor and to delineate its effects on the aquatic environment of San Francisco Bay has been suggested during public review. To provide data directly applicable to future dredging and disposal activities in the Bay, a monitoring program for the Alcatraz site and vicinity during disposal of Oakland Harbor material is presented in the Section 404 (b)(1) Evaluation.

Your expeditious action granting "Water Quality Certification" for the proposed Oakland Harbor Deepening Project as authorized by Congress (Water Resource Development Act of 1986) will be greatly appreciated. Please contact us at your earliest convenience to coordinate the proposed monitoring during the construction of the project.

Sincerely

Galen H. Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

SECTION 404 (b)(1) EVALUATION
FOR THE DISPOSAL OF DREDGED MATERIAL FROM THE CONSTRUCTION AND MAINTENANCE OF THE OAKLAND HARBOR NAVIGATION IMPROVEMENT PROJECT
ALAMEDA COUNTY, CALIFORNIA

U. S. ARMY CORPS OF ENGINEERS
SAN FRANCISCO DISTRICT

JANUARY 1988

SECTION 404 (b)(1) EVALUATION
FOR THE DISPOSAL OF DREDGED MATERIAL FROM THE
CONSTRUCTION AND MAINTENANCE OF
THE OAKLAND HARBOR NAVIGATION IMPROVEMENT PROJECT
ALAMEDA COUNTY, CALIFORNIA

JANUARY 1988

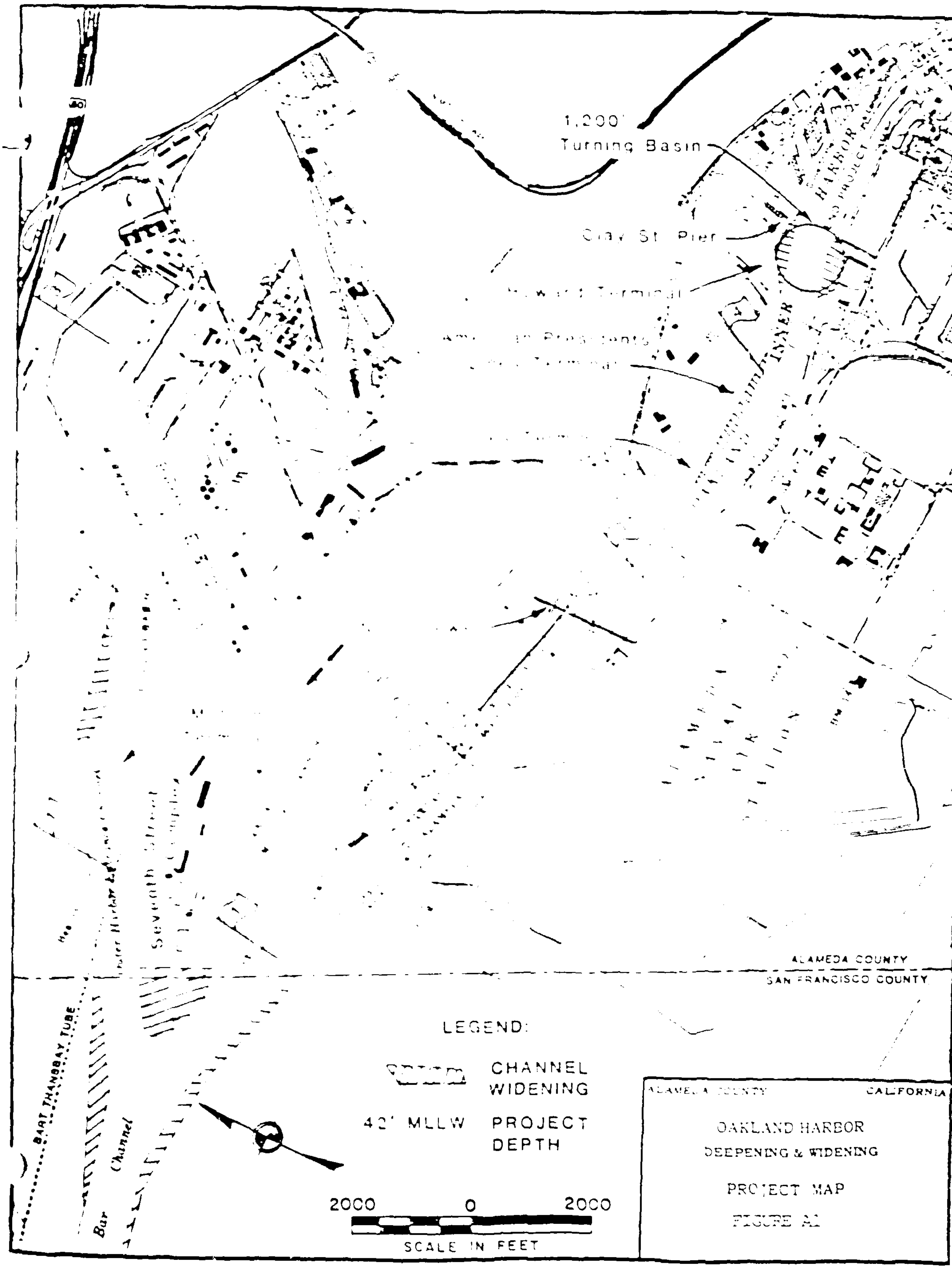
I. PROJECT DESCRIPTION

A. Location. Oakland Harbor is located on the eastern side of San Francisco Bay in Alameda County. The Outer Harbor Channel is located between the Bay Bridge and the Seventh Street Terminals. The Inner Harbor Channel separates the City of Oakland from the City of Alameda.

B. Description of the Recommended Project. The recommended plan of improvement for the Oakland Outer Harbor includes deepening the harbor from the present channel depths to -12.8 m (-42 ft) MLLW and widening the south side of the Bar Channel from 244 m to 274 m (800 to 900 ft) (See Figure A1). The apex of the bend between the Bar and Entrance Channels will be removed, and the north side of the channel widened. The knoll adjacent to the end of the Seventh Street Complex is recommended for removal. The "dog-leg" at the northeastern end of the Seventh Street Terminal will be eliminated, and the turning basin will be relocated and enlarged by widening the north side of the channel opposite berths 32 and 33 in the Matson Terminal near Project Kilometer 3.2 (Mile 2.0). At Project Kilometer 3.6 (Mile 2.2) approximately 580 m (1,900 ft) of channel will be widened 107 m (350 ft) to accommodate the existing wharf. In the final 1400 m (4,600 ft) of the project, the berths will be widened to 38 m (125 ft), which will narrow the channel to a width which varies from 260 to 183 m (850 to 600 ft).

Channel realignment has resulted from a navigation simulation study conducted by Computer-assisted Operations Research Facility (CAORF). The simulation study was performed to provide the minimum dimensions required for safe and efficient ship transit through the Bar and Outer Harbor entrance Channels and has reduced the amount of dredging from the authorized projects by approximately 20 percent. The Recommended Plan widens the Entrance Channel west of the BART tube.

For the Oakland Inner Harbor, the recommended plan of improvement specifies the deepening of the Inner Harbor channel from the authorized depth of -10.7 m to -12.8 m (-35 to -42 ft) MLLW between the Entrance Channel reach and the Clay Street Pier, a distance of approximately 6.4 km (4 mi). The recommended plan also includes widening within the Entrance Channel Reach the northern channel boundary will be moved northward to coincide with the U.S. Pierhead and Bulkhead line off the end of the Seventh Street Terminal, and then taper in to meet the existing channel limit at approximate Project Kilometer 1.6 (Mile 1.0).



ALAMEDA COUNTY CALIFORNIA

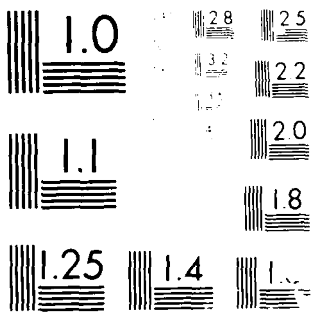
OAKLAND HARBOR
DEEPENING & WIDENING

PROJECT MAP

FIGURE A1

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 8/11

UNCLASSIFIED F/G 13/2 NL


1.0
2.8
2.5
3.2
2.2
2.0
1.1
1.8
1.25
1.4

The southern channel boundary will be shifted south by 61 m (200 ft) at the turn into the Entrance Reach, and by 46 m (150 ft) beyond the turn. East of the mouth of the Middle Harbor, the widened channel will taper in to meet the existing channel limit at approximate Project Kilometer 1.6 (Mile 1.0).

The modifications described above result in a channel width of 360 m (1,180 ft) off the southeast corner of the Seventh Street Terminal which transitions to 220 m (720 ft) at approximate Project Kilometer 1.6 (Mile 1.0). The channel then gradually narrows to a minimum width of 133 m (435 ft) between the rip-rapped banks of the channel near Project Kilometer 2.6 (Mile 1.6), then widens to 140 m (460 ft), and flares out to 175 m (575 ft) at the beginning of the channel bend opposite the terminals for American Presidents Lines. This channel bend will be widened to a maximum width of 274 m (900 ft), and then taper to 183 m (600 ft) to meet the existing width of the channel. Additional project features include providing a 366 m (1,200 ft) diameter turning basin between the Schnitzer Steel Products Company and the Alameda Gateway Properties, and providing a 305 m (1,000 ft) radius fan-shaped area adjacent to the eastern end of the Charles P. Howard Terminal. The project reach will terminate approximately 168 m (550 ft) west of the Webster Street tube.

In conjunction with the Federal channel, the Port of Oakland will obtain water quality data for the deepening and maintenance of the 42-foot depth at the following berths:

Terminal	Berth # Old	Berth # New	Location	Maintained Depth (in meters)
OUTER HARBOR				
Trans-bay	2	26	Outer Harbor Terminal	11.3 (37')*
	3	25	" " "	11.3 (37')
Matson	D	32	Seventh Street Terminal	11.3 (37')
	E	33	" " "	11.3 (37')
	F	34	" " "	11.3 (37')
7th St.	G	35	" " "	11.3 (37')
P.C.T.	H	36	" " "	12.2 (40')
	I	37	" " "	12.2 (40')
Bay Bridge	11	9	Oakland Army Base	11.3 (37')
	12	8	" " "	11.3 (37')
	13	7	" " "	11.3 (37')
Carnation	-	30	Outer Harbor Terminal	11.3 (37')**
	-	31	" " "	11.3 (37')**
INNER HARBOR				
American	A	60	Middle Harbor Terminal	11.3 (37')
President	B	61	" " "	11.3 (37')
Lines	C	62	" " "	12.2 (40')
	D	63	" " "	12.2 (40')

* Reference PN#-17044E35
** Permit application pending

The Port of Oakland is also responsible for continued maintenance of the following berths which are already permitted at the required 42-foot depth:

Terminal	Berth # Old	Berth # New	Location	Maintained Depth (in meters)
OUTER HARBOR				
Maersk	4	24	Outer Harbor Terminal	12.8 (42')
Outer Harbor	5	23	" " "	12.8 (42')
P.C.T.	6	22	" " "	12.8 (42')
Sealand	8	20	" " "	12.8 (42')
	9	21	" " "	12.8 (42')
INNER HARBOR				
Howard	H	67	C.P. Howard Container	12.8 (42')
	I	68	" " "	12.8 (42')

Approximately 2.2×10^6 m^3 (2.8×10^6 yd^3) of material will be dredged from the Oakland Outer Harbor Federal Channel. At Oakland Inner Harbor, approximately 2.8×10^6 m^3 (3.6×10^6 yd^3) of material will be dredged from the Federal channel. This amount represents a 1.6×10^6 m^3 (2.0×10^6 yd^3) reduction in the authorized quantity of dredged material to be disposed. Approximately 430,000 m^3 (560,000 yd^3) will be dredged from all of the berths to be deepened to 42-foot depth. Dredged material will be disposed of at the Alcatraz disposal site. Disposal of material from the Oakland Harbor project including berths will comply with Section 404(b)(1) requirements as appropriate.

Unforeseen material accumulation has occurred since the specification of the use of the Alcatraz disposal site. Based on the investigations to date, some rate of sediment retention at the Alcatraz site will be associated with disposal of any dredge material. The rate of retention will be dependent on type of equipment used for dredging and the sediment density, cohesiveness, and sand content. Approximately 37.5 percent of the total amount of material from the Oakland Harbor project, or 2.1×10^6 m^3 (2.7×10^6 yd^3), is estimated as the amount that will be retained at the Alcatraz site. To ameliorate the potential impact of the retention of 1.6×10^6 m^3 at the site, an equivalent amount of sediments will be dredged from the Alcatraz site and transported to Site 1M, an ocean disposal site located approximately 16 nautical miles outside the Golden Gate. The dredging of 1.6×10^6 m^3 of sediments from the Alcatraz site and associated disposal at an ocean disposal site has been evaluated in accordance with the Ocean Dumping Regulations and is not a part of the 404 certification process.

C. Authority and Purpose. The Oakland Harbor Deep-Draft Navigation project was authorized by the Water Resources Development Act of 1986, 99th Congress, 2nd Session, Public Law 99-662. The Oakland Harbor channels were determined to be no longer adequate to efficiently and cost-effectively accommodate modern deep-draft vessels. The specific planning objectives for the Oakland Harbor improvements are to reduce tidal delays associated with containership passages, to increase economies of scale for waterborne commerce, and to increase navigational safety. The project was authorized with disposal of dredged material from Oakland Harbor at the Alcatraz disposal site. Water quality testing requirements for future maintenance of the Federal channels and related berths as listed above will be processed as a single project to the extent practicable.

D. General Description of Dredged or Fill Material:

1. General Physical Characteristics of Material. The material to be dredged from Oakland Inner Harbor is composed of sand, clay, and silt. Of thirteen random holes sampled, only five contained less than 80 percent sand (by weight). The main soil types found in the Oakland Outer Harbor include silt, silty sand, clay, and sandy clay. The consistency of the silt is soft and sticky to medium hard and sticky; the clay is hard; sand is loose to very dense.

2. Quantity of Material. Although authorized at 7.0×10^6 m^3 (9.2×10^6 yd^3), approximately 5.4×10^6 m^3 (7.0×10^6 yd^3) of material are to be dredged initially. Of the total, about 200,000 m^3 (260,000 yd^3) will be dredged from the turning basin and 430,000 m^3 (560,000 yd^3) will be dredged from berths outside of the existing channel. Maintenance dredging quantities will be increased by an estimated 120,000 m^3 (160,000 yd^3) annually.

3. Source of Material. Material will originate from the deepened Oakland Harbor Channels, Alameda County, California.

E. General Description of the Discharge Site:

1. Location. The Alcatraz Disposal Site is located at the following coordinates: 37° 49′ 17″ N; 122° 25′ 23″ W, about 0.55 km (0.33 mi) south of Alcatraz Island.

2. Size. The coordinates describes the center of the 610 m (2,000 ft) diameter circular site.

3. Type of site. The disposal site is an open-water, high energy location. Due to the magnitude and extent of currents, dispersion of dredged sediments is expected to occur.

4. Type of habitats. A marine open-water habitat exists at this location. This area is a corridor for anadromous fish species migrating to and from the Sacramento-San Joaquin estuary. Many other marine species are also known to migrate through this reach at various times during the year. In 1975, investigations of the benthic fauna, performed by the Corps of Engineers under the Dredge Disposal Study, San Francisco Bay and Estuary, found that the species composition and abundance of the fauna fluctuates markedly at the Alcatraz site. Nearly all species collected were considered transient, as would be expected in a high energy area, subjected to swift tidal currents and a shifting substrate.

5. Timing and duration of discharge. The estimated time frame for dredging and disposal operations is 24 months beginning in May 1988. Maintenance dredging operations are expected to occur over the life of the project. A summary of dredging methods, production rates and construction times follows:

Activity: Dredge Channel with disposal at Alcatraz

	Inner Harbor	Outer Harbor
Cutterhead Dredge:		
Dredge Volume (m^3x1000)	380	780
Dredge Rate (m^3x1000/Mon.)	340	340
Construction Time (Mon.)	1	2
Hopper Dredge:		
Dredge Volume (m^3x1000)	2300	1900
Dredge Rate (m^3x1000/Mon.)	380	410
Construction Time (Mon.)	6	5
Total Dredging Time in months	6 - 7	5 - 7

F. Description of disposal method: Dredge material will be discharged within the perimeter of the disposal site from the bottom of split-hull hopper dredges or disposal barges. Each load size and bulk density is dependent on the equipment used. Approximate maximum quantity is expected to be 3060 m^3 (4000 yd^3) and the maximum bulk density may reach 1400 g/l or greater. The sediments discharged at the site will have been dredged hydraulically or passed through a centrifugal pump and into a disposal barge in order to increase dispersion and minimize bathymetric impacts at the site. Because of the dredging method, stratification of the material within the hopper or barge is expected. Coarser, denser particles will occupy the bottom layers and the finer, and less dense material will make up the upper strata. Upon opening the hull, most of the material will evacuate the vessel in a short period of time (10 to 30 seconds [s]). Approximately 90% of the material will be conveyed to the bottom in a convective descent episode. Terminal velocity will be 1.2 m/s (3.8 ft/s) downward.

II. FACTUAL DETERMINATION

A. Physical Substrate Determinations:

1. Substrate elevation and slope. The average depth at the Alcatraz Disposal Site is approximately -17 m (-56 ft), mean lower low water (MLLW).

2. Sediment type. Bottom sediments at the disposal site consist of a chaotic layering of sands, silts, and consolidated clays typical of an aquatic dredge material disposal site. The material at the site represent a coarser, more consolidated fraction of the dredge material discharged at the site over the past 60 years. The accumulated material has demonstrated resistance to erosion by the strong currents at the site.

3. Dredge/fill material movement. While the Alcatraz Disposal Site is dispersive, not all dredge material discharged at the site is dispersed. Historically, about 20% of the material discharged at the site is retained on the bottom within a 305 m (1000 ft) radius of site center. Within a 610 m (2000 ft) radius of site center, the percentage climbs to 30%. Seventy percent of the dredged material discharged at the site is dispersed and carried from the site by the strong tidally dominated currents. Deviation above or below the 30% average retainage for individual dredging and discharge episodes, is attributed to variations in percent sand of in situ material, the density of in situ material, the method of dredging, and the rate of disposal. Material from the Oakland Harbor deepening has a higher than average sand content, will be more consolidated than most maintenance dredging material discharged at the site, will be dredged by hydraulic methods, and will be discharged at a higher than average rate. Consequently, expected rates of material accumulation at the disposal site are one fourth higher than average, or 37.5%. Five eighths of the dredge material, or 62.5%, is expected to be dispersed and carried from the site. Physical model tests indicate that slightly less than half (47%) of the material swept from the site by currents exits the Bay through the Golden Gate. The remainder is redistributed in the Bay. Numerical modeling efforts are currently underway to address the ultimate fate of the one third part (53% of 62.5%) that is redistributed within the Bay. Difficulties arise from also addressing the 130 x 10^6 m^3 (170 x 10^6 yd^3) of sediments resuspended naturally in the Bay each year by currents and wind generated waves and the 8 x 10^6 (10.5 x 10^6 yd^3) carried into the Bay by rivers. The suspended sediment from dredge material disposal in the Bay represents a small percentage (approximate 2%) of the total suspended sediment redistributed within the Bay annually.

4. Physical effects on benthos. It is certain that some benthic organisms would be destroyed by the proposed dredge material discharge at the Alcatraz Disposal Site. However, the site has been used for the disposal of dredged material for over sixty years and the benthic community is expected to be transient and is expected to be highly adapted to the environmental effects of dredged material disposal. The material carried from the site by the tidal currents represents such a small fraction of the suspended sediment load to the remainder of the Bay that physical effects of disposal are expected to be negligible.

5. Other effects. There are no other significant effects on the physical substrate other than those discussed above.

6. Actions taken to minimize impacts. Use of the Alcatraz site for the authorized Oakland Harbor project is now predicated on the removal of 2.1×10^6 m^3 (2.7×10^6 yd^3) from the Alcatraz site (representing a conservative estimate of 37.5 percent of the 5.4×10^6 m^3 [7×10^6 yd^3] expected to be retained at the site) to an appropriate ocean disposal site. This predredging of the Alcatraz disposal site will preclude any bathymetric effects associated with the disposal of the 5.4 million cubic meters of material from the Oakland Harbors.

B. Water Circulation, Fluctuation and Salinity Determinations:

1. Water

a. Salinity. Salinity should not be affected by the disposal activities.

b. Chemistry. Water chemistry may be altered during disposal, but ambient conditions will return as mixing occurs.

c. Clarity. Clarity is expected to be impacted during disposal, but turbidity above natural levels in all but the lowest part of the water column is unmeasurable after a few minutes at the discharge location and turbidity plumes should be undetectable above background measurements outside of an elipse centered at the site with a 1400 m (4500 ft) radius in the east-west direction and a 300 m (1000 ft) radius north-south.

d. Color. Color will also be impacted as the suspended solids concentration increases in the water column immediately after dredge material discharge. However, as hydraulic dredges discharge several feet below the water surface, the turbidity and discoloration visible at the surface is minimal. Any discoloration will dissipate within a few minutes.

e. Odors. No significant effects.

f. Taste. No significant effects.

g. Dissolved oxygen. Hydraulic dredging operations aerate the dredged material as it is pumped into the hopper. Little or no reduction in oxygen is expected at the disposal site due to discharge of the oxygenated material.

h. Nutrients. Nutrient levels will increase slightly at the disposal site, but should be readily assimilated into the Bay system as mixing occurs.

i. Eutrophication. No significant effects.

j. Others as appropriate. No other changes to water characteristics are anticipated as a result of the disposal activity.

2. Current Patterns and Circulation

a. Current patterns and flow. Changes in water circulation and flow due to discharge of dredged material would be directly related to bottom geometry changes. Physical modeling of the bathymetry of the disposal site in 1957 and 1987 to detect changes in currents or current directions demonstrated little or no change over thirty years. In the case of the Oakland Harbor dredged material, the redredging of the site is designed to mitigate bathymetric impacts. No changes in the site bottom geometry are expected except during the project construction period. At the end of construction site geometry should approximate current geometry. During the construction period, the circulation and flow patterns at the disposal site should not change perceptibly.

b. Velocities. No significant effects on water velocities at the disposal site should occur.

c. Stratification. No significant change to water stratification at the disposal site is expected.

d. Hydrologic regime. No significant hydrologic effects are expected to occur.

3. Normal Water Level Fluctuations. Normal water level fluctuation resulting from tidal exchanges will continue unaffected.

4. Salinity gradient. No significant effects.

5. Actions That Will Be Taken To Minimize Impacts. Since no significant effects on water circulation, fluctuation, and salinity has been identified, specific actions to minimize impacts in these areas are not needed.

C. Suspended Particulate/Turbidity Determination:

1. Expected changes in suspended particulate and turbidity level in the vicinity of the disposal site. Density differential between released dredged material and the water at the receiving site enables convective descent of the dredged material to the Bay floor. Average descent velocity at the site has been measured at 1.2 m/s (3.8 ft/s). The mass of material moving downward conveys lighter particles to the bottom simultaneously. Release of dredged material from a hopper dredge in October 1986 was monitored to determine the movement and persistence of turbidity or suspended material. The longest period of time that an elevated suspended sediment level was detectable above background levels in the vicinity of the site extended up to twelve minutes. The maximum suspended sediment load of six monitored plumes (two coincident with strong ebb currents, two during periods of strong flood currents, and two simultaneous with slack water), reached about 60 mg/l near the surface and 120 mg/l near the bottom. Suspended sediment levels dropped to less than 40 mg/l very rapidly. All plumes tracked east-west and material did not disperse significantly in a north-south direction.

The overall concentration of suspended sediments measured between July 1986 and February 1987 in the vicinity of the Alcatraz Disposal Site was dependent on the stage of the tide. Greatest concentrations occurred after slack low water and the lowest concentrations were observed immediately after slack high water. The influence of tidal circulation in the Bay, transporting sediment laden waters from the shallow areas of the Bay and Delta, and relatively clear waters from the Golden Gate and beyond, back and forth across the disposal site was overwhelmingly the most important factor affecting suspended sediment load.

It has been estimated that afternoon winds in excess of 16 km/hr (10 mph) were capable of resuspending 2 x 10^6 kg (2200 tons) of sediment per day in the shallow area of San Francisco Bay. During periods while wind generated wave action was in progress, sediment concentrations were measured as high as 1000 mg/l. During ebb tide, the suspended sediment is swept into the central Bay and often extends out the Golden Gate. Suspended sediment due to disposal of dredged material at the Alcatraz site is insignificant in comparison.

2. Effects on the chemical and physical properties of the water column.

a. Light Penetration. Increased turbidity levels at the Alcatraz site as a result of dredged material disposal would minimally reduce light penetration into the water column. However, this reduction would be of short duration and localized and is insignificant to the Bay aquatic environment.

b. Dissolved Oxygen. Dissolved oxygen reduction in the water column is associated with disposal of dredged material. However, the hydraulic operation involves the mixing of water with sediment, which will oxygenate the material and minimize the extent of oxygen reduction during discrete disposal. Field studies performed for the Dredge Disposal Study, San Francisco Bay and Estuary, have indicated that depressed oxygen concentrations on the bottom during disposal persist for about 4-8 minutes before ambient conditions return.

c. Toxic metals and organics. Toxic metals and organics related to the sediments to be removed from Oakland Harbor are described in Appendix A of the Draft SEIS. In summary, no significant chemical or physical effects on the water column should result from the disposal of dredged material from Oakland Harbor.

d. Pathogens. No significant effects on the water column related to pathogens are expected.

e. Aesthetics. Dredged material is discharged from the bottom of barges and hoppers. Because the density of the material in the barge or hopper is significantly higher than the water density at the site and the bottom opens rapidly to discharge the material in a short period of time, most of the discharge is carried to the bottom by convective descent. Very little of the temporary elevation in turbidity or discoloration is visible at the water surface. Unless viewed from directly over the disposal site, it is unlikely that any turbidity or discoloration would be witnessed. No significant aesthetic effects are expected.

f. Others as appropriate. Except for the discussion found in Section II. D. of this evaluation, no other chemical or physical effects on the water column have been identified.

3. Effects on biota

a. Primary production, photosynthesis. As indicated in C. 2. a. above, light penetration would be temporarily diminished. The effect would be of short duration and primary production and photosynthesis would not be significantly affected since the hydrologic system is dynamic and tidal conditions constantly move and exchange water mass.

b. Suspension/filter-feeders. Typically, San Francisco Bay is a naturally turbid, and highly variable estuarine system. With such regularly unstable conditions, the responses of aquatic organisms to turbidity and suspended material are frequently difficult to determine because they may be due to a wide variety of causes, including natural variation in the following: concentration of suspended solids or the number of particles in suspension, their densities, size distribution, shape, mineralogy, sorptive properties, or presence of organic matter and its form; inherent physical, chemical, and biological characteristics of each site; and antagonistic and synergistic effects (Stern and Stickle 1978).

Turbidity and suspended material affect invertebrates in a variety of ways, with filter-feeding invertebrates the most frequently and adversely affected. Most studies have indicated that upon exposure to temporary increases in turbidity and suspended material, similar to those encountered in areas where dredging or the disposal of dredged material has occurred, no permanent effects were exhibited (Stern and Stickle 1978).

Since the disposal site area is constantly disturbed with ongoing dumping activities, a paucity of filter/suspension-feeding organisms would be found within the site. Benthos inhabiting muddy soft bottom habitats subjected to frequent disturbance (storms, current scour, dredged material disposal, environmental stress, etc.) characteristically differ markedly in their life history strategies from those infaunal benthos from relatively stable, undisturbed habitats; the former are called "opportunistic species" (Grassle and Grassle 1974), while the latter are termed "equilibrium species" (McCall 1977, 1978). Opportunistic species recolonizing muddy sediments after a disturbance are generally surface deposit feeders or suspensions feeders living in the near-surface sediment layer. These fauna are generally small in size, exhibit erratic population density cycles caused by high reproductive potential (continuous recruitment), high mortalities, and short life spans. Equilibrium species may be deposit feeders or suspension feeders usually living deep within the sediment: they are generally larger in size, long lived, and have lower reproductive potentials (seasonal reproductive cycles) and planktotrophic larvae. This characteristic enables opportunistic species to survive in environmentally stressful or marginal environments (Kendall 1983).

c. Sight feeders. It has long been documented that most sight feeders would tend to avoid areas of turbid water and return to these areas when more favorable conditions reoccur. The abundance of fish at the Alcatraz disposal site may vary as a result of temperature changes, salinity changes, seasonal population variance, dissolved oxygen concentration variances as well as changes in other parameters or combinations thereof (See E. 3. and F. 3. b. for additional discussion).

4. Measures taken to minimize impacts related to suspended particulates/turbidity. No measures related to the disposal have been deemed appropriate to minimize impacts associated with turbidity or with the dispersion of suspended sediments. Elevated levels of turbidity and suspended sediment at the disposal site are of brief duration and limited extent. Overall turbidity and suspended sediment levels in San Francisco Bay due to the disposal of dredged material from the Oakland Harbor at the Alcatraz disposal site are not expected to increase measurably. At no time will the plume from discharge of dredged material exceed or even approach the levels of suspended sediment occurring naturally within the Bay under common meteorological conditions.

D. Contaminant Determination:

1. General. As described in the Dredge Disposal Study, San Francisco Bay and Estuary, bottom sediments act as a reservoir for the many pollutants with concentrations in the parts per million range whereas the overlying waters have concentrations in the sub-parts per billion and parts per billion range. The scavenging effect of clay and silt particles during the sedimentation process is responsible for the higher levels of trace elements, chlorinated and petroleum hydrocarbons, etc. in bottom deposits.

Solid waste substances and dissolved waste materials are introduced in suspended form into the Bay. Contaminants enter the Bay system directly via municipal sewage and industrial waste outfalls, storm drains and surface runoff, aerial fallout, overboard discharge from vessels, and enter indirectly via rivers and streams conveying agricultural drainage and materials from upland erosion to the Bay, and via leaching from waste disposal sites located adjacent to the Bay and its tributaries. Dissolved substances are sorbed by particulate matter both before entry and after entry into the estuary. These organic and inorganic contaminants show behavior and distribution patterns similar to that of natural sediments with the physical setting and estuarine processes that are responsible for their movement and deposition.

Contaminant levels are generally associated with sediment type (particle size) which is reflected in both vertical and horizontal distribution of contaminants. However, this relationship is not absolute and other factors such as proximity to the source of contaminants, rate of shoaling of contaminated sediments, rate of contaminant input, and association of contaminants with other parameters such as organics most probably play a role in this distribution.

For example, urban runoff is a seasonal contributor of large amounts of pollutants to San Francisco Bay. It is evident that storm runoff poses a far greater threat to nearshore shellfish-growing waters than treated sewage effluents, for two reasons: 1) bacterial concentrations may be hundreds or thousands of times greater in urban storm runoff than in treated disinfected wastewater and 2) urban storm runoff typically discharges directly to nearshore waters, whereas, treated sewage effluent is or will be subject to considerable dilution before impinging on the shoreline. (Jones and Stokes 1977)

Contaminant levels in estuarine organisms appear to be controlled by a number of synergistic factors. Suggested factors include the long-term process of sediment resuspension-recirculation, seasonal fluctuations in salinity and sources of contaminants both anthropogenic and geologic. The biological impact may depend on the form of contaminant and whether or not the sediment system can assimilate the contaminant loading. With the observed sorption-desorption by organisms and the fluctuating conditions in the estuary, impacts such as high accumulations, mutations and toxicity would not be expected unless the contaminant loading is foreign, in the case of synthetic chemicals, or above the assimilation capacity of the estuary with the associated sediment regime, in the case of a low energy regime in which the changes in ambient conditions are great.

Availability of sediment-associated heavy metals to biota depends upon the physical and chemical nature of the sediment and water at the locale. Metals are bioaccumulated from the sediment by benthic detrivores and omnivores as well as by plants. A number of factors such as pH, chelating agents, form of the metal, and species of animal or plant will influence the amount of uptake (Olsen 1984).

Investigations on the availability of sediment-sorbed heavy metals to organisms showed bioaccumulation of metals to be minimal and highly variable. The potential for bioaccumulation of a metal associated with sediments appears to depend on the physical and chemical forms of the metal and varies from one sediment and organism to the next (Hirsch et al. 1978).

2. Potential for release of contaminants into the water column. Elutriate tests were conducted on sediment core samples from eleven locations within Oakland Harbor to determine whether excessive concentrations of dissolved contaminants would be released from the sediment into the water column by disposal at Alcatraz. The concentrations of trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, selenium, and zinc) and organics (chlorinated pesticides and PCB's) were below the State of California water quality objectives for ocean waters. The concentrations of copper and zinc at one of the stations in Oakland Inner Harbor was approximately 1.5 times the State objective; the concentration of mercury at another station within Oakland Inner Harbor was approximately 2.3 times the State objective. However, it should be recognized that these water quality objectives are instantaneous maximums as contained in the State of California Water Resources Control Board 1983 Water Quality Control Plan for Ocean Waters of California (See Appendix A, Draft SEIS for subject project for detailed discussion). These 1983 maximums are based on effluent limitations after 100 to 1 dilution in the receiving water. Elutriates are prepared by mixing four parts water from the disposal site with one part sediment from the dredge site (volume/volume). Therefore, after applying the 100 to 1 dilution stated in the 1983 Ocean Plan, none of the elutriate concentrations exceed the State water quality objectives.

3. Potential for ecological effects of dredged material on marine organisms in water column from suspended particulates. Suspended particulate phase bioassays using mysid shrimp, speckled sanddab, and mussel larvae were performed to determine the potential interactions among multiple contaminants and the environmental impacts of dissolved contaminants as well as those associated with suspended particulates. In none of the tests were the sediment from Oakland Harbor toxic to 50 percent of the individuals (or caused abnormal development in 50 percent of the individuals). Therefore, in accordance with the guidance suggested by the EPA/CE Implementation Manual (1977), it was concluded that no unacceptable toxicity due to contaminant release into the water column would occur as a result of disposal of material from Oakland Harbor at the Alcatraz site (See Appendix A, Draft SEIS for subject project for detailed discussion).

4. Potential for ecological effects of dredged material on bottom-dwelling marine organisms. In order to assess the environmental effect of deposited material, solid phase animal bioassays were conducted using mysid shrimp, bent-nose clam and a polychaete worm. These tests measure mortality as the end-point. At the end of the tests, the tissue of survivor clams and worms were analyzed for specified chemical constituents to assess the potential for long-term accumulation of contaminants in the food web. Of the three species tested, only the polychaete worm demonstrated survival that was statistically lower than in the reference sediment. Analyses of the data revealed that significant adverse effects would not occur in the field (See Appendix A of the Draft SEIS for a more complete analysis of the bioassay results).

5. Potential for bioaccumulation of contaminants by marine organisms. In order to assess the potential for contaminants from the dredged material to be bioaccumulated in the tissues of marine organisms, the tissue of clams and polychaete worms surviving the solid phase bioassays were analyzed for trace metals, chlorinated pesticides, PCB's, and petroleum hydrocarbons. The concentrations of several constituents were statistically higher in the tissue of organisms exposed to sediment from Oakland Harbor than in those exposed to the reference sediment. Examination of the data revealed that these results were not biologically significant (See Appendix A of the Draft SEIS for a more complete discussion of the test data).

6. Summary. In summary, the results of bioassay and bioaccumulation testing for Oakland Harbor indicate that no unacceptable toxicity or bioaccumulation in benthic organisms would occur as a result of deposition of dredged material at Alcatraz. Material from Oakland Inner and Outer Harbors is suitable for disposal at the Alcatraz site pursuant to the requirements of Section 404 of the Clean Water Act.

E. Aquatic Ecosystems and Organisms Determination: It is often difficult to assess the effects of turbidity and suspended material on aquatic organisms. Other conditions frequently affect aquatic organisms before and during a rise in turbidity and suspended solids, including complicated interactions between the solids, temperature, and dissolved oxygen on invertebrates and fishes. Laboratory experiments often do not duplicate natural conditions or reflect natural levels of tolerance. Several investigators have demonstrated that suspensions of dredged material that affected organisms in the laboratory produced no detectable changes when encountered in the same concentrations in nature. In other studies, higher concentrations of resuspended natural sediments were required to cause the same effects obtained with suspensions of processed mineral solids of known composition, particle size distribution, and organic matter content (Stern and Stickle 1978).

1. Effects on plankton. Short-term, increased suspended solids in the water column at the disposal site may impact plankton present during disposal. However, ambient water conditions are expected to return shortly after disposal operations have ended.

2. Effects on benthos. No significant impacts on benthos are expected at the disposal site. Disposal occurs annually at the site with ongoing permitted maintenance dredging and new work projects. The relatively constant disruption of the bottom by material deposition effectively reduces any benthic community development that may occur at the disposal site over time. Organisms associated with mud environments within the Bay are highly tolerant of sediment suspension. Biota associated with the turbulent Bay environment have adapted to the changing physical conditions. As changes continue, the biota will also change to the extent possible.

3. <u>Effects on nekton</u>. Short-term impact on nekton is expected during the construction period. It is expected that most nektonic organisms will tend to avoid the discharge area during the disposal operations. However, most free-swimming organisms are not seriously affected by the suspended sediment conditions created in the water column by the disposal operation. The level of concentrations of suspended sediments directly causing mortalities far exceed those created during most dredging and disposal operations (Hirsch et al. 1978).

4. <u>Effects on aquatic food web</u>. Bioaccumulation phenomena consist of the accumulation or concentration of substances from the external environment to higher concentrations within an organism. Although commonly referred to as "food-web magnification," this concept is generally misapplied to aquatic organisms. Unlike terrestrial organisms, which do concentrate substances from lower to higher trophic levels, aquatic organisms tend to bioaccumulate directly from the environment through respiratory and other external body surfaces. Hence, if soluble substances are released into the water column during disposal then they may be incorporated into the body tissues of aquatic organisms. Such substances may include metals, hydrocarbons, pesticides, and similar materials (Kay 1984).

The aquatic food web is not expected to be altered by the disposal activity. Most marine food webs do not have well-defined trophic levels. Thus, energy flow in aquatic food webs is multi-directional. Tracing the pathway of a given species and relating potential for effects at a given area, such as the Alcatraz disposal site, would be difficult. One species may occupy several levels during its lifetime due to different feeding habitats at different stages of its life cycle. The disposal site occupies a small portion of the Bay-wide food web which is continually affected by natural processes. For example, sediment deposition in the Bay is determined by tide and tidal currents, water circulation and mixing characteristics, and wind-wave action. In addition, the relative magnitude of the deposition may be determined by size and distribution characteristics of sediments (Sustar 1977). Sorting effects as well as the magnitude of the effects of natural processes and human activities within the bounds of marine food web relationships would require extensive, complex research and may be inefficacious.

5. <u>Effects on special aquatic sites</u>

a. <u>Sanctuaries or refuges</u>. The wildlife refuges within San Francisco Bay are located in South Bay and North Bay along their respective shorelines. These refuges are wetland complexes and will not experience measurable effects from the disposal at the Alcatraz site.

b. Wetlands. Aquatic disposal operations at the Alcatraz site would have no direct impact on wetland areas since none are present in the vicinity of the site.

c. Mudflats. Aquatic disposal operations at the Alcatraz site would have little direct impact on mudflats. As discussed in the Dredge Disposal Study, San Francisco Bay and Estuary, the natural sedimentation process is dynamic and elaborate. Deposition of material on the mudflats within the Bay as a result of dredged material disposal at the Alcatraz site is inconsequential when placed in perspective of the overall system. The environment of deposition is determined by processes described previously, e.g., tide and tidal currents, water circulation and mixing characteristics, and wind-wave action.

d. Vegetated shallows. No significant effects.

e. Coral reefs. No coral reefs are found in San Francisco Bay.

f. Riffle and pool complexes. This applies to riverine ecosystems, and is not applicable to estuarine systems.

6. Threatened and endangered species. No threatened or endangered species will be affected by the disposal.

7. Other wildlife. No other wildlife species will be significantly impacted.

8. Measures to be taken to minimize effect. No measures to minimize impacts to the aquatic ecosystem and marine organisms have been considered appropriate.

F. Proposed Disposal Site Determinations.

1. Mixing Zone Determinations: The mixing characteristics at the Alcatraz site permit dispersal of unconsolidated dredged material. Because convective descent of dredged material discharged at the site conveys most of the material directly to the bottom, the initial mixing involves only a small percent of the material. The plume of material remaining in suspension immediately after disposal is diluted to ambient levels of suspended particulate matter in a few minutes. Plumes are transported in an east-west direction by tidal flows and very little dispersion in the north-south direction occurs. Plume monitoring suggests an eliptical mixing zone of 1 km^2, with the short axis of the elipse coincident with the

north-south site radius of the disposal site. Suspended sediment resulting from the discharge of 4000 m^3 of dredged material, with a bulk sediment density of 1300 g/l, distributed throughout the 1 km^2 mixing zone would be 0.02 mg/l. Disposal plumes persisting longer than fifteen minutes are not expected.

2. <u>Determination of Compliance with Applicable Water Quality Standards</u>: The results of the elutriate analysis indicate no potential for adverse effects. Although one parameter tested, residual petroleum hydrocarbon, did show a slightly higher concentration when compared with the ambient disposal site water, its concentration returned to an acceptable level over a short period of time. This parameter at the Alcatraz site after disposal is not expected to be detected in amounts over ambient concentrations. Additional test results should be available in late January.

3. <u>Potential Effects on Human Use Characteristics</u>:

a. <u>Municipal and private water supply</u>. Disposal of dredged material at the Alcatraz disposal site will not impact any municipal or private water supply.

b. <u>Recreational and commercial fishing</u>. Year-round disposal operations at the Alcatraz site have been in place for several years and natural seasonal variation in the distribution of Bay fisheries exists. The disruption at the Alcatraz site caused by the continual discrete release of suspended material may initiate avoidance by fish present in the neighborhood of the site. It has been recorded that, in some cases, disposal operations may also attract as well as cause avoidance (Stern and Stickle 1978). As the Alcatraz site is used for the disposal of dredged material on a continuing basis, the discharge of material from the Oakland Harbors is not expected to increase or decrease the recreational fishing value within the vicinity of the disposal site significantly. It is expected that fishing activities in the locality of the Alcatraz site may be affected during periods of increased disposal activity from the usual ongoing disposal activities. Increased avoidance of the site may occur during episodic disposal of dredged material from the Oakland project. The disposal activities may also limit the range of the fish in the vicinity of the Alcatraz site. However, the regional geographical catch is likely to remain unchanged for a given fishing season.

c. Water-related recreation. No other water-oriented recreation should be impacted significantly. Recreational craft, the occasional swimmer, and the increasingly frequent wind surfer will need to avoid disposal vessels and vice versa. As the disposal site is near the inbound navigation channel, transit of the area by even larger vessels is commonplace.

d. Aesthetics. Discharge of dredged material is from the bottom of the disposal vessels; any upwelling of turbidity or discoloration at the surface is minimal in scope, of short duration, and not visible unless viewed from directly overhead.

e. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, research sites and similar preserves. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, research sites or similar preserves would not be adversely affected by the proposed disposal. All project disposal will be confined within the boundaries of the designated Alcatraz disposal site located in open water south of Alcatraz Island. The Alcatraz disposal site has been in use continuously since the late 1800's. Alcatraz Island is the only park amenity area in close proximity to the disposal site. It is part of the Golden Gate National Recreation Area (GGNRA). Its surrounding boundary extends 275 m (300 yds) beyond the low-water line. A portion of the southern GGNRA boundary extends into the northern end of the disposal site area. Dredging and disposal are not prohibited within the GGNRA and no permits are required as these activities are consistent with existing statutes dealing with water and related resource development. The historically used disposal site will receive material similar to the existing substrate which is comprised of disposed sediment from numerous dredging projects throughout the Bay.

G. Determination of Cumulative Effects on the Aquatic System:

1. Physical substrate. Disposal of dredged material from the Oakland Project will not contribute to bathymetric changes at the disposal site. Removing the material retained at the site, or predredging an equivalent amount, mitigates any bathymetric impacts. Because the Alcatraz disposal site is filling, similar dredging of retained material for future use of the site may be warranted to avoid impacts. Cumulative impacts on the substrate away from the

vicinity of the disposal site are minimal. As the sediment dispersed from the site may contribute up to two percent of the suspended sediment in the overall Bay sediment regime, it follows that two percent of maintenance dredging each year may be attributable to disposal activity at Alcatraz. But because the amount of suspended sediment in the Bay regime is dependent upon currents and meteorological conditions and the bank of sediment available for resuspension surpasses tens of billions of cubic meters, no appreciable reduction in resuspension and subsequent maintenance dredging will occur if disposal is terminated.

2. Water circulation, water levels, and salinity. No significant cumulative effects.

3. Suspended particulate and turbidity. Turbidity and suspended sediments in the vicinity of the disposal site are elevated for brief periods in a localized area by disposal activity. Cumulative effects of disposal of dredged material from other projects occurring simultaneously may make these pulses of increased turbidity more frequent or occasionally cause more than one disposal plume to be present and dispersing in a given period. Two discharges of dredged material near to each other and at the same time will not occur. As stated above, the amount of suspended sediment in the greater Bay regime is dependent on tidal and meteorological conditions. dredged material resuspended after initial deposition replaces other sediments in the total sediment regime and does not increase or reduce overall suspended sediment load or turbidity in the Bay. Cumulative impacts from disposal of dredged material from other projects during the same time period or in sequence will not effect long term suspended sediment levels or turbidity.

4) Contaminants. The contribution of low level contaminants associated with dredged material from the Oakland Harbor project is a small one when viewed in light of the continuous influx of true source contaminants. Contaminants associated with dredged sediments that may be distributed throughout the Bay as a result of disposal from the Oakland Harbor project may be fractionally available to the array of marine organisms inhabiting the Bay. However, this is also applicable to all dredged material allowed to be disposed at the Alcatraz disposal site and for all marine sediments of the Bay that are naturally resuspended, redistributed, recirculated and redeposited in the system. San Francisco Bay is a natural estuarine system greatly influenced by human activities. Sediment contamination in San Francisco Bay is the result of input from the local population and industries as well as hinterland communities of the State through past and ongoing point and non-point discharges. As long as these inputs continue at even a rate acceptable to the public, surface water contamination, potential uptake by plants and animals, and risk to human health will remain possible problems.

5) Aquatic ecosystem and organisms. San Francisco Bay is subject to numerous overlays of natural, physical processes involving sediment transport, meteorological and hydrodynamic conditions and human activities including maritime trade, maintenance and new work dredging and disposal, municipal and industrial effluent, commercial and sportsfishing pressure, agricultural and urban runoff. It is within this complex that the amount of disposal activity must be viewed. The aquatic ecosystem of San Francisco Bay has long sustained the abuses of natural processes and human activities for over a hundred years. As such, many changes to the system have already occurred and will continue to occur. Wind-wave action on shallow areas and high currents in deep waters of the Bay present a hostile environment to which most established organisms have been acclimated. Suspended sediments are a part of the variable nature of the Bay and the continuous influence upon the ecosystem. The disposal of 5.4×10^6 m^3 (7.0×10^6 yd^3) at the Alcatraz disposal site over a two year period will increase the amount of material expected to be disposed at the Alcatraz site by approximately 30 percent in 1988 and 100 percent in 1989. Assuming that the material complies with water quality criteria, the resuspended and redistributed material resulting from disposal at the Alcatraz site will become a part of the immense sediment regime and will be insignificant to the aquatic ecosystem.

H. Determinations of Secondary Effects on the Aquatic Ecosystem. There are no significant secondary effects that would result from the disposal of dredged material from Oakland Harbor at the proposed Alcatraz site.

I. Appropriate and Practicable Steps Taken To Minimize Potential Impacts of the Discharge on the Aquatic Ecosystem: Although no special measures have been taken to eliminate open water disposal impacts, a site specific monitoring program at the Alcatraz disposal site during the construction of the Oakland project will be undertaken to better delineate the potential for particular effects from disposal activities. The following monitoring program will be coordinated with the Regional Board staff prior to disposal of the Oakland Harbor project:

1. A monthly hydrographic survey will be conducted during the construction period to determine bottom topography changes within and outside of disposal site boundaries.

2. Sediment traps will be set in the vicinity of the disposal site to determine areal extent of bottom impacts.

3. Turbidity measurements will be performed during the disposal activity to determine areal extent and levels. Water quality monitoring of particular parameters could also be included.

4. Current meters will be installed to collect prototype current data for additional modeling inputs.

5. Trawling in the vicinity of the disposal site (bottom and mid-water) to determine the presence/absence of target species.

6. Bottom sampling will be conducted. The following objectives would define the sampling program:

a. characterize material outside of the site boundaries

b. sample for potential species diversification or introduction of nuisance species

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ATTACHMENT A1
ECOLOGICAL EVALUATION TESTING
AREAS ADJACENT TO SCHNITZER STEEL COMPANY AND ALAMEDA GATEWAY

I. SAMPLES

A. Total Cores - Seven taken to proposed depth (-44 feet, MLLW); 3 within the turning basin area adjacent to Schnitzer Steel Company and 4 within the turning basin area adjacent to the former Todd Shipyards (Adjacent lands presently owned by the Alameda Gateway).

B. Samples are to be analyzed separately to determine the extent of any contamination.

II. CHEMICAL AND PHYSICAL ANALYSIS OF SEDIMENTS

A. Metals

1. Antimony
2. Cadmium
3. Chromium
4. Cyanide
5. Copper
6. Lead
7. Mercury
8. Nickel
9. Silver
10. Zinc
11. Selenium
12. Thallium
13. Mono-, di- and tributyltin

B. Organics

1. Chlorinated pesticides
2. PCB's
3. PAH's
4. Total Pthalates

C. Phenols

D. Oil and Grease

E. Total and Water Soluble Sulfides

F. Grain size

III. BIVALVE LARVAE BIOASSAYS (7 bioassays, one for each core)

Reference sediment = Alcatraz sediments;
Reference water = Alcatraz water;
Control water = Culture water

FINDING OF COMPLIANCE
FOR THE
CONSTRUCTION AND MAINTENANCE OF
THE OAKLAND HARBOR NAVIGATION IMPROVEMENT PROJECT
ALAMEDA COUNTY, CALIFORNIA

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

2. Other open-water disposal sites in the Bay were considered, but are located in either more shallow water than found at the Alcatraz site or at a greater haul distance from the project area. The large amount of material from Oakland Harbor was considered to be more appropriately disposed closer to the Golden Gate at the Alcatraz disposal site. Potential residency of dredged material in the Bay system is shortened when it is moved and disposed of closer to the Golden Gate. This concept has been employed for many years in using the Alcatraz disposal site as a dispersive site. Material accumulation at the Alcatraz disposal site has resulted in the reassessment of a number of disposal alternatives including (1) land disposal, (2) disposal at the Alcatraz site only as authorized, (3) a combination of Alcatraz disposal and ocean disposal, and (4) ocean disposal. Land disposal (both in wetland and upland areas) was determined to be not feasible due to the amount of material to be dredged, the availability of an appropriate land site to accommodate the material, and the potential costs related to land acquisition, haul distance, and site development and maintenance. Disposal at the Alcatraz site would result in material accumulation at the site that would be undesirable to continuing annual disposal activities. Ocean disposal was also considered, but the high costs associated with this alternative makes it much less desirable than the selected alternative. Alcatraz disposal for the Oakland Harbor project in conjunction with ocean disposal of material from the Alcatraz site is the less costly, environmentally acceptable alternative.

3. The disposal of dredged material at the Alcatraz disposal site will not violate any applicable State water quality standards and will comply with the Section 404(b)(1) requirements. The disposal operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

4. Use of the selected disposal site will not harm any endangered species or their critical habitat.

5. The proposed disposal of dredged material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife will not be adversely affected. Documented research indicates that turbidity

and suspended solids concentrations typically created by most dredging and disposal operations are of short duration and are unlikely to produce severe and irreversible ecological effects. Possible exceptions to this generalization are coral reefs and other communities especially sensitive to turbidity, which would not likely be found in the naturally active San Francisco Bay environs. Disposal of dredged material at the Alcatraz site is expected to result in a temporary, localized increase in suspended solids in the water column. This will only last for a few minutes until the sediments are completely dispersed by currents. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values are not likely to occur.

6. Although no specific measures to minimize potential impacts of the discharge on aquatic systems have been developed, several monitoring activities have been proposed. These activities include (1) bathymetric surveys to measure bottom area covered by fine-grained material within and outside of disposal site boundaries; (2) turbidity measurements to determine areal extent thereof and to provide additional input to modeling efforts (water quality monitoring of particular parameters may also be included); (3) installation of current meters to collect additional data for field verification and modeling purposes; (4) trawling (bottom and mid-water) to determine presence/absence of target species in the vicinity of the site; (5) placement of sediment traps to determine areal extent of bottom deposits; and (6) bottom sediment sampling to characterize material outside of the site boundaries and to sample for potential species diversification or introduction of nuisance species.

7. On the basis of the guidelines the proposed discharge site for the disposal of dredged material is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the affected aquatic ecosystem.

DATE: 22 January 1988

Galen H Yanagihara

GALEN H. YANAGIHARA
Colonel
District Engineer

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

November 5, 1987

Environmental Branch

Mr. Roger James
Executive Officer
San Francisco Bay Region
Regional Water Quality Control Board
1111 Jackson St., Rm 6040
Oakland, CA 94607

Dear Mr. James:

We have received your letter, dated October 9, 1987, requesting a 15-day extension on comments to our Draft Supplemental Environmental Impact Statement (EIS) on our authorized Oakland Harbor Navigation Improvement Project, Alameda County, California. We will grant you the requested 15-day extension. The matter of the $10,000 filing fee is still under consideration and will be addressed by separate correspondence.

We appreciate your expeditious review of our Draft Supplemental EIS and look forward to obtaining the Board's certification.

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

GEORGE DEUKMEJIAN Governor

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

October 9, 1987
File No. 2198.11(SAH)

Colonel Galen H. Yanagihara
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94101

ATTN: Environmental Branch

Subject: Corps dredging of Oakland Inner and Outer Harbors

Dear Colonel Yanagihara:

We have received your September 23 letter in which you request a State water quality certification action on a proposed Corps dredging project in Oakland Inner and Outer Harbors. The project would deepen navigation channels to 42 feet below MLLW and dispose of about 6.5 million cubic feet of material. Disposal would be at the Alcatraz site, with pre-dredging of the Alcatraz site to an ocean disposal site.

This project falls above the threshold for a waiver of water quality certification by staff, pursuant to the Regional Board's May 1987 waiver resolution. Therefore, this letter serves as notification within the 60 day review period as required by 33 CFR 325.2(b)(ii) that the Regional Board does not waive water quality certification for this project at this time. I request that the Corps submit an application for water quality certification.

Your September 23 letter included many of the necessary elements of the application: project description, environmental review document (Supplemental EIS), and sediment bioassay results. In order to be considered complete, the application should also include a final environmental document and a filing fee of $10,000 (see attached fee schedule). The Porter Cologne Act and its regulations require the Regional Board to require a filing fee for applications of this sort (Section 13260(e) of Act, 23 CAC Section 2200, and p.61 of Administrative Procedures Manual).

According to Section 401(a)(1) of the Clean Water Act, the State must act on the request for certification within a reasonable period of time, not to exceed one year from the submittal of a complete certification package to the Regional Board. Due to the complexity of the issues presented in this certification request (e.g. potential threat to groundwater aquifers), we specifically request that the District Engineer determine that more than 60 days is needed and reasonable for the State to act. We expect that it will require no more than 90 days from the date of completed application to review the proposed project.

I also request a 15-day extension of the comment deadline for the Supplemental EIS (November 9 to November 24). Our Regional Board meets only once per month, and this would allow the Board to review and authorize comments on this environmental document at its November 18 meeting. I feel that comments from the Board, rather than staff, would carry more weight, given the complex water quality issues raised by this proposed project. The extension would also allow us to complete discussions with your staff on the subject of additional monitoring of aquifer impacts.

If you have any questions about this matter, please contact Teng-chung Wu at (415) 464-0899 or Stephen Hill at (415) 464-4399 of my staff.

Sincerely,

Lawrence P. Kolb
for
ROGER B. JAMES
Executive Officer

Attachment: Fee schedule

cc: Barbara Evoy, SWRCB
Carl Hague, DWR

TYPE OF WASTE DISCHARGE AND DESCRIPTION	UNITS	FEES[1]		
DOMESTIC and MUNICIPAL Sewage or mixture of predominately sewage and other wastes from districts, municipalities, communities, hospitals, schools, and publicly or privately owned systems (excluding individual subsurface leaching systems disposing of less than 1,000 gallons per day)[3].	mgd[2] DESIGN FLOW	LESS THAN 0.5 mgd	FROM 0.5 mgd TO 10.0 mgd	GREATER THAN 10.0 mgd
		$1,000	$2,000 X design flow in mgd	$20,000
INDUSTRIAL Liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, waterwell pumping.	mgd[2] DESIGN FLOW or MAXIMUM RATE of DISCHARGE	LESS THAN 0.25 mgd	FROM 0.25 mgd TO 5.00 mgd	GREATER THAN 5.00 mgd
		$1,000	$4,000	$20,000
	STORMWATER, OR FLOW NOT SUSCEPTIBLE TO MEASUREMENT OR ESTIMATE		$2,000	
EARTHEN MATERIALS Waste containing earthen materials including soil, clay, silt, and sand from any soil disturbing activity such as grading and movement of earth, road construction and development, logging operations, dry quarrying. Includes Group C mining waste.	ACRES- AREA IN WHICH SOIL WILL BE DISTURBED	LESS THAN 50 ACRES	50-500 ACRES	GREATER THAN 500 ACRES
		$500	$10 /ACRE	$5,000
DRILLING AND EXPLORATORY MINING OPERATIONS		[illegible] for all exploratory operations within a zone having a radius of one mile or less. $1,000 for all operations within a zone having a radius greater than one mile.		
IRRIGATION RETURN WATER		FLAT FEE $50		

NEW

DISCHARGE OF WASTE TO LAND[4]		
Class I Unit	: Liquid, solid, or dry solid HAZARDOUS waste. Includes Group A mining waste (Former Class I Site)	Flat Fee $20,000[5]
Class II Unit	: Liquid, solid, or dry solid DESIGNATED waste. Includes Group B mining waste (Former Class II 1 Site)	Flat Fee $20,000
Class III Unit	: NONHAZARDOUS solid waste. (Former Class II-2 Site)	Flat Fee $10,000
Unclassified Unit	: Inert waste (Former Class III Site)	Flat Fee $1,000

TYPE OF WASTE DISCHARGE AND DESCRIPTION	UNITS	FEES		
DREDGING Dredging operations with spoils disposal, such as navigational dredging, marine development and stream bed modifications.	QUANTITY OF MATERIAL TO BE DREDGED	UNDER 25,000 CUBIC YARDS $500	25,000-500,000 CUBIC YARDS $20 X thousands of cubic yards	OVER 500,000 CUBIC YARDS $10,000
Product dredging such as sand, gravel or mineral removal	MAXIMUM DAILY PRODUCTION RATE	UNDER 250 TONS/DAY $500	250-5,000 TONS/DAY $2 X TONS/DAY	OVER 5,000 TONS DAY $10,000
Confined animal feeding, confined holding, confined aquatic animals, and aquaculture	MAXIMUM YEAR ANIMAL WEIGHT AND/OR PLANT WEIGHT	MINIMUM $500	$2 per 1,000 Pounds Gross Weight	MAXIMUM $2,000
Deletion	The filing fees for deletion will be based on the fee which accompanied the initial report of waste discharge plus an annual adjustment for inflation based on the consumer price index, not to exceed 6%. If an initial report of waste discharge was not filed prior to May 1981, the filing fee will be based on the schedule for confined animal feeding.			

MTW

1. Fees are rounded off to the nearest dollar.

2. mgd--millions of gallons per day.

3. Individual subsurface leaching systems disposing of less than 1,000 gallons per day of domestic waste may be subject to a $100 filing fee.

4. POST-CLOSURE MAINTENANCE ACTIVITIES

   For dischargers which have had Waste Discharge Requirements issued in accordance with the 1984 revisions to Subchapter 15, then base fee shall be 40 percent of the base fee for the appropriate waste type.

   For dischargers which have not been issued Waste Discharge Requirements in accordance with the 1984 revisions to Subchapter 15, then the base fee shall be 100 percent of the base fee for the appropriate waste type.

5. Where surface impoundments are the only waste management unit, and a hydrogeologic Assessment Report is required to be submitted then the base fee shall be 50 percent of the base fee for Class I waste.

6. Includes concentrated animal feeding operations and concentrated animal production facilities.

Authority: Water Code, Section 1058

Reference: Water Code, Section 13260

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

September 23, 1987

Environmental Branch

Mr. Roger B. James
Executive Officer
California Regional Water Quality
Control Board, San Francisco Bay
Region
1111 Jackson Street, Room 6040
Oakland, California 94607

Dear Mr. James:

Pursuant to Section 404 of the Clean Water Act of 1977 (33 USC 1251 et seq.) the U.S. Army Corps of Engineers has prepared an 404(b)(1) evaluation for the proposed deepening of the Outer and Inner navigation channels of the Oakland Harbors. The project was authorized by the Water Resources Development Act of 1986 (99th Congress, 2nd Session, P.L. 99-662). The 404(b)(1) evaluation is included in the enclosed, "Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Draft Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, Alameda County, California". (Please see Appendix D and Appendix A of the draft SEIS).

At the request of the Regional Water Quality Control Board, ground water studies have been conducted and coordinated with Dr. Teng-Chung Wu of your staff, Ms. Barbara Evoy of the State Water Resources Control Board, and Mr. Carl Hauge of the Department of Water Resources. The result of the Corps' studies and subsequent studies conducted by the Department of Navy indicated that the shallow Merrit/Posey aquifer is not a viable resource, and that it was exposed by natural geomorphic processes along the Oakland/Alameda shoreline prior to extensive urban development. Of greater concern is the deep-water aquifer of the Alameda Formation and the protecting aquitard. The depth to the aquitard is -60 to -70 feet MLLW. The proposed construction depth of the Oakland Channels is -42 feet MLLW, thus the project will have no effect on the either the Merrit/Posey aquifer, the Alameda Formation aquifer, or the protecting aquitard.

Pursuant to Section 404(t) of the Clean Water Act, we request a State water quality certification or waiver for the proposed project under Section 401 of the Act. Please provide your response within forty-five (45) days from your receipt of this letter.

Questions regarding this matter may be directed to Ms. Patricia Duff (415/974-0441) or Mr. Dennis Thuet (415/974-0330).

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

Copy Furnished:

Ms. Barbara Evoy, State Resources Control Board, Division of Water Quality, 901 P. Street, Sacramento, CA 95814

Mr. Carl Hague, Department of Water Resources, 1416 Ninth Street, Room 215-4, Sacramento, CA 95814

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

July 3, 1987
File No. 2199.9237 (TCW)

Mr. Dennis Thuet
U.S. Department of the Army
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Subject: Oakland Channel Improvements - Groundwater Study and Monitoring Program, January 15, 1987

Dear Mr. Thuet:

We have completed our review of the subject study report with assistance from Ms. Barbara L.Evoy of the State Water Resources Control Board, and Mr. Carl Hauge of the State Department of Water Resources. Their comments are presented in Evoy's memo of June 11, 1987 to me, a copy of which is enclosed for your review.

We are pleased that the report is the first good compilation of geologic and hydrogeological data for the area immediately landward of proposed dredging projects in the Oakland area. After you have reviewed our comments, we would like to schedule a meeting to discuss our comments and the implementation of the proposed monitoring program.

Please call me at (415) 464-1255 when you are ready to meet with us.

Sincerely Yours,

Teng-Chung Wu

Teng-Chung Wu
Municipal Division
Chief

Enclosures

cc: Barbara L. Evoy, SWRCB
Carl Hauge, DWR

State of California

Memorandum

To : Dr. Teng Chung Wu
San Francisco Bay Regional Board

Date : JUN 11 1987

Barbara L. Evoy, C.E.G. 1273
Associate Engineering Geologist
Hydrogeology Section

From : STATE WATER RESOURCES CONTROL BOARD

Subject: ARMY CORPS OF ENGINEERS' PROPOSED GROUNDWATER MONITORING PROGRAM, OAKLAND CHANNEL IMPROVEMENTS

Pursuant to your request, I have reviewed the following documents submitted by the Army Corps of Engineers (ACE), dated January 15, 1987:

1. Groundwater Monitoring Program, Oakland Channel Improvements, Groundwater Study (GWMP)

2. Hydrogeologic (Geologic-Geohydrologic) Appendix, Groundwater Monitoring Program, Oakland Channel Improvements, Groundwater Study (Appendix)

3. Hydrogeologic Appendix, Attachment 1A, Geologic Data Points Summary Sheets, Hydraulic Conductivity Data and Lithologic Logs for Geologic Data, Points 1 through 224 (Attachment 1A)

4. Hydrogeologic Appendix, Attachment 1B, Lithologic Logs for Geologic Data, Points 225 through 497 (Attachment 1B)

These reports provide the first compilation of geologic and hydrogeologic data for the area immediately landward of proposed dredging projects in the Oakland area. The ACE consultants appear to have done a thorough job in uncovering the major sources of this data. The collection of this information is to be commended.

The available data, however, are still too few to characterize both the present hydrologic and water quality conditions and the potential impacts of the proposed dredging. As stated on page 34 of the GWMP, ground water monitoring and data collection are necessary to provide sufficient data for analysis. Critical aquifer parameters, seasonal and tidal ground water gradient information, and water quality information remains unknown.

The GWMP attempted to address three issues that were apparently relayed to the consultants as representative of Regional Board concerns. These issues, discussed below, do not represent the Regional Board's historic concerns with these and other dredging proposals in the Oakland Harbor area.

To more fully characterize the impact of the dredging projects, the ACE has proposed ground water monitoring and modelling programs which appear appropriate. Specifics of the programs, however, would benefit from a phased initial data collection effort. Refinements could then be made to more efficiently collect the necessary information.

The following are my specific comments:

A. The GWMP is difficult to review because of the chosen format, the lack of a consistent data base, the apparent lack of correlation between statements in the Summary and the documents, and the inaccurate presentation of Regional Board concerns. The GWMP discusses three "conditions leading to future impacts" apparently set out in a Scope of Services developed by the ACE. While these three "conditions" are stated as representing Regional Board concerns, they do not appear to be issues raised by the Board over the last three and one-half years. Individual issues are:

1) "An increase in the depth of saline water due to deepening the harbor channel".

Neither the Regional Board nor the Department of Water Resources (DWR) has expressed a concern that saline intrusion into the shallow coastal aquifers may be enhanced by increased depth of marine water brought about by channel bottom lowering.

The Regional Board has expressed concern, however, that removal of more bay mud would change head losses and gradients through the low permeability material, and would increase the total surface area of sediments exposed to saline water, allowing the saline front to move further inland. This issue was also raised by the DWR reports of 1981 and 1982.

The consultant's analysis on pages 10 and 11 of the GWMP is unclear. Permeability of the bay mud is stated as both 0.001 to 0.0001 ft/day and 0.028 ft/day. The value used in the calculation is 0.0028 ft/day. This value is potentially 28 times faster than estimated permeabilities. In addition, effective porosity is defined as 0.25. This value is more appropriate for gravelly sands and fine gravel than it is for bay mud. Bay muds would be expected to have effective porosities in the range of 0.02 to 0.07. It is also unclear why "following dredging,...the thickness of the bay mud beneath the channel will remain within the same range" as currently exist. Dredging will remove bay mud and thereby reduce the thickness of the bay mud layer.

The consultants conclude the analysis on page 11 by stating that the effects of removing bay mud can be potentially great upon the seepage rate. Thus, it is confusing why the Summary does not discuss this potentially significant aspect.

Removal of the bay mud has not been addressed in terms of the saline/fresh water interface position. As indicated by the equation shown on page 20 of the GWMP, the inland distance of the salt water wedge toe is directly related to the permeability of the material. The greater the permeability, the greater the distance inland. Thus, removal of the low permeability muds would appear to increase distance of saline water inland.

ii) "An increase in area of exposed aquifers due to berthing area and harbor channel deepening and widening, and turning basin construction".

This has been a stated concern of the Regional Board and DWR. The discussion and analysis in the GWMP report, however, do not address the worst case scenario of dredging - maximum depth with a two foot overdredge - nor does it appear to evaluate the increase in both horizontal and vertical exposure. The map data base used for area calculations appears to provide a difference in only horizontal exposure. Both vertical and horizontal increases in surface area exposed to dredging should be considered. Additional calculations should be performed incorporating the increased exposure area associated with the two-foot overdredge.

Statements implying that bay mud is kept in suspension by passing ships in the channel, and is thus an inefficient barrier (page 9), are unsupported. Boring information indicates that a significant bay mud layer exists over much of the proposed channel area.

iii) "An increase in demand for water from the aquifers either by larger pumps, more pumps, increased pumping time, or a combination of the three".

In meetings with the ACE and the Navy, the Regional Board has repeatedly stressed the need to determine both the current and future beneficial uses of ground water in potentially affected areas. While the analysis called for in item iii, above, may be incorporated to some extent in these undertakings as well as in the discussion of mitigation measures, evaluation of demand has not been a specific focus of Regional Board concern.

The GWMP has not yet adequately addressed the issue of current and potential beneficial use. The statement found in the Executive Summary "There is no positive evidence of a present utilization of the water in the Merritt/Posey Aquifer" is very misleading. There are many wells screened in the Merritt/Posey Aquifer in the Oakland Bayshore Area. Table 3-2 in the GWMP shows recorded well yields for some of these. Lack of detailed information concerning yield and use of other Merritt/Posey wells should not be construed as "nonuse". In addition, depiction of wells with no recorded well yields as "0" gallon per minute of recorded well yield on both Table 3-2 and Plate 1 is not necessarily correct. Where there is no record for the wells listed in the tables, the tables should clearly indicate "No record", or "No data". Table 3-2 of the GWMP should also be checked for accuracy against Table 1 of DWR's 1982 report. There appear to be inconsistencies between well numbers and usage.

The Summary ignores the beneficial use issues associated with the Alameda Formation. Many private wells produce water from the Alameda Formation. Some wells draw from both the Merritt/Posey and the Alameda Formations. Thus, unless hydraulic isolation can be demonstrated, the impacts on the beneficial uses of the Alameda Formation must also be considered.

In addition, the Summary states that "if future demand on the aquifer were to arise, the water supply could be expected to be undependable and of questionable quality". Again, this statement is unsupported by data in the documents.

These inconsistencies and misinterpretations of Regional Board concerns have led to a misdirected emphasis in the GWMP. The above mentioned changes should be made to the documents. In addition, the Scope of Services referred to on pages 1 and 2 of the GWMP should be submitted to the Regional and State Boards for completeness and review.

B. To evaluate potential impacts of dredging, the geology and hydrogeology of the region needed to be defined. Page 2 of the GWMP states that certain tasks were required of the consultant by the ACE. The consultant was to a) perform a "literature search for all available subsurface and stratigraphic data pertinent to the groundwater resources of the area" and b) "identify and evaluate any possible areas or sources for hydrologic continuity between aquifers...and to describe any expected impacts to them as a result of channel deepening".

The consultant appears to have done a very good job of collecting pertinent geologic information in the study area. However, correlation of this geologic information appears to be schematic only, as on Plate VII of the Appendix. Detailed geologic cross sections are necessary to evaluate potential stratigraphic interconnection and geometry. Available information should be used to redraft specific cross sections of the dredged areas and regions of proposed ground water monitoring. Individual data points should be noted on the cross sections. Areas of particular interest underlying the proposed channel deepening sites should be particularly detailed.

The available information, as presented, does not appear to adequately address potential interconnection between the Merritt/Posey aquifer and the Alameda Formation. For complete impact analysis, this potential must be evaluated.

C. In performing a hydrogeologic assessment of potential saline intrusion, the consultants found the following data limitations: 1) the geometry of the aquifer is only roughly approximated; 2) no regional synoptic data are available for hydraulic head calculations; 3) chloride ion distribution has only been sporadically measured; and 4) aquifer parameters have not been determined. This led them to state "In order to fully carry out the tasks, such as the evaluation of the probability of future impacts and the development of a monitoring program...it is proposed that each of the necessary data items be collected as part of the monitoring program".

A phased approach to data collection seems prudent. Limitations on water quality data, aquifer parameters and hydraulic gradient data have resulted in crude estimations of the saline interface. These estimates may be substantially in error.

Before a ground water monitoring scheme can be formalized, a technical rationale for well placement should be developed. The Ghyben-Herzberg equation used to approximate the saline interface assumes isotropic, homogeneous conditions, where seaward freshwater flow, permeability, and aquifer thickness (saturated thickness) are known. While such assumptions may crudely approximate conditions, additional data are necessary to prove the validity of such assumptions and conclusions.

Approximate ground water gradients were estimated from scattered data taken over 30 years, regardless of year, season, or tidal cycle. Some of these approximations are in apparent disagreement when compared to actual data presented for individual sites, such as Site 469, in the Appendix. There, values ranging from -12.1 to -18.4 feet Mean Lower Low Water (MLLW) have been recorded for water level elevation. Plate VIII of the Appendix indicates the values should be greater than +4-foot MLLW. Table 3-6 of the Appendix shows that Site 472 is affected by a tidal range of up to 15.6 feet. Thus, use of this "nontemporal", i.e., nonsynoptic, data in saline front determination is highly questionable.

The calculations used to determine that the saline front approximates the "nontemporal" +4-foot MLLW contour are not clear. The GWMP states that "it is possible to use the approximate ground water gradients along with regional aquifer hydraulic conductivity data...and aquifer thickness data...to predict that the toe of the salt water/fresh water wedge will possibly lie in the zone between mean sea level and the approximate +4-foot MLLW groundwater elevation contour" (page 20 and 21). The document does not show how this "prediction" was arrived at. No calculations are shown. The GWMP goes on to state, however, that "without specific hydraulic head distribution data and chloride ion concentration data the approximate location of the Ghyben-Herzberg line cannot be determined within this zone".

Examination of Plate 2 of the GWMP, indicates that the +4-foot MLLW contour is not a consistent distance from the shoreline, yet the solution of the equation on page 20 yields a fixed "L", which is the distance of the salt water wedge toe from the seaward salt water interface at the coastline. It is not clear how the +4-foot MLLW contour can be depicted as the inland extent of the saline wedge in this situation.

This issue becomes of great importance in the review of the proposed ground water monitoring plan. The predicted +4-foot MLLW contour is used to determine the location of the proposed monitoring well system. The proposed well cluster cross sections are to begin near the shoreline and progress inland to the approximate location of the +4-foot MLLW contour. In light of the uncertainties associated with the location of this contour and its questionable relation to the saline front, it would seem prudent to define the saline intruded area more accurately before drilling the monitoring wells. The ACE should explore the possibilities of locating recorded wells and performing chloride analysis on them or using geophysical methods to locate the inland extent of intrusion.

D. The rationale for the monitoring well and pump test well locations is not clear. The position of the pump test well, monitoring cross sections and individual clusters should be discussed in terms of usability for future modelling efforts and impact analysis. Without this kind of analysis, it is not possible to evaluate potential effectiveness of this system.

E. It is recommended that drilling and well construction procedures utilize: a) geophysics to determine saline depth; b) a larger than 3-inch inside diameter auger to ensure adequate filter pack placement around 2-inch diameter wells; c) continuous lithologic sampling or a minimum sampling interval of every 5 feet and change in lithology; d) the Unified Solid Classification System for lithologic descriptions, performed under the direct supervision of a Registered Geologist; e) accepted filter pack and slot size determinations based on individual lithologic units to be screened instead of using a standardized selection for all formation materials; f) tremie techniques for placement of bentonitie pellets and filter pack materials; and g) the initial lithologic log for all wells in a cluster only if wells are sufficiently close together, QA/QC sampling indicates lithologies of first boring are applicable, and sampling of individual screened intervals occurs.

F. The well survey following well completion should include elevations in both mean sea level (MSL) datum and MLLW datum so that existing boring logs and developed information can be correlated with existing data that are referenced to either MLLW or MSL.

G. The sealing method for the proposed pump test well is unclear. How is the well to be constructed from the surface to the top of the bentonite seal? It will be necessary to ensure that the pump test well does not act as a conduit for shallow ground water to the screened zone. Abandonment of pumping well(s) and observations wells should be performed using Alameda County well abandonment standards.

H. Well development logs should be submitted for all wells used in the sampling program. Information on the well development logs should include well number, date, method of development, volume of material removed, method of disposal, clarity (in N.T.U.'s) of water with volume pumped, and rate of pumping. Water Well Drillers' Reports should be submitted to DWR.

I. In addition to the proposed pump test, the ACE should consider the use of additional pump tests and/or slug tests in other wells to provide a larger area evaluation of aquifer characteristics. The regional applicability of a single pumped well test may be limited.

J. Ground water monitoring protocol should include the use of a bottom emptying device if a bailer is used. Teflon bailers are recommended. Purging records should be submitted with ground water quality results to verify that field indicator parameters have stabilized.

BEVCY:lhall

FILE: COEOKLND:BE

GROUNDWATER MONITORING PROGRAM

Oakland Channel Improvements

Groundwater Study

Prepared for:

UNITED STATES

DEPARTMENT OF THE ARMY

San Francisco District

Corps of Engineers

211 Main Street

San Francisco, California 94105-1905

Prepared by:

GEO/RESOURCE CONSULTANTS, INC.

851 Harrison Street

San Francisco, California 94107

Under subcontract to:

JayKim Engineers, Inc.

January 15, 1987

EXECUTIVE SUMMARY

The United States Department of the Army, San Francisco District, Corps of Engineers, in conjunction with the Port of Oakland and the United States Navy, are planning for the improvement of the harbor channels of the Oakland Inner, Outer, and Middle Harbors, the Alameda Naval Ship Channel, and the berthing areas along the channels. The issue of groundwater quality degradation within the existing aquifers of the area as a result of channel improvements was raised by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). In order to address the issues raised by the RWQCB, the Corps of Engineers have issued contract DACW07-86-D-0007 to conduct a groundwater study of an area consisting of the Oakland Inner and Oakland Outer Harbors, West Oakland, and Alameda Island, located along the east side of San Francisco Bay, at the cities of Oakland and Alameda, Alameda County, California. This geographic area is herein defined as the Oakland Bayshore Area.

Two separate aquifers are identified in the Oakland Bayshore Area: the Merritt/Posey Aquifer consisting of the shallow Merritt sands and Posey sands that are considered to represent a single hydrostratigraphic unit based upon reviewed borehole data in this study; and the less formally defined "Alameda Aquifer" consisting of the underlying Alameda Formation comprised of upwards of 800 feet or more of alternating sands, silts, and clays. The San Antonio Aquitard consisting of the Antonio Formation and a thin, upper, clay rich portion of the Alameda Formation separates the above defined aquifers. The Merritt/Posey Aquifer is the subject of this investigation and has been characterized as thoroughly as available data permits. The aquifer characterization is provided in the Hydrogeologic Appendix.

Based on available information a hydraulic assessment was conducted of the Merritt/Posey Aquifer relative to the issues raised by the RWQCB. The issues raised and a summary of the response follows.

a. An increase in the depth of saline water due to deepening the harbor channels.

Increasing Bay water depth along the channels will not result in an increase in the salt water hydraulic head entering into the calculations of the position of the salt water/fresh water interface or of other aspects of salt water intrusion.

b. An increase in area of exposed aquifers due to berthing area and harbor channel deepening and widening, and turning basin construction.

The Merritt/Posey Aquifer is already exposed below sea level throughout more than half of the channel improvement area, as well as elsewhere in the study area. The project will increase channel floor exposures by 25 ~~41~~ percent. Increased aquifer area exposure affects the time interval over which aquifer response to changes can be expected but does not induce salt water intrusion. Further, it was emphasized that numeric groundwater modeling of the Oakland Bayshore Area is necessary to quantify this relatively complex aspect.

c. An increase in demand for water from the aquifers either by larger pumps, more pumps, increased pumping time, or a combination of the three.

There is no positive evidence of a present utilization of the water in the Merritt/Posey Aquifer. If a future demand on the aquifer were to arise, the water supply could be expected to be undependable and of questionable quality. Furthermore, a future utilization of the Merritt/Posey Aquifer can be expected to induce or enhance salt water intrusion even if the current state of the channel floors remains unaltered.

A groundwater monitoring program is presented that is capable of addressing the issues raised by the RWQCB. The monitoring program is designed to allow collection of sufficient groundwater data to permit determination of the present aquifer conditions along the shoreline, to allow determination of the impacts of the proposed channel improvements using groundwater modeling techniques, and to allow an interactive assessment of the monitoring program during its implementation, thereby permitting the ongoing monitoring program to be improved as it develops. Finally, the monitoring program will allow an assessment of additional data collection and monitoring needs that may be necessary for predictive groundwater impact modeling of future development of the Merritt/Posey Aquifer in the Oakland Bayshore Area.

It is important to note that completion of the channel improvements proposed by the United States Army, Corps of Engineers will not in itself cause a degradation of the groundwater resource of the Merritt/Posey Aquifer. Potential future developers of the groundwater resource of the Merritt/Posey Aquifer may increase salt water intrusion and will need to consider these effects in their development plans, regardless of whether or not the channels are improved. The benefits of implementation of the monitoring program must be considered relative to the benefits of the channel improvement project and potential benefits of groundwater development.

BAY CONSERVATION AND DEVELOPMENT COMMISSION

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

March 8, 1988

Environmental Branch

Mr. Alan Pendleton
Executive Director
San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue
San Francisco, CA 94102

SUBJECT: Request for Concurrence with Consistency Determination on the Oakland Harbor Deep-Draft Navigation Improvements Project (BCDC Consistency Determination No. CN 12-87)

Dear Mr. Pendleton:

Pursuant to Section 930.34 of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulation (15 CFR 930 et. seq.) the Corps of Engineers, San Francisco District has determined that the proposed Oakland Harbor Deep-Draft Navigation Improvements Project is consistent to the "maximum extent practicable" with the San Francisco Bay Plan (Enclosure). The enclosed Consistency Determination addresses the Federal plan of improvement for both the Oakland Outer and Inner Harbors in order to permit safe and more efficient navigation of deep-draft container vessels. The Oakland Harbor Deep-Draft Navigation Improvements Project was authorized by the Water Resources Development Act of 1986, 99th Congress, 2nd Session, PL99-662.

Based on conversations between Ms. Joan Lunstrom and Mr. Roger Golden of our respective staffs, the Corps will submit to BCDC, under separate cover, a request to amend Consistency Determination No. CN 13-85 in order to provide for the annual maintenance dredging quantities following the navigation improvements to the Oakland Harbor Channels.

BCDC concurrence with Consistency Determination No. CN 12-87 is respectfully requested pursuant to 15 CFR 930.41 of the NOAA Federal Consistency Regulations.

If you have any questions or require additional information, please contact Mr. Golden at (415) 974-0444.

Sincerely,

Galen H Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

The U.S. Army Corps Of Engineers, San Francisco District
Consistency Determination On The
Oakland Harbor Deep-Draft Navigation Improvements Project
(BCDC Consistency Determination No. CN 12-87)

This Consistency Determination has been prepared in compliance with the Coastal Zone Management Act of 1972, Section 307 (Title 16, U.S.C. Section 1456(c), which states that Federal actions must be consistent with State coastal management programs to the maximum extent practicable. Sections of the approved San Francisco Bay Plan, the program managing this area under the State of California Coastal Management Program, applicable to the Oakland Harbor Deep-Draft Navigation Improvements Project are Bay Plan policies on Fish and Wildlife; Water Pollution; Dredging; and Ports.

Project Description (Reference Exhibits A, B, C,and D)

The specific improvements to be undertaken within BCDC's jurisdiction include the following:

The Port of Oakland consists of an Outer Harbor, a Middle Harbor, and an Inner Harbor. The entrance channel to the Outer, Middle, and Inner Harbors is known as the Bar Channel.

Oakland Outer Harbor includes the Oakland Bar Channel, an Outer Harbor Entrance Channel, an Outer Harbor Turning Basin Reach, and the North End Reach. The proposed plan of improvement for Oakland Outer Harbor is to deepen the existing 3.4 mile Outer Harbor Channel from 35 feet below mean lower low water (MLLW) to 42 feet below MLLW, and to relocate, deepen, and enlarge the turning basin.

Oakland Inner Harbor is 8.5 miles long and includes an Inner Harbor Entrance Reach, an Inner Harbor Reach, the Brooklyn Basin Reach, Park Street Reach and a Tidal Canal that connects with San Leandro Bay at Project Mile 8.5. The proposed plan of improvement for Oakland Inner Harbor is to deepen approximately 4 miles of channel between the Entrance Channel Reach and the Clay Street Pier from 35 feet below MLLW to 42 feet below MLLW. Also, the channel will be widened at the Inner Harbor Entrance, at Project Mile 3 of the Inner Harbor Channel, and at the upper project terminus. In addition, a turning basin will be constructed.

An estimated 7.0 million cubic yards (cys.) of material will be dredged from the Oakland Harbor Deep-Draft Navigation Improvements Project. Of the estimated 7.0 million cys. of required dredging, the Federal portion of the project is estimated at 6.5 million cys. and the non-Federal local sponsor (i.e. the Port of Oakland) portion is estimated at 0.5 million cys. The estimated 7.0 million cys. of "new work" dredged material will be disposed at a U.S. Environmental Protection Agency (EPA) / U.S. Army Corps of Engineers approved open-water ocean site located outside the jurisdiction of BCDC and the California Coastal Commission. Annual maintenance dredging quantities following the navigation improvements to Oakland Harbor are estimated to be 600,000 cubic yards. The current BCDC Letter of Agreement for Consistency Determination No. 13-85 (issued March 6, 1986, as amended through September 15, 1987) reflects an Oakland Harbor annual maintenance dredging quantity of 500,000 cubic yards. By separate transmittal, the Corps will request Consistency Determination No. 13-85 be amended to reflect the estimated annual maintenance dredging quantity increase of 100,000 cubic yards.

Of the estimated total 7.0 million cys. of required dredging which is scheduled to start in May 1988 and take approximately 13 months to complete, an initial estimated 0.5 million cys. of dredging in the Inner Harbor is proposed to be completed by June 4, 1988 in order to provide a safe navigable channel for the first arrival of the new generation container ship. The initial estimated 0.5 million cys. of dredging represents an Inner Harbor channel deepening from -35 feet MLLW to -38 feet MLLW, as shown in Exhibit C. (It is noted that the Port of Oakland has submitted a permit application to BCDC for the dredging of 560,000 cys. of material from the Inner Harbor. The Port's BCDC application and the Corps's proposed initial estimated 0.5 million cys. of Inner Harbor dredging are the same proposal. The Corps understands that the Port has submitted the application to BCDC in order to better ensure project construction approval in the time frame necessary for implementation of a -38 foot MLLW channel to accommodate the new generation container vessel scheduled arrival of June 8, 1988.)

Project Need And Purpose

The Port of Oakland is a complete transportation/distribution center with access to modern marine terminals specializing in containerized shipments. This world class port is the largest on San Francisco Bay and one of the largest container ports on the west coast. An estimated 30 ships per day currently travel inbound and outbound from the Port of Oakland, with one ship passing through the entrance channel an every 1.75 hours on average.

The Oakland Harbor channels are no longer adequate to efficiently and cost effectively accommodate modern deep-draft vessels. Deepening of the Oakland Harbor is necessary to accommodate the arrival of the new generation, deep-draft container vessels scheduled to arrive at the Port of Oakland in June 1988. Deep-draft container vessels built in the 1970s ranged in the 700 foot length with a draft of 33 feet. New container vessels range up to 1,050 feet in length with a draft of 38 feet. The current authorized Oakland Harbor channel depths are -35 feet MLLW.

Currently, problems encountered by ship pilots are: that inbound vessels operating during strong ebb tides risk grounding in the shallow water off the Seventh Street Terminal; and lack of adequate channel width at the Outer Harbor Entrance Channel increases the risk of a vessel in transit colliding with berthed ships at the Seventh Street Terminal or creating a wake or surge which could damage berthed ships or break mooring lines. The Oakland Harbor Deep-Draft Navigation Improvements Project will: improve navigational safety and efficiency of container vessel movement in the harbor channels; reduce the potential for vessel collisions and groundings; and eliminate vessel tidal delays.

Project Details

1. Dredging. Dredging an estimated total 7.0 million cys. from the Oakland Harbor is based on channel configurations which were optimized through navigation simulation study. Conditions modeled in the simulation study included vessel size and maneuverability, winds, waves, currents, bottom and bank conditions, visibility and mode of operation. The purpose of the simulation study was to provide the minimum channel dimensions required for safe and efficient ship transit. Approximately 3.4 miles of the Outer Harbor will be deepened and the turning basin will be relocated, deepened, and enlarged. Approximately 4 miles of the Inner Harbor channel will be deepened, the entrance channel widened, a 1,200 foot diameter turning basin between Schnitzer Steel Products Company and the Alameda Gateway Properties will be dredged, and a 1,000 foot radius fan-shaped area adjacent to the eastern end of the Charles P. Howard Terminal will be dredged. The dredging will terminate approximately 550 feet west of the Webster Street tube. The most likely method of dredging is by clamshell with tug/barge transport of the dredged material to an EPA/Corps approved ocean disposal site.

2. Dredged Material Sediment Tests. The Corps has conducted the appropriate sediment sampling and testing (physical, chemical, and biological) of the material to be dredged from the Oakland Outer and Inner Harbor channels and disposed at an EPA/Corps approved ocean site. The sediment testing protocol and test results as contained in reference item A. was provided to the San Francisco Bay Regional Water Quality Control Board (RWQCB) in September 1987. Following submittal of the sediment test results to the RWQCB, the RWQCB requested the industrial areas such as Schnitzer Steel and the former Todd Shipyards adjacent to the navigation project be investigated for potential toxic chemicals. Due to concerns related to possible contamination from land based activities at the Schnitzer Steel Company and at the former Todd Shipyards, the Corps, in cooperation with the Port of Oakland, collected sediment samples for testing. The results of this additional sediment testing are contained in the "Oakland Harbor Deep-Draft Navigation Improvements Design Memorandum Number 1 and Final Supplement To The Environmental Impact Statement, Alameda County, California", dated March 1988 (reference item No. 9). With respect to dredging material from the Oakland Harbor improvement project, sediment tests show the material to be highly plastic with little or no mixing in the water column. Thus no adverse impacts on water quality at the dredge site are anticipated. Disposal of the dredged material will be at an EPA/Corps approved open water ocean site located outside State waters.

3. Aquifers. The Corps has been coordinating closely with the RWQCB, Alameda County Flood Control and Water Conservation District, and the Port of Oakland to achieve an acceptable water monitoring plan. Reference item H. describes the Corps' proposed ground water monitoring plan which was transmitted to the RWQCB. By letter dated

March 3, 1988 (reference item No. 10, enclosed) the Executive Officer of the RWQCB determined the Corps' ground water monitoring program to be adequate and acceptable.

Consistency With The Bay Plan

The proposed navigation improvements to the Oakland Harbor are consistent to the maximum extent practicable with the following relevant portions of the San Francisco Bay Plan.

Bay Plan Policies on Fish and Wildlife, in part, state that "The benefits of fish and wildlife in the Bay should be insured for present and future generations of Californians ..." and "... to the greatest extent feasible, the remaining marshes and mudflats around the Bay, the remaining water volume and surface area of the Bay, and adequate fresh water inflow into the Bay should be maintained." The proposed navigation improvements to the Oakland Harbor will not affect the Bay's marshes, mudflats, water volume, surface area, and fresh water inflow.

Bay Plan Policies on Water Pollution, in part, state that "Water quality in all parts of the Bay should be maintained at a level that will support and promote the beneficial uses of the Bay as identified in the Regional Water Quality Control Board's Basin Plan." No unacceptable Bay water column impacts would occur as a result of deepening the Oakland Harbor channels.

Bay Plan Policies on Dredging, in part, state that "Dredging or construction work should not be permitted that might reasonably be expected to damage an underground water reservoir..." and that "To prevent sedimentation resulting from dredging projects, mud from future dredging should be disposed of in one of the following ways: (a) placement on dry land, (b) placement as fill in approved fill projects, (c) barging or piping to suitable disposal sites in the ocean, or (d) if no other alternative is feasible, dumping in designated parts of the Bay where the maximum amount will be carried out the Golden Gate on ebb tides...". All proposals for deepening Oakland Harbor that could penetrate the mud "cover" of aquifers have been reviewed by the Regional Water Quality Control Board (RWQCB). The RWQCB has approved the Corps' proposed ground water monitoring program. The dredged material from the Oakland Harbor improvement project will be barged to an EPA/Corps approved ocean disposal site.

Bay Plan Policies on Ports, in part, state that "The Seaport Plan provides for expansion and/or redevelopment of port facilities at ... Oakland ..." and "Further deepening of ship channel [s] [are] needed to accommodate expected growth in ship size and improve terminal productivity ...". This is the purpose of the Oakland Harbor Deep-Draft Navigation Improvements project.

Summary

Based on a review of the relevant portions of the San Francisco Bay Plan and on the information contained in the enclosed list of references, the proposed Oakland Harbor Deep-Draft Navigation Improvements project is consistent with the San Francisco Bay Plan to the maximum extent practicable.

The U.S. Army Corps of Engineers, San Francisco District
Consistency Determination On The
Oakland Harbor Deep-Draft Navigation Improvements Project
(BCDC Consistency Determination No. CN 12-87)

References

1. "Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, Draft Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, Alameda County, California", dated September, 1987

2. San Francisco Bay Conservation and Development Commission (BCDC) letter dated October 19, 1987, Subject: Request for Concurrence with Consistency Determination Proposed Navigation Improvements, Oakland Harbor (BCDC Consistency Determination No. CN 12-87)

3. U.S. Army Corps of Engineers, San Francisco District letter to BCDC dated October 30, 1987

4. California Department of Fish and Game Memorandum to Mr. Gordon Van Vleck, Secretary for Resources, dated November 2, 1987, Subject: Draft Supplement to the Environmental Impact Statement (DEIS) Oakland Inner and Outer Harbor Improvements SCH 87081823

5. U.S. Army Corps of Engineers, San Francisco District letter to Ms. Linda Martinez, State Lands Commission, dated December 3, 1987

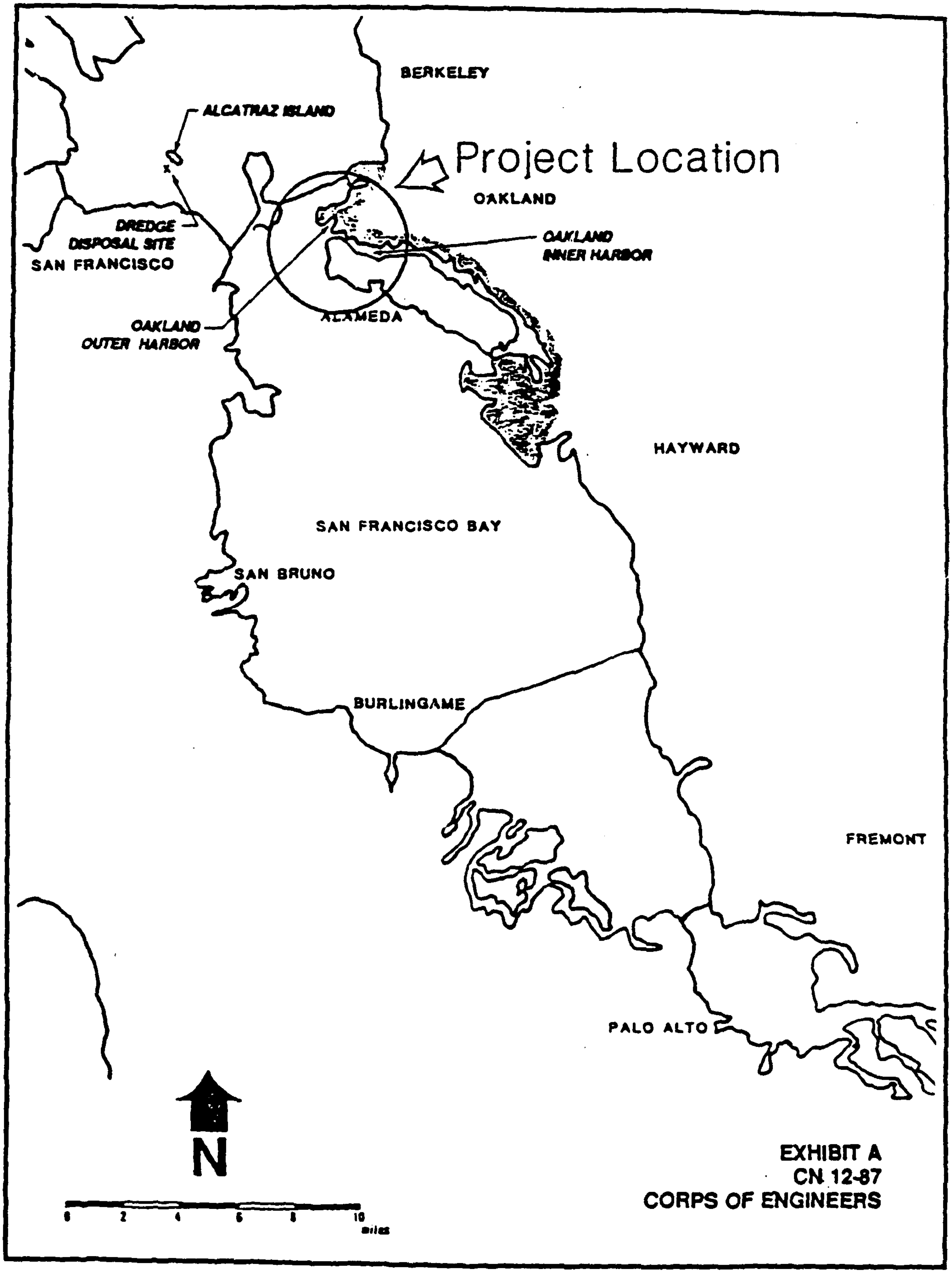
6. BCDC letter dated December 24, 1987, Subject: Corps of Engineers Proposed Navigation Improvements, Oakland Harbor: BCDC Consistency Determination No. CN 12-87

7. U.S. Army Corps of Engineers, San Francisco District letter to Mr. Roger B. James, California Regional Water Quality Control Board, dated January 21, 1988, requesting water quality certification for the dredging of the Oakland Outer and Inner Harbors and disposal of the dredged material at the Alcatraz site

8. U.S. Army Corps of Engineers, San Francisco District, Proposed Oakland Groundwater Monitoring Plan, January 1988

9. "Oakland Harbor Deep-Draft Navigation Improvements Design Memorandum Number 1 and Final Supplement To The Environmental Impact Statement, Alameda County, California", dated March, 1988

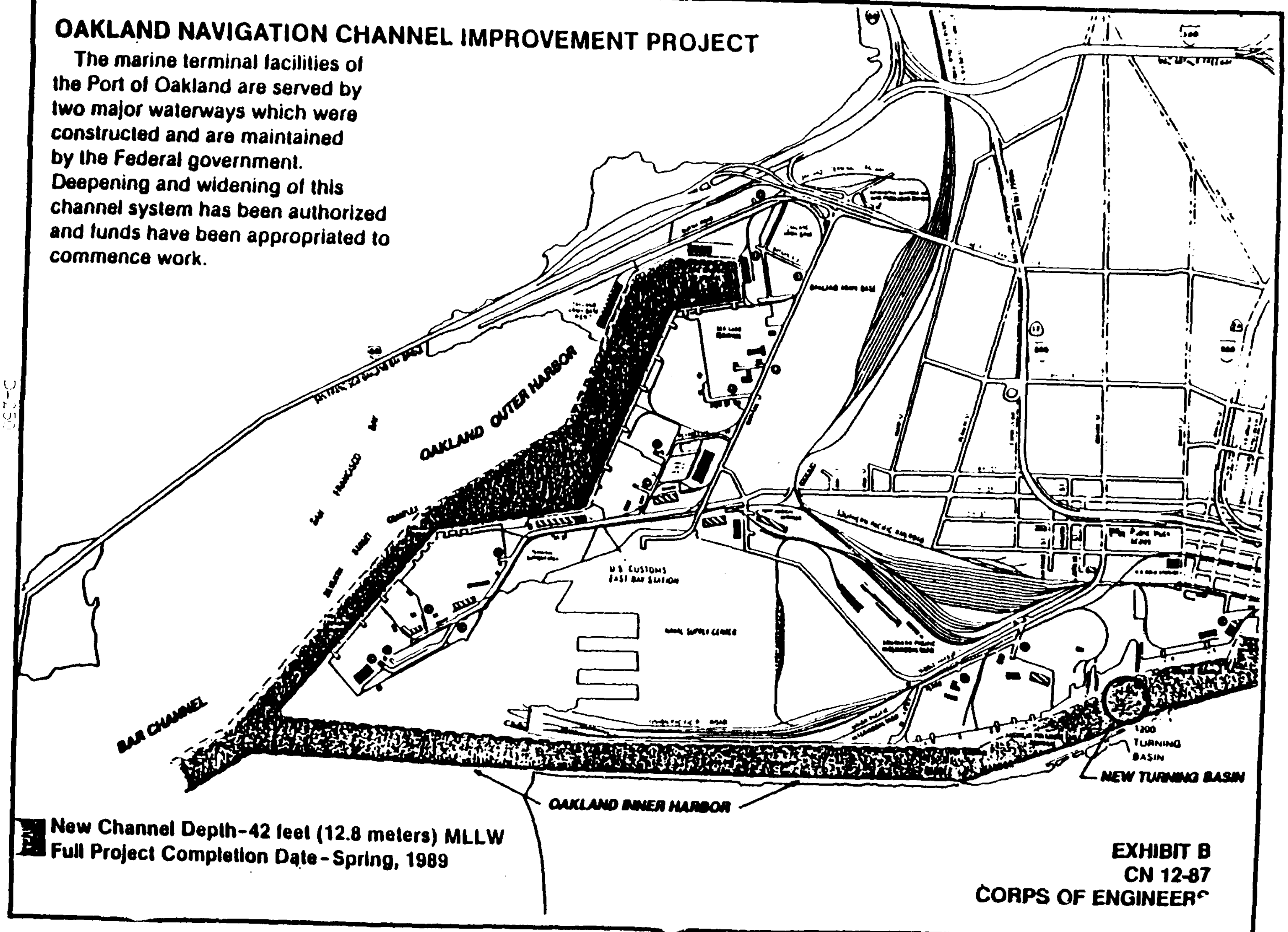
10. California Regional Water Quality Control Board - San Francisco Bay Region letter dated March 3, 1988, Subject: Groundwater Monitoring Program for Monitoring the Impact of the Oakland Inner and Outer Harbors Navigational Improvement Project



BERKELEY
ALCATRAZ ISLAND
Project Location
OAKLAND
DREDGE
DISPOSAL SITE
SAN FRANCISCO
OAKLAND
INNER HARBOR
OAKLAND
OUTER HARBOR
ALAMEDA
HAYWARD
SAN FRANCISCO BAY
SAN BRUNO
BURLINGAME
FREMONT
PALO ALTO
N
0 2 4 6 8 10
miles
EXHIBIT A
CN 12-87
CORPS OF ENGINEERS

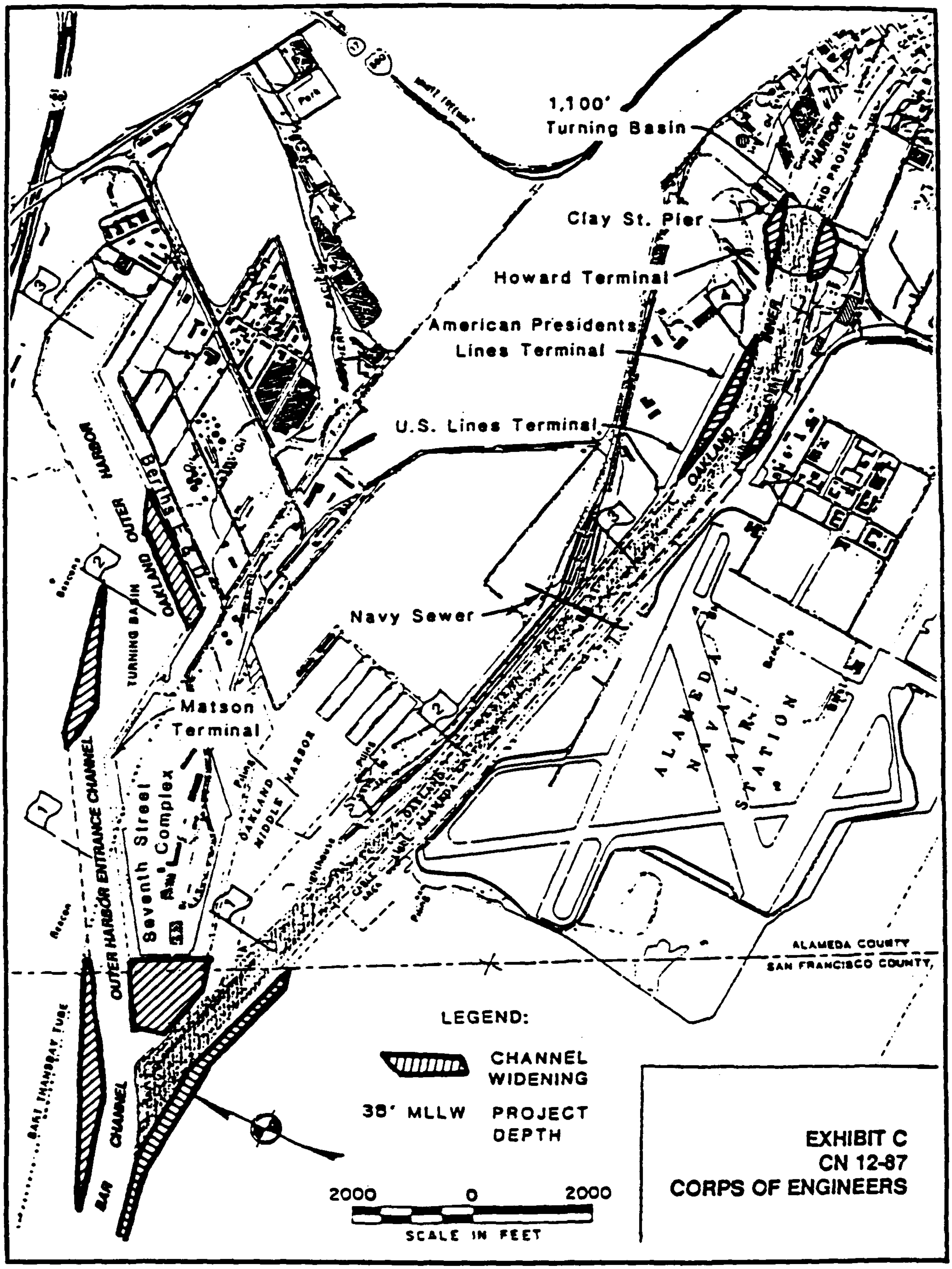
OAKLAND NAVIGATION CHANNEL IMPROVEMENT PROJECT

The marine terminal facilities of the Port of Oakland are served by two major waterways which were constructed and are maintained by the Federal government. Deepening and widening of this channel system has been authorized and funds have been appropriated to commence work.



New Channel Depth-42 feet (12.8 meters) MLLW
Full Project Completion Date - Spring, 1989

EXHIBIT B
CN 12-87
CORPS OF ENGINEERS


1,100'
Turning Basin
Clay St. Pier
Howard Terminal
American Presidents
Lines Terminal
U.S. Lines Terminal
Navy Sewer
Matson
Terminal
OAKLAND OUTER HARBOR
TURNING BASIN
OUTER HARBOR ENTRANCE CHANNEL
BAR CHANNEL
Seventh Street
Complex
OAKLAND MIDDLE HARBOR
OAKLAND
HARBOR
ALAMEDA NAVAL AIR STATION
ALAMEDA COUNTY
SAN FRANCISCO COUNTY
LEGEND:
CHANNEL
WIDENING
38' MLLW PROJECT
DEPTH
2000
0
2000
SCALE IN FEET
EXHIBIT C
CN 12-87
CORPS OF ENGINEERS

Detailed Project Description

Oakland Outer Harbor. The proposed plan of improvement is deepening the harbor from -35 feet to -42 feet MLLW and widening the south side of the Bar Channel from 800 feet to 900 feet. The apex of the bend between the Bar and Entrance Channels will be removed and the north side of the channel widened. The knoll adjacent to the end of the Seventh Street Complex is proposed for removal. The "dogleg" at the northeastern end of the Seventh Street Terminal will be eliminated, and the turning basin will be relocated and enlarged by widening the north side of the channel opposite berths 32 and 33 (formerly D and E) in the Matson Terminal near Project Mile 2.0. At Project Mile 2.25, approximately 1,900 feet of channel will be widened 350 feet to accommodate the existing wharf. In the final 4,600 feet of the project, the berths will be widened to 125 feet, which will narrow the channel to a width which varies from 850 to 600 feet).

Oakland Inner Harbor. The proposed plan of improvement specifies the deepening of the Inner Harbor channel from -35 feet to -42 feet MLLW between the Entrance Channel reach and the Clay Street Pier, a distance of approximately 4 miles. The proposed plan also includes widening within the Entrance Channel Reach as follows:

The northern channel boundary will be moved northward to coincide with the U.S. Pierhead and Bulkhead line off the end of the Seventh Street Terminal, and then taper in to meet the existing channel limit at approximate Project Mile 1.0.

The southern channel boundary will be shifted south by 200 feet at the turn into the Entrance Reach, and by 150 feet beyond the turn. East of the mouth of the Middle Harbor, the widened channel will taper in to meet the existing channel limit at approximate Project Mile 1.0.

The modifications described above result in a channel width of 1,180 feet off the southeast corner of the Seventh Street Terminal which transitions to 720 feet at approximately Project Mile 1.0. The channel then gradually narrows to a minimum width of 435 feet between the stone jetties near Project Mile 1.6, then widens to 460 feet, and flares out to 575 feet at the beginning of the channel bend opposite the terminals for the American Presidents Lines. This channel bend will be widened to a maximum width of 900 feet, and then taper to 600 feet to meet the existing width of the channel. Additional project features include providing a 1,200 foot diameter turning basin between the Schnitzer Steel Products Company and the Alameda Gateway Properties, and providing a 1,000 foot radius fan-shaped area adjacent to the eastern end of the Charles P. Howard Terminal. The project reach will terminate approximately 550 feet west of the Webster Street tube.

The existing U.S. Navy Sanitary Sewer Export Main, a 16-inch diameter cast iron pipe located under the Inner Harbor Channel at approximate Project Mile 2.5, must be lowered to accommodate the proposed channel improvements. Dredging of the ship channel necessitates relocation of the existing sewer main from an invert elevation of -45 feet MLLW to a depth approximately 12 feet lower.

EXHIBIT D

STATE OF CALIFORNIA GEORGE DEUKMEJIAN, Governor

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
THIRTY VAN NESS AVENUE, SUITE 2011
SAN FRANCISCO, CA 94102-6080
PHONE: (415) 557-3686

March 4, 1988

Department of the Army
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94106-1905

ATTENTION: William C. Angeloni, Chief
Planning/Engineering Division

SUBJECT: Proposed Corps of Engineer's Dredging of
Oakland Outer and Inner Harbors
(BCDC Consistency Determination No. CN 12-87)

Gentlemen:

This is to confirm our receipt of your request to withdraw the Corps consistency determination for dredging the Oakland Outer and Inner Harbors dated February 1, 1988. You indicate that the Corps anticipates resubmitting a consistency determination for a modified project by March 10, 1988. Please submit an original and six copies of your complete request so that we may circulate the information as required for a 28-day review period to federal and state reviewing agencies. Depending upon when we receive the Corps request, we will schedule the consistency determination for Commission hearing and vote on our first free agenda.

Very truly yours,

Joan L. Lundstrom

JOAN L. LUNDSTROM
Permit Analyst

JLL/mm

cc: Roger Golden, Corps of Engineers Planning

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

February 26, 1988

Environmental Branch

Ms. Joan L. Lundstrom
Permit Analyst
San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue, Suite 2011
San Francisco, Ca 94102-6080

Dear Ms. Lundstrom:

We respectfully request that you withdraw our Consistency Determination No. CN12-87 and proposed amendment to Consistency Determination currently scheduled for BCDC hearing on March 3, 1988.

As you are aware, the Corps is in the process of modifying the Oakland Outer Harbors Deep-Draft Navigation Improvements Project to reflect ocean disposal of the dredged material.

We anticipate re-submitting a Consistency Determination package on or before March 10, 1988 in order to be scheduled for BCDC hearing on April 7, 1988 and BCDC vote on April 21, 1988.

Thank you for your consideration of this matter. Any question should be directed to Mr. Roger Golden of my staff at (415) 974-0444.

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, Governor

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
THIRTY VAN NESS AVENUE, SUITE 2011
SAN FRANCISCO, CA 94102 6080
PHONE: (415) 557-3686

February 4, 1988

Colonel Galen H. Yanigahara
District Engineer
Department of the Army
Corps of Engineers, San Francisco District
211 Main Street
San Francisco, California 94105-1905

SUBJECT: BCDC Consistency Determination No. CN 12-87;
Federal Agency: Department of the Army, Corps of Engineers
Tentatively Set for Hearing on March 3, 1988

Dear Colonel Yanigahara:

On February 1, 1988, we received the Corps of Engineer's consistency determination for the proposed deepening of the navigation channels at Oakland Outer and Inner Harbors and disposal of the dredge spoils at the Alcatraz disposal site with predredging of 1.7 million cubic yards of Alcatraz materials to an ocean disposal site. The consistency determination has been designated as Consistency Determination No. CN 12-87.

We are scheduling the matter for public hearing at the Commission meeting of March 3, 1988, the first meeting that would allow us to follow our regular public noticing procedures. The Commission vote is scheduled for March 17, 1988. However, federal regulations require that the Commission make a final determination on a consistency determination within 45 days from receipt of the request, which would be March 16, 1988. BCDC staff therefore requests that the Corps of Engineers grant a 15-day extension for Commission review of the consistency determination as provided for in the federal regulations (15 CFR Section 930.41(b)). Please respond to this request in writing.

Your staff has indicated to us that the proposed project may change prior to Commission action on this request. For example, the amount of dredging and location of spoil disposal may change. The Corps must submit a new consistency determination for the new project which thoroughly addresses the consistency of its proposed project with all the relevant sections of the McAteer-Petris Act and San Francisco Bay Plan policies. The new project would

Colonel Galen H. Yanigahara
February 4, 1988
Page 2

then be reviewed, public notices sent, and a new Commission hearing and vote scheduled. The 45-day review period for the new project would begin when the new consistency determination and supporting information is received. Should you have any questions in this regard, please call.

Very truly yours,

Joan L. Lundstrom

JOAN L. LUNDSTROM
Permit Analyst

JLL/mm

cc: Roger Golden, Planning and Engineering Division, Corps of Engineers

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905
February 1, 1988

Environmental Branch

Mr. Alan Pendleton
Executive Director
San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue
San Francisco, CA 94102

SUBJECT: Request for: 1) Concurrence with Consistency Determination on the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements (BCDC Consistency Determination No. CN 12-87); and 2) amendment to Consistency Determination No. CN 13-85 to reflect the Oakland Harbor Annual Maintenance Dredging Requirement of 600,000 Cubic Yards

Dear Mr. Pendleton:

Pursuant to Section 930.34 of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations (15 CFR 930 et seq.), the U.S. Army Corps of Engineers, San Francisco District has prepared a Consistency Determination for the Congressionally authorized project as described in the "Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, Draft Design Memorandum (GDM) Number 1 and Supplement to the Environmental Impact Statement (SEIS), Alameda County, California", dated September, 1987. This document was provided to you as an enclosure to our September 23, 1987 letter.

The Corps has determined that the proposed project is consistent to the "maximum extent practicable" with the San Francisco Bay Plan. Please refer to paragraph 4.5 (page 33) in the GDM, Appendix E of the draft SEIS. Also, please refer to the additional information provided in our October 30, 1987 letter to Ms. Lundstrom, of your staff, and the enclosed information which responds to your December 24, 1987 letter concerning the subject project Consistency Determination. Your staff has indicated that the additional information which may be gathered through the SEIS is essential to BCDC deliberations. The inference that BCDC concurrence with the Corps' Consistency Determination can not occur until completion of the Final SEIS implies that the State holds final decision (veto) over a Congressionally authorized Federal navigation project. It is a Corps responsibility to decide whether or not the Oakland Harbor navigation improvement project should proceed. This additional information is submitted in accordance with the provisions of 15 CFR 930.39 which guides me in determining the appropriate information to provide BCDC in support of my Consistency Determination.

Annual maintenance dredging quantities following the navigation improvements to the Oakland Outer and Inner Harbor channels are estimated to be 600,000 cubic yards (cys.). The current BCDC Letter of Agreement for Consistency Determination No. 13-85 (issued on March 6, 1986, as amended through September 15, 1987) reflects an Oakland Harbor annual maintenance dredging quantity of 500,000 cys. The Corps requests that Consistency Determination No. 13-85, Table 1, row 4, column 2, be amended to read "600,000" cys.

BCDC concurrence with Consistency Determination No. CN 12-87 and BCDC amendment to Consistency Determination No. 13-85 is requested pursuant to 15 CFR 930.41 of the NOAA Federal Consistency Regulations. Questions should be directed to Mr. Roger Golden of my staff (telephone 415-974-0444).

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

Additional Information To Support
The U.S. Army Corps of Engineers, San Francisco District
Consistency Determination On The Oakland Outer and Inner Harbors
Deep Draft Navigation Improvements
(BCDC Consistency Determination No. CN 12-87)
And
Amendment To Consistency Determination No. CN 13-85 For
Annual Maintenance Dredging Of 600,000 Cubic Yards From
The Oakland Outer and Inner Harbors

1. References:

a. "Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, Draft Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, Alameda County, California", dated September, 1987 (previously provided to BCDC under Corps cover letter dated September 23, 1987)

b. San Francisco Bay Conservation and Development Commission (BCDC) letter dated October 19, 1987, Subject: Request for Concurrence with Consistency Determination Proposed Navigation Improvements, Oakland Harbor (BCDC Consistency Determination No. CN 12-87)

c. U.S. Army Corps of Engineers, San Francisco District letter dated October 30, 1987

d. California Department of Fish and Game Memorandum to Mr. Gordon Van Vleck, Secretary for Resources, dated November 2, 1987, Subject: Draft Supplement to the Environmental Impact Statement (DEIS) Oakland Inner and Outer Harbor Improvements SCH 87081823, enclosure 1

e. U.S. Army Corps of Engineers, San Francisco District letter to Ms. Linda Martinez, State Lands Commission, dated December 3, 1987, enclosure 2

f. BCDC letter dated December 24, 1987, Subject: Corps of Engineers Proposed Navigation Improvements, Oakland Harbor: BCDC Consistency Determination No. CN 12-87

g. U.S. Army Corps of Engineers, San Francisco District letter to Mr. Roger B. James, California Regional Water Quality Control Board, dated January 21, 1988, requesting water quality certification for the dredging of the Oakland Outer and Inner Harbors and disposal of the dredged material at the Alcatraz site, enclosure 3

h. U.S. Army Corps of Engineers, San Francisco District, Proposed Oakland Groundwater Monitoring Plan, January 1988, enclosure 4

?. Additional Information:

The following additional information responds to the topical items (in the order presented) of reference item 1.e. This additional information will be included in the forthcoming (a copy of which will be distributed to BCDC) Final SEIS for the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements project.

Toxics

The Corps has conducted the appropriate sediment sampling and testing (physical, chemical, and biological) of the material to be dredged from the Oakland Outer and Inner Harbor Channels and disposed at the Alcatraz (SF-11) aquatic site. This sediment testing protocol and test results as contained in reference 1.a. was provided to the San Francisco Bay Regional Water Quality Control Board (RWQCB) in September 1987. Following submittal of the sediment test results to the RWQCB, the RWQCB requested the industrial areas such as Schnitzer Steel and the former Todd Shipyards adjacent to the navigation project be investigated for potential toxic chemicals. Due to the concerns related to possible contamination from land based activities at the Schnitzer Steel Company and at the former Todd Shipyards, the Corps, in cooperation with the Port of Oakland, collected sediment samples which are currently being tested by contract laboratories. The results of this additional sediment testing are expected to be available during the first week of February 1988 and will be provided to the RWQCB. On January 21, 1988, the Corps requested water quality certification from the RWQCB (reference 1.f.). The Corps has requested that the RWQCB provide certification for the project no later than March 15, 1988.

Turbidity

The following addresses turbidity effects on Bay fisheries from disposal of the Oakland Outer and Inner Harbor dredged material at the Alcatraz site.

There are no scientific data to establish a cause and effect relationship between turbidity associated with dredged material disposal at Alcatraz and the purported decline of fisheries in San Francisco Bay. Naturally occurring levels of turbidity and suspended sediment often exceed levels caused by disposal of dredged material and the turbidity or suspended sediment load in the Bay attributable to dredged material disposal is very small.

The Corps of Engineers has monitored dredged material disposal operations at the Alcatraz disposal site and found turbidity to be localized and short term in duration. Maximum turbidity in disposal plumes was exceeded by naturally occurring levels of suspended sediments in some shallow areas of San Francisco Bay by several magnitudes. Also, background levels of suspended sediment in the vicinity of the disposal site are controlled by tidal stages and not by the rate of dredged material disposal nor by current velocity as would be expected if resuspension of sediment contributed significantly to increase local turbidity. Sediment laden waters from the shallow areas of the Bay and Delta and the relatively clear coastal waters sweep across the central Bay with each change of the tide. San Francisco Bay's enormous tidal prism affects the turbidity of large areas of the Gulf of the Farallones, the central

Bay, and to a lesser extent, the south Bay and San Pablo Bay. An estimated 170 million cubic yards of sediments are suspended annually by wind generated waves and currents in the shallow areas of the Bay. Sediment suspended in San Pablo Bay on a typical windy summer afternoon can be transported miles to the ocean or miles upstream to the Delta on the next tidal cycle. The interface between the sediment carrying water from upstream and the relatively clear water from the ocean can be seen from boats, planes, bridges, and even high rise buildings. The interface is most noticeable in the summer months.

Frequently encountering "muddy water" should be expected by fishermen working San Francisco Bay. Muddiest water should be expected by fishermen in the central portion of the Bay near the end of an ebb tide during windy days or at the end of an ebb tide immediately after the windy period. Alleged higher turbidity in the Bay during 1986 and 1987 does not correlate to disposal of dredged material at the Alcatraz site. Disposal of dredged material in that period of time was consistent with previous years' activities. Additionally, during late summer and fall of 1986, when the highest level of turbidity is alleged, dredged material disposal activity was lower than it had been for several previous years as turbidity monitoring of the Alcatraz site was being conducted as part of the Alcatraz Dredged Material Disposal Monitoring Study. Turbidity measurements in the vicinity of the Alcatraz disposal site have clearly demonstrated the back and forth movement of turbid and relatively clear water across the site (Winzler and Kelly, 1985; SAIC, 1987). Turbidity readings have been taken continuously or at very short intervals to show the pattern and to detect increases due to dredged material disposal. Monitoring results have shown that turbidity in the near vicinity of the Alcatraz site is overwhelmingly determined by the back and forth movement and not by the level of dredged material disposal activity nor by the speed of the currents.

The data provided to BCDC by the California Department of Fish and Game (reference item 1.d.) to support the fishermen's claim of unexpected "muddy water", consist of turbidity measurements taken at three sites in the central portion of the Bay. The monthly turbidity measurements were taken by secchi disks which can only measure surface turbidity. No effort was made to repeat turbidity measurements at the same point in the tidal cycle or to delineate whether the ocean or estuary side of the tidal interface that moves back and forth across the region was being measured. Due to the wide range of potential monitoring results and the scarcity of data points, skewing of the study results is possible. Without reviewing data from other measurements of turbidity collected throughout the Bay over a longer period of time, it is presumptuous to declare the Bay as being more turbid.

Conclusions based on exiguous data sets can also be inaccurate or easily misinterpreted. The Department of Fish and Game has indicated that turbidity in 1986-87 was higher than the 1980-85 time period. What is not indicated is that the highest level of turbidity occurred in 1983. The "unexpected" turbidity level in 1987 was the third highest of those occurring during the 1980-87 time period. Inferences are that fishing is bad due to turbidity. However, fishing in 1983, during the period of highest turbidity, was good. Fishing in 1986 was better than in 1987 even though turbidity in 1986 was higher than in 1987. Finally, dredged material disposal during the 1986 fishing season (the period of time the Department of Fish and Game alleges as having the highest level of turbidity) was at the lowest level of activity in several years. Careful analysis of the data supplied to BCDC by the Department of Fish and Game show no correlation between dredged material disposal and turbidity levels and dubious correlation between increased turbidity and the decline of fishing in San Francisco Bay.

In addition, Department of Fish and Game data does not support the claim that the May to October time frame is historically considered clear-water months. Also, their statement ignores the movement of the interface between relatively clear ocean waters and sediment laden waters of the Bay back and forth through the central Bay.

Mounding at Alcatraz

The Alcatraz (SF 11) dredged material disposal site was intended to serve as a dispersive disposal site. Historically, more than 85% of all dredged material discharged at the Alcatraz site was carried away by the strong tidally dominated currents. Of the proposed 7.0 million cubic yards of material to be dredged from the Oakland Harbor deepening project and disposed at Alcatraz, recent studies have shown an estimated 37.5% of the material would be retained at the disposal site (SAIC, 1987). The proposed dredging of 2.7 million cubic yards from Alcatraz represents a conservative estimate of the 7.0 million cubic yards of disposed material expected to be retained at the site. Therefore, the proposed rehandling of material expected to be retained at the Alcatraz site effectively achieves zero bathymetric impacts at the SF 11 site. The Oakland Harbor deepening project will not reduce the Alcatraz disposal site capacity. The Corps recognizes the issues of continued future use of the Alcatraz disposal site. These issues associated with long term management plans for use of the Alcatraz site will be addressed in the Corps' "Central San Francisco Bay Projects Disposal Study", currently underway.

The following addresses the BCDC concern about whether the proposed disposal at Alcatraz will result in material dispersion to adjacent areas which then will require further dredging. An estimated 170 million cubic yards of sediments are suspended annually by wind generated waves and currents in the shallow areas of the Bay. Monitoring results have shown that turbidity at the Alcatraz disposal site area is determined by the back and forth (east-west) movement of tidal stages. In a "worst case" analysis of dredged material disposal at Alcatraz, it could be concluded that dredged material disposal activities increase Bay maintenance dredging by four percent annually. Basically, dispersion of dredged material from Alcatraz causes a negligible amount of additional dredging in adjacent areas.

Aquifers

The Corps has been coordinating closely with the RWQCB, Alameda County Flood Control and Water Conservation District, and the Port of Oakland, over the last several months to achieve an acceptable ground water monitoring plan. As a result of the January 5, 1988 meeting among the above mentioned parties, the Corps of Engineers agreed to consider two alternative monitoring programs. Reference item 1.h., enclosed, describes the Corps' proposed ground water monitoring plan. This monitoring plan has been transmitted to the RWQCB for review and acceptance. The Corps anticipates RWQCB staff approval of the monitoring plan during the week of February 8th. BCDC will be provided the results of the RWQCB's action on the monitoring plan as soon as it is available. Until then, BCDC may contact either Dr. Teng-Chung Wu (415-464-0899) or Mr. Dan Tempelis (415-464-1325) of the RWQCB staff.

State Lands Commission

BCDC has requested the Corps to provide evidence of having responded to the concerns of the State Lands Commission. By letter dated November 2, 1987, the State Lands Commission informed the Corps of the need to secure a State dredging permit for the use of the State-owned mineral reserve lands. The Corps, in a letter dated December 3, 1987 (reference item 1.e.), declined to apply for a dredging permit from the State Lands Commission on the basis that Congress exercised its dominant right under the Commerce Clause of the Constitution to make reasonable improvements in navigation without the need to apply for State permits.

STATE OF CALIFORNIA — GEORGE DEUKMEJIAN, Governor

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
THIRTY VAN NESS AVENUE, SUITE 2011
SAN FRANCISCO CA 94102-6080
PHONE (415) 557-3686

December 24, 1987

Department of the Army
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105-1905

ATTENTION: William C. Angeloni
Chief, Planning/Engineering Division

SUBJECT: Corps of Engineers Proposed Navigation Improvements, Oakland Harbor: BCDC Consistency Determination No. CN 12-87

Gentlemen:

We are writing to provide you with some guidance regarding how to most expeditiously proceed to receive a finding of concurrence from the Commission for your proposal to do navigational dredging at the Oakland Harbor.

As you are aware, one of the Bay Commission's primary missions is to assure that development of Port facilities proceeds so that the Bay Area ports can be competitive with other West Coast ports. The Oakland Harbor dredging project is an essential part of port development. The Commission therefore will want to find the Corps dredging project consistent with its Management Program. In order to do so it must have information on the project's effects on water quality which demonstrates that the project is consistent with the Commission's policies on water quality, fish and wildlife, and dredging. Specifically, the Commission will need to determine whether:

1. The spoils contain toxic materials which could detrimentally affect the fish and wildlife resources of the Bay;

2. Disposal of spoils at Alcatraz will cause turbidity which will detrimentally affect fisheries;

3. The spoils will be dispersed to the ocean or contribute to the mounding problem at Alcatraz; and

4. The dredging will adversely affect any aquifers.

We believe the most efficient way to provide the Commission with enough information to answer these questions is to gather the information as part of the environmental analysis of the project and to submit the information as part of your consistency determination after the environmental document has been circulated and corrected to include comments. We were pleased to see that the Corps had extended the comment period for the environmental report so that all interested parties will be able to express their opinions regarding project effects and understand the Corps will be revising its report in response to these comments.

Toxics

As you are aware, the Commission has chosen not to concur that projects are consistent with the fish and wildlife policies in its federally approved management program prior to the Regional Water Quality Control Board, San Francisco Bay Region (Regional Board) making a finding regarding the amount of toxicants present in the spoils and their potential to cause adverse impacts. This decision is based on the Commission's amended Bay Plan policies on dredging which state, in part, "Prior to authorization of dredging or the disposal of dredged materials in the Bay, the Commission should assure that adequate testing of the sediments will be done and the sediments will be dredged and disposed of consistent with the requirements of the Regional Water Quality Control Board and the Environmental Protection Agency." In order for the Regional Board and the Environmental Protection Agency (EPA) to provide the Commission with such assurances, they need the results of adequate testing of the sediment in the project area.

In order to make a determination regarding the presence of toxics, the Commission will need the Regional Board's comments on the tests and an analysis of the results of the tests. As part of its environmental review the Corps should conduct the appropriate tests and submit them to the Regional Board. As part of its consistency determination, the Corps should provide a letter from the Board stating they have reviewed the test data and find that dredging will not have an adverse affect on the beneficial uses of Bay waters.

Turbidity

In order to provide the Commission with adequate information regarding the project's effect on Bay fisheries, the Corps will need to analyze the impact of project turbidity on fisheries as part of its environmental report. The Commission has received many letters from fishing interests and fish and wildlife agencies stating they believe the disposal of spoils at Alcatraz has significantly affected fisheries. Data has also been provided to support this position. The Corps will need to provide as part of its consistency determination supporting evidence for any statement it makes regarding the project's effect on fisheries.

Mounding at Alcatraz

The mounding problem at Alcatraz is a recent phenomenon: neither the accumulation nor the dispersal pattern to surrounding areas appear to be completely understood. The Oakland Inner and Outer Harbor dredging project is among the largest dredging projects ever to be undertaken in the Bay and is only one of many large dredging projects proposed for the next several years. Therefore, a decision based on incorrect or insufficient information could have a significant effect on other projects and the economy of the Bay Area. The new dredging for this project totals 7 million cubic yards. The Corps proposes to remove 2.4 million cubic yards of material from the Alcatraz site and to place 6.5 million cubic yards of dredge spoils at Alcatraz, resulting in a net increase of 4.1 million cubic yards. The Corps estimates that about 37.5% (pg. 31 SEIS) of the deposited material will be retained at the site. This dispersal rate is quite different than that provided by the Corps as recently as 1984, when it estimated that dredge spoils deposited at Alcatraz from the Baldwin Ship Channel would disperse completely. The Final EIR for the Baldwin Ship Channel (May, 1984) stated that the mounding is "apparently a one-time occurrence"...from..."unauthorized debris placed at the site." However, it was discovered after the project was complete that the dredge material was not completely dispersed even though it was slurried.

The Commission's first concern will be whether the Alcatraz site capacity will be used up by this project, thereby requiring other applicants to find alternative locations for disposal. The costs and feasibility of Bay dredging projects could be significantly affected by the need to use alternative disposal methods. These costs could be particularly difficult for small marinas or flood control districts to bear. We therefore believe that the environmental report should include a factual and frank discussion of the capacity of Alcatraz, the anticipated life of the Alcatraz site, and long-term management plans for the Alcatraz site.

The Commission's next concern will be whether the proposed Alcatraz disposal will result in spoils being dispersed to adjacent areas which, in turn, will require further dredging. We believe analysis of dispersal patterns from the Alcatraz site should be provided as part of the Corps' environmental report and its consistency determination.

Aquifers

The Commission will also be concerned about the effect of the project on freshwater aquifers. You anticipate this issue will be resolved shortly. Please provide a written statement as part of your consistency determination from the Regional Board and the Department of Water Resources stating they are satisfied the project will not adversely affect ground waters in the project area and that further monitoring is not required. If future monitoring is required, please describe the monitoring program.

State Lands Commission

Please provide evidence that you have responded to the concerns of the State Lands Commission which owns lands directly adjacent to the Alcatraz disposal site.

In conclusion, we believed the continued operation and improvement of the Oakland Outer and Inner Harbors are essential to the entire economy of the Bay Area. However, the Commission must be able to make the necessary findings that the project is consistent with its policies. We are desirous of working with you so that this project can be approved. BCDC staff will be glad to meet with you to discuss this project.

Very truly yours,

Steve Goldbeck for

JOAN L. LUNDSTROM
Permit Analyst

cc: Corps of Engineers, Rod Chisholm, Environmental Branch
Port of Oakland, Walter Abernathy, ED
Regional Board, Michael Carlin
Environmental Protection Agency, Patrick Cotter
State Lands Commission, Fred Sled
Save the Bay, Barry Nelson
Sierra Club, Donna Kokobun
CBE
United Anglers
Commissioner Marion Otsea
Commissioner Jay Soper

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

30 October 1987

Environmental Branch

Ms Joan L. Lundstrom
Permit Analyst
San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue, Suite 2011
San Francisco, CA 94102-6080

Dear Ms. Lundstrom:

We appreciate receiving your timely letter, dated October 19, 1987, on our request for concurrence with Consistency Determination for the authorized Oakland Harbor Navigation Improvement Project, Alameda County, California. We have reviewed your letter and your stated concerns. Your request for additional information and time for providing information to the Commission members is not unreasonable. However, we wish to provide our initial thoughts on the additional information needs you have outlined.

1. Sediment tests for contaminants. The tests performed for Oakland Harbor sediments represent the statutory tests as required by Section 404(b) of the Clean Water Act and Section 103 of the Marine Protection Research and Sanctuaries Act. The tests are considered more comprehensive than the testing approach for San Francisco Bay disposal under consideration by the Regional Water Quality Control Board (RWQCB) and the Environmental Protection Agency (EPA). Specific mention was directed toward the area adjacent to Schnitzer Steel. If there are particular known contaminants of concern in the waterway, we would appreciate their identification to ensure that appropriate testing either has been performed or appropriate additional testing can be identified.

Based on our preliminary analysis of the Alcatraz mound, removal of material from the Alcatraz site is not expected to adversely affect the Bay's water quality. As you are aware, disposal of material at the Alcatraz site was based on elutriate tests which provide an indication of contaminant release into the water column. Such tests of material at the Alcatraz site have indicated no adverse impact to the water column. We do not anticipate that contaminant release would be enhanced by the dredging of material from the Alcatraz site.

2. RWQCB determination regarding underground aquifers. We have been coordinating closely with the RWQCB staff regarding this subject. Additional information has been collected by the U. S. Navy during the past year. The shallow Merrit/Posey aquifer is considered a limited potential resource, and that natural geomorphic processes along the Oakland/Alameda shoreline exposed it to seawater intrusion prior to extensive urban development. The authorized construction depth of 42 feet MLLW will not affect either the Merrit/Posey aquifer, the Alameda Formation aquifer, or the protecting aquitard. We expect to resolve this issue with RWQCB staff in the near future.

3. Mounding at Alcatraz. There appears to be some confusion in your analysis of the estimated quantities of material to be disposed at the Alcatraz site. We have tailored the channel design of both project areas to reduce the quantities and project costs from those documented in our respective feasibility reports, while maintaining navigation efficiency and safety. We view the pre-dredging of the Alcatraz site as a means to eliminate the potential cumulative effect of the Oakland project at the Alcatraz site. The Oakland report does not address the on-going disposal activities outside of the scope of Oakland project authorization. We recognize the problems of on-going disposal activities at the Alcatraz disposal site and the continued use of the Alcatraz site will be addressed in our Central San Francisco Bay investigations. The estimate of disposal activity at the Alcatraz site between 1987 - 1992 is a conservative estimate which includes the Oakland project.

We do not understand the 4.1 million cubic yards, referred to as a net increase in your letter. The expected annual average 7 million cubic yards (2 million contributed by new work and 5 million by maintenance) represented our estimate of disposal activity for the period between 1987 - 1992. Approximately 10 million cubic yards of new work was expected for the five year period (including the Oakland, San Francisco, Navy and Richmond projects). New work initially scheduled in 1987 included dredging for the Missouri Homeporting and the Port of San Francisco container facility. The Oakland projects were initially scheduled for construction independent of each other, although there was expected overlapping of dredging. However, estimates change as demonstrated by the delay in implementing the Homeporting project. Since the Outer Harbor and Inner Harbor projects involve the Port of Oakland, the two project areas have been combined into one project for construction efficiency. Our SEIS describes the recently estimated quantities for the Oakland Outer Harbor and Inner Harbor areas as follows:

Project Area	Estimated Quantity	Total
Oakland Outer	3.3	3.3
Oakland Inner	3.7	3.7
	Total	7.0

The removal of 2.7 million cubic yards (based on the total 7 million cubic yards of Federal and non-Federal dredging) from the Alcatraz site is based on our analysis of material type from the Oakland Harbor Project. The amount of material to be dredged is based on physical characteristics of the dredged material and not on costs attributable to the project as you have suggested.

4. Other Information.

a) Your request for specific correspondence from State Lands Commission, RWQCB and EPA in order that the Bay Commissioners can assess the views of these agencies may present a hardship on our construction schedule. We will consider all views on the proposed disposal activity including those of the three mentioned agencies. In the case of the RWQCB and EPA, both have similar statutory requirements as your agency. RWQCB is required to furnish its certification or deny certification. EPA is expected to concur on the use of the ocean disposal site and the Alcatraz disposal site or furnish its denial and reasons supporting its determination. If BCDC desires these determinations prior to rendering its concurrence on our consistency determination, we will make every attempt to secure the RWQCB and EPA views prior to seeking consistency. In this case, our contract schedule will be dependent on the Commission's action.

b) As you are aware, the use of the Alcatraz site has been based on maximum dispersal and this concept has not changed. The authorized Oakland project was based on the use of the Alcatraz site with optimum dispersal. We have not changed our views based on the claims by the Fish and Wildlife Service that disposal at the Alcatraz site increases turbidity in shallow water, spawning areas, since natural perturbations are far more significant than increases that may be related with disposal activities at the Alcatraz site. We recognize that Bay fishing interests have claimed a direct relationship between a recent marked decline in angling success and the material dispersal at the Alcatraz site related to disposal, and even the dredging activity itself. As such, we have responded to the views of the fishing interests in our letter, dated 23 October 1987, and will examine the turbidity concerns further.

c) The scope of the overall project should have included the dredging/disposal requirements of the Port of Oakland. Our new submittal for concurrence with our consistency determination will include the estimated quantities associated with the Port of Oakland's berths as well as a recommended revision to CN 13-85.

By this letter, we respectfully request that you withdraw our consistency determination in order that we can better detail our responses to your concerns and to allow for a more amenable schedule for the Commission's processing requirements. We also hope to clarify any misinterpretation of the information you have reviewed. We again appreciate your expeditious review of our consistency determination and look forward to obtaining the Commission's concurrence.

Sincerely,

William C. Angeloni
Chief, Planning/Engineering Division

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
THIRTY VAN NESS AVENUE, SUITE 2011
SAN FRANCISCO, CA 94102-6080
PHONE: (415) 557-3686

October 19, 1987

Department of the Army
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, California 94105-1905

ATTENTION: Col. Galen H. Yanagihara

SUBJECT: Request for Concurrence with Consistency Determination
Proposed Navigation Improvements, Oakland Harbor
(BCDC Consistency Determination No. CN 12-87)

Gentlemen:

On October 5, 1987, BCDC received a request from the Corps of Engineers for concurrence with a consistency determination for the dredging of Oakland Harbor. Staff has reviewed the request and cannot concur with the request because inadequate information has been submitted by the Corps.

The Corps proposes to dredge 6.5 million cubic yards of material from the Oakland Harbors, deposit the dredge spoils at the Alcatraz disposal site, and predredge 2.4 million cubic yards of material from Alcatraz to an ocean disposal site. The consistency determination is prepared in compliance with the Coastal Zone Management Act of 1972 which states, in part, that "each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs...." Department of Commerce, National Oceanographic Administration Regulations, Section 930.34(b) further states, in part, that "A consistency determination should be prepared of sufficient information to determine reasonably the consistency of the activity with the State's management program, but before the Federal agency reaches a significant point of decision making in its review process...."

Staff reviewed the information submitted and concluded that the Corps has not submitted sufficient information for the Commission to determine whether the proposed project is consistent with the policies of the San Francisco Bay Plan or the McAteer-Petris Act, the state legislation which established the Commission and therefore cannot concur with the Corps determination. We believe the proposed dredging of Oakland Harbor raises significant issues regarding water quality, both in terms of possible release of toxic materials in the dredge spoils and possible adverse affects on the Merritt-Posey acquifer in the Oakland Estuary and regarding the continued mounding at the Alcatraz disposal site. The McAteer-Petris Act states in

Section 66600, in part, that "the public has an interest in the bay as a most valuable single natural resource of an entire region...and that the bay operates as a delicate physical mechanism in which changes that affect one part of the bay may also affect all other parts...." Bay Plan Policies on Dredging state, in part, that "prior to authorization of dredging or the disposal of spoils in the Bay, the Commission should assure that adequate testing of the sediments will be done and that the sediments will be dredged and disposed of consistent with the requirements of the Regional Water Quality Control Board and the Environmental Protection Agency...."

Information Needed

We believe that the following additional information must be submitted:

1. Sediment Tests for Contaminants. The Corps has completed a series of bioassay, bulk sediment and elutriate testing of five areas within the Oakland Inner and Outer Harbors. From these tests, the Corps has concluded that the material "is suitable from a chemical standpoint for disposal at Alcatraz and at an ocean disposal site, pursuant to the requirements of Section 404 of the Clean Water Act and Section 103 of the Marine Protection Research and Sanctuaries Act." However, the information does not include any confirmation by the Regional Water Quality Control Board (RWQCB) or by the Environmental Protection Agency (EPA) that the sediment tests are comprehensive and complete and that they believe the proposed project will meet their requirements for water quality.

We are particularly concerned about dredging in the turning basin area of the Inner Harbor which abuts Schnitzer Steel and Todd Shipyard facilities. Schnitzer Steel recently applied for a permit and withdrew because the Commission felt that a plan for containing toxic contaminants must be prepared prior to a hearing before the Commission. Past industrial practices at steel yards and shipyards on shore and in the water were not monitored for toxic contaminants. There is a strong possibility that dredging this area to a deeper depth may uncover previously undisturbed contaminants and may disburse them throughout the Bay by depositing the material off Alcatraz.

Another concern is that sufficient testing of sediments at the Alcatraz disposal site is completed to indicate that these sediments are suitable to disposal at an ocean site. The Supplemental EIS, on page A-9, states that bioassay and bioaccumulation tests are currently being conducted. The results of these tests are not included or analyzed in the information submitted. We believe this information must be complete before the Commission can determine whether the removal of 2.4 million cubic yards of material will not adversely impact the water quality of the Bay.

While the Commission has separate authority regarding water quality, it also relies heavily on opinions of the RWQCB and EPA concerning the impacts of a project on water quality. Therefore, to assure the Commission that the project will be consistent with the requirements of RWQCB and EPA, you should submit letters from these agencies that discuss in some detail their analysis and conclusion regarding the affects this project is likely to have on the water quality of the Bay.

2. RWQCB Determination Regarding Underground Aquifers. Staff previously indicated its concern that known underground fresh water aquifers under the Inner Harbor may be adversely impacted by deeper dredging. The Supplemental EIS further investigates the characteristics of the Merritt/Posey Aquifer. The assessment concludes that increasing the channel depth would not result in an increase of salt water intrusion and cause degradation of the groundwater resource of the acquifer. Since the Corps project will significantly deepen the Inner Harbor Channel, we are concerned that the aquifer will not be adversely affected. Therefore, we wish written assurance that, as a result of the additional Corps investigation, the RWQCB is satisfied there will be no adverse impacts on groundwater in the area and that further monitoring is not required.

3. Mounding of Alcatraz Dredge Disposal Site. The Commission recently concluded a study of the problem of in-Bay dredge disposal sites. Within the next few years this and several other major dredging projects will significantly increase the amount of dredge spoils placed at Alcatraz annually. Page 21 of Appendix B outlines the amounts of new and maintenance dredging proposed by the Corps, but does not include dredging by other entities. For the years 1987 to 1992 the Corps estimates that a total of 7 million cubic yards will be deposited annually at Alcatraz, consisting of 2 million cubic yards of new dredging and 5 million cubic yards of maintenance dredging. It appears that this estimate is low because the Oakland Harbor dredging alone will generate a total of 7 million cubic yards of dredge spoils without predredging at Alcatraz.

If this project results in a net increase of 4.1 million cubic yards of material (not including the Port of Oakland dredging), the total amount of dredge spoils for 1988 could be a minimum of 11.1 million cubic yards without any other new dredging projects occurring. This large amount of dredge spoils will accelerate the mounding problem at Alcatraz. We do not believe statistical analysis has been provided to conclude that removal of 2.4 million cubic yards of spoils to an ocean disposal site is an amount sufficient to offset the placement of 6.5 million cubic yards which may thus exacerbate the problem of mounding at Alcatraz. We request that the Corps provide additional information to justify that the amount of predreged material is sufficient so as to not create additional mounding in the succeeding years. It appears that the amount of spoils to be removed from Alcatraz is based on cost benefit and not on mitigating the problem of mounding.

In addition, we are concerned that the Corps has not completed the final SEIS for this project. The Draft SEIS is now being circulated to appropriate government agencies, interested organizations, and the public for review. This step of the process will not be complete until November 9, 1987. Commission staff is commenting separately on this document. It appears that the Corps will not complete the environmental review process until some time after it has asked the Commission to act on the consistency determination request. We believe the information gathered from the final SEIS will be essential to the Commission's deliberations.

4. Other Additional Information. In addition we request further information on the following:

a. The area directly adjacent to the Alcatraz disposal site is owned by the State of California and managed by the State Lands Commission. Since a major quantity of dredge material is proposed to be added to the Alcatraz disposal site, we are concerned that the State Lands Commission has been informed of the project so that their concerns are recognized. Please provide evidence of correspondence with the State Lands Commission.

b. The recommended plan for the project as outlined on pages 5 to 7 of the Draft Design Memorandum does not include a description of what specific steps will be taken to minimize dispersal of sedimentation throughout the Bay and optimize dispersal of sediments to the ocean. Concern has been expressed by the Fish and Wildlife Service that the project could contribute to the decline of fish populations by increasing turbidity in shallow areas where spawning occurs. Please outline the steps you propose to undertake to address this concern in terms of the type of dredging methods to be used, the times of dredging, and whether dredging will be precluded during herring spawning season.

c. The scope of the Corps project is unclear. From the information provided the project will remove 6.5 million cubic yards of material from the Oakland

Harbors, depositing that amount at the Alcatraz disposal site. An additional 2.4 million cubic yards will be removed by the Corps from Alcatraz and deposited at an ocean disposal site. The project does not include work by the Port of Oakland to dredge an additional .5 million cubic yards of material from Oakland Harbor or to remove an additional .3 million cubic yards from Alcatraz to deposit at an ocean site. It is unclear when the Port of Oakland will request approval from the Commission and undertake their work.

Also the document states that this project will generate an additional 100,000 cubic yards of annual maintenance dredging. The Letter of Agreement for Consistency Determination CN 13-85 authorizes the Corps to maintenance dredge 500,000 cubic yards from the Oakland Harbor Channels is included in for 1985 to 1990. The Corps request should include a request for Consistency Determination No. CN 13-85 to be amended to include the additional material.

The Commission received the Corps request for consistency determination on October 5, 1987. The Commission must act upon a consistency determination request within 45 days of receipt of the request, which would be November 19, 1987, unless you request a 15-day extension. Since the project is considered to be a major consistency determination, a hearing and vote before the Commission are required. The Commission generally hears a project at one meeting, then votes upon the request at a regularly scheduled meeting two weeks later. This matter is tentatively scheduled for a hearing on November 5 and a vote on November 19, 1987. However, this schedule does not allow time for the Corps to submit the additional information we believe is necessary for staff to make a favorable recommendation on the request and does not allow 28 days notice time for other interested agencies to comment. In order to meet this time schedule the Corps would need to submit the additional information by the day you receive this letter. We do not believe such a schedule is feasible.

Therefore, by this letter we are requesting a 15-day extension. Only one 15-day extension is allowed under CFR Regulation 930.41(b). If a 15-day extension is granted, the Commission would hold a hearing on November 19 and a vote on December 3. In order for the staff to meet the statutary requirements for mailing material to the public and the Commission we must have the information no later than October 26. As you can see, even with a 15-day extension because of the type of information lacking, the time schedule is difficult if the Corps desires a favorable recommendation from the Commission. If the Corps does not submit additional information and insists on holding a hearing, we believe that the Commission will most likely not concur with the request because of insufficient information.

Staff will be glad to meet with you and discuss this request further. Please call me at your convenience.

Very truly yours,

Joan L. Lundstrom

JOAN L. LUNDSTROM
Permit Analyst

JLL/mm

cc: Corps of Engineers, Rod Chisholm, Environmental Branch;
Brian Walls, Environmental Branch
Port of Oakland: Walter Abernathy, Executive Director
San Francisco Bay Regional Water Quality Control Board,
Attn: Michael Carlin
U. S. Environmental Protection Agency, Attn.: Patrick Cotter
State Lands Commission: Fred Sledd
Commissioner Jay K. Soper
Commissioner Marion Otsea
Commissioner Judith Ayers
Gary Schnitzer
John Berry, Alameda Gateway
Citizens for a Better Environment
United Anglers

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

September 23, 1987

Environmental Branch

Mr. Alan Pendleton
Executive Director
San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue
San Francisco, California 94102

Dear Mr. Pendleton:

Pursuant to section 930.34 of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations (15 CFR 930 et seq.), the Corps of Engineers, San Francisco District has prepared a Consistency Determination for the congressionally authorized project described in the enclosed, "Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, Draft Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, Alameda County, California".

The Corps has determined that the proposed project is consistent to the "maximum extent practicable" with the San Francisco Bay Plan. Please refer to paragraph 4.5 (page 33) in the GDM, and Appendix E of the SEIS. Annual maintenance quantities to be dredged from the Oakland Harbor Channels will be approximately 600,000 cys. Maintenance dredging for this project covering Fiscal Years 1985 through 1990 was included in the Letter of Agreement for Consistency Determination No. CN 13-85 (Issued on March 6, 1986, As Amended through September 15, 1987).

Your concurrence with our determination within 45 days is requested pursuant to section 930.41 of the Regulations. If you have questions or require additonal information, please contact Ms. Patricia J. Duff of our Environmental Branch at (415/974-0441).

Sincerely,

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

APPENDIX E

DRAFT SEIS COMMENTS/RESPONSES

DRAFT SEIS OAKLAND INNER AND OUTER HARBORS
DEEPENING PROJECT, ALAMEDA, CALIFORNIA

COMMENTING AGENCIES, GROUPS, AND INDIVIDUALS
as of December 30, 1988

OAKLAND HARBOR
CATEGORIES OF COMMENTS ON SEIS

Category #	Subject
1	GROUNDWATER - Merrit-Posey, Alameda Formation, aquifer, wells, monitoring
2	WATER QUALITY - sediment testing, chemical analysis, bioaccumulation, bulk sediment, bioassay
3	OCEAN DISPOSAL - Site 1 M, nearshore site, Zone of Siting Feasibility (ZSF), Ocean Vessel Monitoring System (OVRMS), radar net, Section 102 and 103 site selection criteria, deepwater site, site off the Continental shelf, etc.
4	ALCATRAZ PREDREDGING AND DISPOSAL - slurry disposal, turbidity, life of site, mounding, water quality concerns, impacts on fish and other biological resources, cumulative impacts
5	IMPACTS ON FISHERIES, COMMERCIAL AND SPORT FISHING, OTHER BIOLOGICAL RESOURCES - declines in dungeness crab, declines in fish populations, destruction of habitat,etc.
6	LAND JURISDICTION - National Park Service, State Lands, need for permits, geodetic markers
7	SCOPE OF PROJECT - scope unclear, insufficient studies, inadequate studies, need to consider additional alternatives
8	OFFSHORE LEASING - offshore mineral development, oil leases
9	ECONOMICS, MITIGATION and MONITORING - need for and cost of mitigation, monitoring, cost/benefit ratio, economic analysis, cost of transporting dredge material
10	TRANSPORTATION - increased truck traffic, interference with BART
11	PROCEDURAL - request for additional information, coordination incomplete or inadequate, elevation to CEQ
12	LEGAL - legal requirements, Clean Water Act (Sect. 404), NEPA, BCDC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California [illegible]

October 28, 1987 [illegible]

Colonel Galen H. Yanagihara
District Engineer
San Francisco District
Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Yanagihara:

The National Marine Fisheries Service (NMFS) completed its review of the "Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements Draft Design Memorandum Number [illegible] the Environmental Impact Statement (EIS) [illegible] order to provide as timely a response [illegible] comments as possible, we are submitting the [illegible] you directly, in parallel with their transmittal to the Department of Commerce for incorporation in [illegible] response. These comments represent the views of the [illegible] Region of the NMFS. The formal, consolidated [illegible] Department should reach you shortly.

Briefly, the project would involve dredging [illegible] approximately 7-million cubic yards of [illegible] aquatic environment. The purpose [illegible] access to Oakland harbor [illegible] the Port.

The NMFS is responsible for [illegible] estuarine and anadromous [illegible] habitats and the migratory [illegible] and the uninterrupted [illegible] and commercial interest [illegible] striped bass [illegible] croaker and [illegible] complex food web [illegible] fisheries.

There have been [illegible] species within [illegible] populations [illegible] significantly [illegible] in the case of the [illegible] issues should be [illegible]

San Francisco Bay [illegible] estuary of [illegible]

importance (i.e., Environmental Protection Agency's National Estuary Program). Many studies and programs are being discussed to augment those already underway and to improve aquatic and wetland characters of the Bay. Newly proposed shoreline development projects of significant proportions, such as the subject of this EIS/SEIS, should recognize and support this important initiative.

Recently, the NMFS was alerted to potentially significant adverse fishing conditions in San Francisco Bay. Unusually prolonged, high turbidity conditions occurred in the Bay the last two fishing seasons with a corresponding decrease in fish harvest. Potential responsibility lies with 1) the Corps' requirement to slurry material before disposal at Alcatraz, and 2) lack of disposal schedules to minimize redeposition in the Bay. Because this concern is recent, it understandably is not discussed in the SEIS. Nonetheless, it should be examined in some detail in the final EIS. F-3

Regarding the work site, our initial calculations, using measurements from Figure 8, indicate that approximately 124 acres of shallow, subtidal habitat will be converted to maintained-channel habitat. This will be new, first-time dredging that will impact habitat not previously disturbed. Our review of this SEIS and [illegible] reports (SEIS page 4) does not reveal any on-site, biological assessments of this habitat to determine what actual fishery or seagrass losses will occur. Such assessments should have been performed to determine if mitigation will be appropriate. Without this information, resource agencies must assume that the loss of 124 acres of this habitat is significant, and will need to be mitigated. F-4

Regarding the Alcatraz disposal site, decisions must be made soon [illegible] its future. It is very appropriate to discuss this matter in [illegible] To use the site for 7-million cubic yards of dredge [illegible] in the environmentally preferred manner (non-slurry) means shortening the life of the site for continued disposal of [illegible] dredged material. This benefits the Port of Oakland at the expense of smaller dredging enterprises. Also, it is appropriate to consider the cumulative impact of numerous large [illegible] disposal at Alcatraz. The Navy Homeport [illegible] will affect all calculations predicted for the life of the Alcatraz site. Further, if it is obvious to the Corps that material must be [illegible] at Alcatraz (intermittent [illegible] sediments from Alcatraz to an ocean site) to [illegible] San Francisco Bay dredging needs, then it also must be obvious that the Alcatraz site is not a good disposal site for [illegible] material disposed in water should not be considered suitable. It is not consistent with good [illegible] with plans to improve the condition of [illegible] an undesirable precedent for similar [illegible] Federal [illegible] throughout the country. F-5 F-6 F-7 F-8

The impact [illegible]
on the [illegible]

[illegible]

of the [illegible]
environment [illegible]
purpose of [illegible]
of the [illegible]
economic [illegible]
site [illegible]
The cost of [illegible]
The benefit/cost [illegible]
fishing [illegible] 11

[illegible] fishery, resources, and users of [illegible]

[illegible] baseline studies need to be [illegible] hydrographic and biological [illegible] hydrographic and [illegible] are needed to determine the fate [illegible] materials. Although this document [illegible] before designating [illegible] for the [illegible] that may [illegible] be necessary before [illegible] F-15

[illegible] F-16

[illegible] F-17

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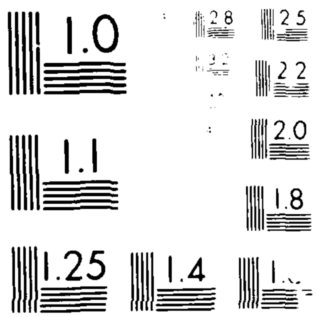
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File Name: NMFS10-2

Comment Categories: 3,4,5,7,9

RESPONSE TO COMMENTS

Agency/Group/Individual: DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL MARINE FISHERIES SERVICE

Date of Letter: October 28, 1987

F-1 Comment noted. The striped bass fishery and Dungeness crab have suffered declines in population, distribution and catch in recent years. Their declines as well as purported declines in other species have been attributed to many factors including water diversions, meteorological changes, oceanographic temperature fluctuations, pollution, habitat losses, over-fishing, parasites and so forth. To this point, the available research has been unable to quantify the contribution of each of these factors to the population declines (See SEIS, Section 3.3.7).

F-2 Comment noted. Recognition of the National Estuary Program has been included in the SEIS in Section 3.3.1. The EPA's National Estuary Program, which has recently included San Francisco Bay, is recognized by the Corps of Engineers as an important step in furthering our collective understanding of estuarine processes at work in the Bay and aiding in management of this valuable resource. However, The Oakland Harbor project is not considered a new proposal. Two separate feasibility and EIS reports have been prepared as described in the SEIS (see Section 1.1). The Oakland Outer Harbor feasibility report and EIS was finalized in 1979, and the Oakland Inner Harbor feasibility report and EIS was finalized in 1985. The project as authorized by Congress in 1986 was developed in support of regional maritime needs and is consistent with the regional Seaport Plan (MTC/BCDC, 1982).

F-3 The Alcatraz disposal site is not necessarily the preferred alternative. It has, however, been in use since 1894. Its use has increased since the early 1970's when dredged material disposal sites in the Bay were reduced from eleven to three dispersive sites. The use of the sites was based upon the conveyance of a portion of the material by currents out of the Bay. The employment of a slurry requirement was put into effect after unforeseen material accumulation at the Alcatraz site was identified. As noted, high turbidities at sampling stations in the vicinity of Alcatraz were reported (CDFG, unpublished data) over the last two years. It is alleged that disposal at Alcatraz is responsible for the reported levels. However, the levels and the timing of the "high" conditions are not consistent with the actual implementation of the slurry requirement for dredged material disposal at the Alcatraz site nor commensurate with the intensity of disposal. The prevalence of high turbidities in the Central Bay does not correlate with slurry activities at the disposal site. Procedures for these activities had to be developed and slurry disposal was not truely operational until mid-1987. During late summer and fall of 1986, when the highest level of turbidity was reported, disposal activity was lower than it had been for several years. Moreover, during the same period, turbidity monitoring of the site was being undertaken as part of the Alcatraz Dredged Material Disposal Monitoring Study (SAIC, 1987). Levels of turbidity at the disposal site were measured as highest immediately after slack low water and at the lowest levels immediately after slack high water. The influence of tidal circulation in the Bay, with transportation of sediment laden water from the shallow areas of the Bay and Delta, and the relatively clear waters from beyond the Golden Gate, back and forth across the disposal site, was the most important factor determining turbidity at the disposal site. The intensity of disposal activity and the speed of the currents at Alcatraz did not significantly alter suspended sediment levels in the vicinity of the site, and therefore would be extremely unlikely to exert a measurable influence on the larger Bay. Since San Francisco Bay is naturally turbid, the data collected from the overall CDFG sampling program must be considered. To examine an exiguous data set from stations in the vicinity of the Alcatraz site only and relate it to disposal activities at the Alcatraz site is problematic and does not reflect the Bay-wide sediment regime during the sampling period. As an example, the storms of 1986 caused large quantities of suspended solids to be flushed into the Bay system, and their distribution continued into 1987, yet this phenomenon is not mentioned.

Ebb tide only disposal was considered as a way of maximizing the evacuation of material from Alcatraz to the ocean in the Oakland Outer Harbor GDM and EIS which were finalized in 1979. More recent studies have shown that few benefits, if any, are achieved by ebb tide disposal because of the complex currents in the Alcatraz area (Winzler and Kelly, 1986; SAIC, 1987a; SAIC, 1987b; SAIC, 1987c; USACE, 1987).

F-4 Appendix B, Benthic Study, in the Oakland Outer Harbor EIS, 1979, provides a biological assessment. In that appendix, Leighton and Associates state that re-establishment of benthic species could be similiar to the pre-deepened condition because of the relatively diverse infauna communities present in the area.

F-5 Comment noted. The Alcatraz Dredged Material Disposal Site is a dispersive disposal site. Historically, more than 85% of all dredged material discharged at the site was swept away by the strong tidally dominated currents. The pre-dredging of the Alcatraz site, with removal of 2.7 million cubic yards to an ocean dredged material disposal site, was originally designed to preserve the future use of the site. Based on this design there should be no bathymetric change at the disposal site. Therefore, the alternative will not "shorten the life of the site" or "benefit the Port of Oakland at the expense of smaller dredging enterprises".

F-6 Comment noted. Cumulative impacts of the proposed project in conjunction with other anticipated dredging is addressed in SEIS, Section 4.5 and the Section 404 (b)(1) evaluation appended to the Final SEIS.

F-7 The Alcatraz site historically disperses about 85% of the dredged sediments discharged there. About 15% of discharged material remains at the site. The proposed predredging of materials previously retained at the site is intended to protect this site for the entire San Francisco Bay maritime community.

F-8 The predredging of Alcatraz would be new to the site and it could preserve the site's capacity, if selected as the preferred alternative. Both rehandling and predredging are techniques in common use throughout the United States' dredging community. It is unlikely that the predredging of Alcatraz will be precedent setting except for that site.

F-9 The recent "slurry" requirement did not significantly influence turbidity. As discussed in F-3, turbidity levels are not correlated with rate of disposal. With respect to recent fisheries declines being an outgrowth of the slurry requirement, history at the site suggests otherwise. Historically, most Corps of Engineers dredging in San Francisco Bay has been accomplished with hopper dredges which produce a slurried disposal material. This practice continued for many decades. There have been no fish kills reported or declines correlated with this ongoing disposal activity. Turbidity resulting from dredge disposal is a very temporary effect, especially when compared with wind wave and run-off caused turbidity. Also, recent attempts to have clamshell dredgers slurry their dredged material before disposal have not been completely successful. The equipment is not capable of producing a homogeneous slurry. Therefore, there has been no significant change in historic operational procedures or Alcatraz water quality. In view of the above information, we do not believe that recent attempts to have all materials disposed at Alcatraz in a slurried form, could be an important contributing factor in the declining fish harvests.

F-10 The impacts on juvenile fish, invertebrates and bird use on shallow mudflats and in tidal sloughs were not assessed because there are no data to indicate that "shallow mudflats are elevated, and tidal sloughs are filled at accelerated rates". The initial depositional pattern is confined to the Central Bay. The influence of wind-wave resuspension and/or freshet solids transport dominates general sediment transport processes in the shallow areas of the Bay. To imply a direct cause-effect relationship between disposal at the Alcatraz site and the acceleration of deposition of the material in quiescent shallow waters ignores these other factors. In fact, BCDC has expressed concern regarding erosion of mudflats and wetlands if the sediment load is too low (San Francisco Bay Conservation and Development Commission, 1987).

F-11 Comment noted. The Corps is working with the EPA and will comply with 40 CFR 228.5 in our site selection process.

F-12 Please refer to response F-11 and the Zone of Siting Feasibility (ZSF) Analysis appended to the SEIS, Appendix F.

F-13 Present navigation in the Gulf of the Farallones by commercial, military, fishing, and recreation vessels presents a potential danger. The U.S. Coast Guard has established the OVMRS radar to monitor vessel movement. To this traffic, disposal operations could add several round trips each day of tugs with one or two barges in tow. Vessels will depart from established traffic lanes and operations will continue at night and during periods of inclement weather or reduced visibility. Not all smaller vessels are equipped with radar or are easily visible on the radar screens of larger vessels. Operating under the umbrella of safety provided by the OVMRS radar will provide a greater degree of protection for both the barge operators and the pilots of other vessels in the Gulf. For more detail, consult the ZSF Analysis appended to the SEIS.

F-14 See response to F-11.

F-15 A baseline survey of one potentially viable ocean site (1m) has been undertaken by the Corps of Engineers and a monitoring program of the selected site will be coordinated with EPA, Region IX. See also response to EPA comment F-4 (SEIS, Section 4.6)

F-16 Comment noted. The statement has been modified in the SEIS. An array of disposal alternatives has been considered throughout the feasibility study and preconstruction planning stage. Reasons for elimination of disposal alternatives have been described. The comment regarding present disposal of dredged material at the Alcatraz site is noted.

F-17 The Corps of Engineers is guided in its decision-making process, during this and all other projects, by the laws and regulations of the United States. As required by NEPA, and our own regulatory procedures, all elements of a project's implementation are assessed to determine impacts. Then, using a balancing process of the "best public interest", a decision is formulated. We believe that impacts on commercial and recreational fisheries have been assessed and evaluated in a fashion equal to the project benefits.

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

NOV 9 1987

Colonel Galen H. Yanagihara, USA
District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Yanagihara:

The Office of Ocean and Coastal Resource Management has completed its review of the "Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Draft Design Memorandum Number 1 and Supplement to the Environmental Impact Statement, September, 1987" (SEIS). This letter provides our comments on this draft proposal.

The recommended alternative to designate Site 1M as an ocean disposal site for approximately 2.7 million cubic yards of sediment may have an adverse impact on the resources of the Gulf of the Farallones National Marine Sanctuary, which include many commerically important fish and shellfish. We suggest that as part of your site selection process you review and compare the available information on the hydrographic and biological characteristics of Site 1M and Site B2, a deepwater site further away from the Sanctuary, to determine which site receiving disposal wastes will have the least adverse effect on the area's fisheries and other natural resources. F-1 Additionally, as part of your determination, we suggest that you compare the economic costs of using Site B2 with those previously calculated for Site 1M; including disposal costs and potential losses to the region's fisheries. F-2

The Gulf of the Farallones National Marine Sanctuary was established in January, 1981, to ensure the long-term protection and preservation of the extraordinary marine habitat and assemblages of species that occur in the region. The Sanctuary, an area of some 948 square nautical miles, is protected and managed under the terms of Title III of the Marine Protection, Research and Sanctuaries Act of 1972, as amended, and by the implementing regulations found at 15 CFR 936. The Gulf of the Farallones National Marine Sanctuary is part of the National Marine Sanctuary Program, which is administered by the Marine and Estuarine Management Division, within Office of Ocean and Coastal Resource Management of the National Ocean Service.

The apparent justification for disqualifying Site B2 is that it lies beyond the range of Coast Guard radar coverage (SEIS p. 9). It is not clear why this coverage is crucial to identifying a disposal site since fishing and shipping vessels operate in this area beyond Coast Guard radar coverage every day. F-3 However, if navigational safety is a prime criterion for selection, it should be noted that Site B2 lies well within the Coast Guard's recently established Offshore Vessel Movement Reporting System. F-4 In addition, a disposal contractor could be required to carry a radar transponder, a device which enhances the visibility of the vessel to radar. F-5 Thus, Site B2 does not appear to suffer from problems associated with navigational safety and has only moderate problems with radar surveillance.

In summary, we suggest that, as part of your site selection process, you fully consider both the regional environmental and economic effects of disposing dredged materials at both Sites 1M and B2. F-6 The Office of Ocean and Coastal Resource Management, through the Gulf of the Farallones National Marine Sanctuary is prepared to assist in designing and supporting a program to monitor the effects of disposed dredged materials on the Sanctuary's resources.

Sincerely,

Peter L. Tweedt
Director

FILENAME: COMOCRM1 Comment Categories: 3,9,5

RESPONSE TO COMMENTS

Agency/Group/Individual: UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL OCEAN SERVICE, OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT (OCRM)
Date of Letter: November 9, 1987

F-1 Technical guidance in identifying an appropriate ocean disposal site has been established by joint Environmental Protection Agency (EPA) and Corps of Engineers in General Approach to Designation Studies for Ocean Material Disposal Sites, May 1984. The site selection process as framed by the guidance involves a sequential process considering operational factors and economic aspects (e.g., project costs). As defined in the Zone of Siting Feasibility (ZSF), SEIS, Appendix F, the areas in which an appropriate site can be located lies within a 24 nautical mile arc from Point Bonita. Two potential sites within this zone are 1m and B1. Site B2 is situated outside of the ZSF and, therefore, has not been included for detailed evaluation.

F-2 The suggestions are noted. As mentioned in the prior comment, Site B2 lies outside of the ZSF (SEIS, Appendix F) established to delineate the area in which it would be operationally and economically viable to dispose of dredged material. Sites within the ZSF were evaluated to locate a site that will have acceptable environmental impact at the least economic costs. The detailed comparison suggested was undertaken for sites within the ZSF and is not relevant for Site B2 and other preliminary candidate sites that were determined to be outside of the ZSF.

F-3 The safety concerns addressed by locating the disposal site within the range of the Offshore Vessel Movement Reporting System radar are presented in the ZSF (SEIS, Appendix F).

F-4 Site B2 does not lie within the OVMRS radar range of the U.S. Coast Guard and the Established ZSF. The range of the OVMRS radio is a 70.5 km (38 nmi) radius from Mt. Tamalpais and does extend beyond Site B2 (33nmi). However, the radio system is voluntary and therefore is not used by all vessels. The system does not relay relative position between vessels to operators or oversight personnel, and will not overcome the inability to communicate with the pilots of foreign commercial vessels or some pilots of the domestic fishing fleet that do not speak English.

F-5 The U.S. Army Corps of Engineers and the U.S. Coast Guard have determined that disposal operations within the 51.9 km (24nmi) will have a greater degree of safety than operations outside of that radius. Furthermore, the U.S. Coast Guard has requested that the Corps of Engineers require as conditions of all permits for ocean disposal of dredged material the mandatory participation in the OVMRS radio net as well as the installation of transponders or devices to enhance radar detection on all vessels. Without devices to enhance the radar image, the effective radar range would be greatly reduced during periods of inclement weather and the ZSF would have to be drawn at a much smaller radius to provide the same degree of control.

F-6 Comment noted. Please refer to previous discussion for responses F-1 through F-5.

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

N/CGx11:GTE

OCT 30 1987

MEMORANDUM FOR: David Cottingham
Ecology and Conservation Division
Office of the Comptroller

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

SUBJECT: DEIS 8709.08 San Clemente Water Project, California
DEIS 8710.04 Oakland Outer and Inner Harbor Deep Draft Navigation Improvements, California

E-7

The subject statements have been reviewed within the areas of Charting and Geodetic Services' (C&GS) responsibility and expertise and in terms of the impact of the proposed actions on C&GS activities and projects.

Geodetic control survey monuments may be located in the proposed project areas. If there are any planned activities which will disturb or destroy these monuments, C&GS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. C&GS recommends that funding for these projects includes the cost of any relocation required for C&GS monuments. For further information about these monuments, please contact Mr. John Spencer, Chief, National Geodetic Information Branch (N/CG17), telephone (301) 443-8281 or Lieutenant Commander Richard P. Floyd, Chief, Operations Branch (N/CG16), telephone (301) 443-8792 at C&GS, National Ocean Service, NOAA, Rockville, Maryland 20852. F-1

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102

MAY - 5 1987

ER 87/1142

Colonel Galen H. Yanagihara
District Engineer, San Francisco District
U.S. Army Corps of Engineers
211 Main Street
San Francisco, California 94105-1905

Dear Colonel Yanagihara:

The Department of the Interior (Department) has reviewed the Draft Design Memorandum Number 1 (DM) and Draft Supplement 1 to the Final Environmental Impact Statement (SEIS) for the Oakland Outer and Inner Harbors Deep Draft Navigation Improvements Project and finds the documents deficient in many areas. The following comments are provided for your use and consideration when preparing the final documents.

General Comments

Water Resources: The final DM should clarify yields given for wells in the Merritt-Posey aquifer, indicating whether the statement [illegible] means that: (1) there is no record of well measurement available, (2) the well was not in use when visited, (3) there was no pump on the well when visited, or (4) a well does not have the capacity to yield a significant quantity of water. F-1

The [illegible] analysis in the final document should evaluate the potential for adverse effects on the Alameda aquifer in the event of salt water encroachment into the Merritt-Posey aquifer. In particular, potential avenues for salt water movement through wells screened in both aquifers and along the annuli of wells penetrating both aquifers should be considered. F-2

[illegible] measures for mitigation of project-related changes in ground-water quality, if detected, should be discussed. If warranted, a mitigation plan should be finalized and formally adopted prior to the signing of the Record of Decision. F-3

Fish and Wildlife Resources: The Oakland Outer and Inner Harbors projects, evaluated previously by the U.S. Fish and Wildlife Service (Service) pursuant to the Fish and Wildlife Coordination Act, now include, as the recommended plan, the pre-dredging of the Alcatraz disposal site (2.0 million cubic yards) with disposal of the material at an ocean disposal site, and the subsequent disposal of 7.6 million cubic yards of dredged material F-4

from the Oakland Harbor projects at the same Alcatraz disposal site. This disposal plan would have a greater potential adverse impact on biological resources of the Bay, and also on the ocean, than the plan authorized in 1986 (Ph99-662).

The Service has provided several planning aid letters to the U.S. Army Corps of Engineers (Corps) indicating its concerns and providing preliminary recommendations to minimize the potential adverse effects of this revised disposal plan on fish and wildlife. The Service, however, was not provided adequate project information to conduct a detailed impact analysis, nor was it requested to provide a Fish and Wildlife Coordination Act report for inclusion in the draft DM/SEIS. F-5

As a result, we believe that the document: (1) greatly understates the potential impacts on commercial and sport fish species from pre-dredging and slurry disposal at Alcatraz and the disposal of dredged material at the recommended nearshore ocean disposal site; (2) is deficient in its analysis of potential project impacts to Bay estuarine and offshore marine biota; (3) does not include measures to mitigate potential adverse project impacts on these resources; and (4) lacks a detailed economic analysis of project impacts on commercial and sport fisheries and their supporting industries. F-6 F-7 F-8 F-9

The Department believes these points must be addressed and thoroughly evaluated before the project proceeds.

Mineral Resources

The final DM should address any potential conflict between the proposed dredge spoil disposal sites and Outer Continental Shelf (OCS) Leasing and Development Plans, and any cumulative effects when OCS activities are considered together with the disposal of dredge spoils. F-10

To assist you in evaluating these potential issues, enclosed is a copy of the Minerals Management Service's (MMS) Proposed 5-Year Plan for OCS Oil and Gas Leasing Program from mid-1987 to mid-1992. This document outlines the MMS's leasing plans for the area specific to the proposed disposal sites and provides additional useful information concerning water quality and biological resources.

Specific Comments

DM Page 31, Section 4.2.1., Data Collection, last paragraph: A statement should be included in the final document to [illegible] that, although benthic organisms may not be directly impacted by sediment quality, they can nevertheless be suffocated due to sediments quantity. F-11 [illegible] dredge to Ocean. The paragraph [illegible] that slurry material would settle in [illegible] channels and harbors, thereby shortening [illegible]. Slurry settlement would require [illegible] costs. Increased dredging frequency would [illegible] resources at the dredging and disposal sites. These issues should be discussed in detail [illegible]. F-12

[illegible] Page 42, Section [illegible], Project Economics. This entire section does not include a discussion of mitigation costs. Mitigation requirements should be determined and the costs included in this section. [illegible] costs are project costs; therefore, they have a [illegible] bearing on [illegible] alternative selection. F-13

[illegible] Section [illegible] Conclusions and Findings. [illegible] the NED Plan is that the option is [illegible] least costly alternative. However, the full [illegible] is not included. Of the 7.0 million cubic yards [illegible] material proposed for disposal at the Alcatraz site [illegible] expected to recirculate back into and [illegible] the Bay (53 percent and 47 percent of the 67.5 percent [illegible] model studies). Some of the material [illegible] into the Bay could be expected to settle into [illegible] and harbors, thereby necessitating more [illegible] to maintain their navigability. [illegible] and included in the final SEIS. F-14

[illegible] the analysis are the potential impacts [illegible] fisheries. Commercial [illegible] have reported that turbidity levels have increased [illegible] the last 2 years [illegible] coincident with initiation [illegible] at Alcatraz [illegible] and that a decline in fish [illegible] Department of Fish and Game [illegible] the decline. Therefore, a thorough [illegible] relative impacts of [illegible] should be presented in the final SEIS [illegible]. Any mitigation cost would be a project [illegible]. F-15

[illegible] the potential [illegible] F-16

Colonel Galen H. Yanagihara 4

SEIS Page iv, Section b, 2, Long-term Environmental Effects, Project area. We believe that the conclusions reached in this paragraph are premature, especially without long-term studies. The Service has informed the Corps repeatedly of the need to conduct long-term studies of ocean disposal alternatives. Such studies are essential before any ocean disposal occurs. F-17

SEIS Page iv, Section c, 3. The draft document was prepared without sufficient coordination with the Service. Hence, we believe that the document is deficient in providing a detailed analysis of potential impacts and mitigation measures. When such significant biological resources are involved, as in this case, the Service recommends that a thorough evaluation of in-bay and ocean impacts be conducted and appropriate mitigation measures proposed before proceeding any further with the project. F-18

SEIS Page v, Area of Controversy. We are not only concerned with increased turbidity, increased sedimentation of shallow [illegible] areas, and the release of contaminants, but also with the [illegible] crease in the frequency of maintenance dredging required to maintain existing navigation channels and port facilities. Maintenance dredging impacts the Bay ecosystem by disturbing bottom organisms; increasing turbidity and sedimentation (both dredging and disposal); and releasing contaminants. F-19

SEIS Page vi, Unresolved Issues. We disagree with the statement that there are no unresolved issues. The Corps' intention to dredge the Alcatraz disposal site and then dispose of 7.0 million cubic yards of slurry material from the Oakland Harbor Navigation Project at the same site is an issue which we believe to be unresolved. The Service has repeatedly informed the Corps of its objections to this proposal as well as any proposal to dispose of dredge materials at the Alcatraz site. We have never considered in-Bay disposal compatible with the need to protect fish and wildlife resources in the bay. Our basic position has always been that the first priority for disposal of dredged material is on upland areas, followed by ocean disposal at a deep water site. Only if these alternatives are not feasible should open water disposal in the Bay be considered and then only on [illegible] tions. In addition, we believe that pre-dredging of Alcatraz would unnecessarily aggravate the existing problems associated with in-Bay disposal.

Further, the Service has informed the Corps of [illegible]. The selection of the proposed nearshore (site [illegible]) [illegible] site. We believe that the selection of the site was [illegible] more on economic than environmental concerns. The Service's letter of February 24, 1987, stated that in order to [illegible] the potential adverse effects of dredged material disposal [illegible]. F-20 valuable marine resources of the area, the Kennitic Laboratories. The study should be expanded: (1) to consider seasonal variations of faunal composition and dynamics; (2) to encompass at least 3 years of sampling; and (3) to include several extremely deep-water sites beyond the continental shelf. None of these actions have been implemented. Therefore, we believe it is premature to select any of the proposed ocean disposal sites. F-20

The Service's letters of February 24, and August 18, 1987, are planning aid documents that provided information based on very preliminary data from the Corps and, therefore, should not be construed as satisfying coordination between the Service and the Corps as required by the Fish and Wildlife Coordination Act. Hence, a detailed with- and without- project analysis of the disposal alternatives and mitigation recommendations, were not provided. Because of the significant modification in disposal plans, at least a draft Coordination Act report from the Service should be in [illegible] with the final DM/SEIS. F-21

SEIS Page [illegible], Candidate Sites Considered. The final SEIS should acknowledge that Sites 2, B2, B3, B5, and the Service's recommended deep water sites beyond the Continental Shelf were eliminated largely because of high transportation costs, rather than potential impacts on aquatic resources and the commercial and sport fisheries. The sites selected for further study (Kennitic Laboratories [illegible]) may have a greater aquatic resource and fishery value than those potential sites that have been eliminated. F-22

SEIS Page [illegible], Ebb Tide Disposal. This section should be corrected [illegible] the final SEIS to recognize that the Service would find ebb tide [illegible] acceptable only when upland disposal and ocean disposal are not [illegible]. F-23

Also, the description of ebb tide currents appears to imply that they are exclusive to this alternative. It should be discussed in the final SEIS that the only difference between disposal at ebb tide and at any tide could be the loading factor. However, if disposal is in a slurry form, then retention of spoils would be significantly reduced. F-24

SEIS Page [illegible], Pre-Dredging Alcatraz. A statement should be [illegible] that 62.5 percent of the dredged material not retained at the Alcatraz site would be recirculated back into the Bay and carried out of the Bay (53 percent and 47 percent of the 62.5 percent, respectively, Corps model studies). Material [illegible] into the Bay is expected to settle in navigation channels and shallow water areas. Pre-dredging would contribute to the recirculation of material. F-25

SEIS Page 52, 3.4.5, a. The reference to seasonal studies of infaunal benthic communities should be documented. We are not aware of any recent benthic studies on seasonal and year-to-year variation in community composition. F-26

Summary Comments

Because the document is deficient in so many respects, and because the Service has not been requested to prepare a Fish and Wildlife Coordination Act report that would thoroughly evaluate the dredged material disposal alternatives and provide mitigation recommendations, the Department cannot support the Corps' recommended plan to improve deep-draft navigation at Oakland Outer and Inner Harbors. I suggest that you contact Fred [illegible] the Service's Sacramento Ecological Services Field Station for technical assistance. F-27

The final Design Memorandum and final SEIS should be revised to discuss in detail the above identified issues. The documents should include a detailed mitigation plan. Before a Record of Decision can be signed, the mitigation plan and the monitoring enforcement programs must be finalized and formally adopted (40 CFR 1505.3). F-28

In view of these concerns, we may, depending on the [illegible] included in the final SEIS, refer this project to the Co[illegible] Environmental Quality under Section 1504 of the Council's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. F-29

We appreciate this opportunity to review and comment on [illegible] documents.

Sincerely,

Patricia [illegible]

Patricia Sanderson [illegible]
Regional Environmental [illegible]

Enclosure

cc: Director, OEPR (w/orig. [illegible])
Reg. Dir., FWS
Reg. Dir. [illegible]

File Name: INT-EPR1

Comment Categories:
1,3,4,,5,8,9,11

RESPONSE TO COMMENTS

Agency/Group/Individual: UNITED STATES DEPARTMENT OF THE INTERIOR, OFFICE OF ENVIRONMENTAL PROJECT REVIEW
Date of Letter: November 5, 1987

F-1 Comment noted. The final document clarifies yields given for wells in the Merritt/Posey Aquifer. (See General Design Memorandum or GDM Section 4.1). A zero yield basically means there is no recorded yield measurement available.

F-2 A discussion of the potential for adverse effect on the Alameda formation aquifer in the event of salt water encroachment into the Merritt/Posey aquifer has been included in the GDM, Section 4.1.

F-3 Possible measures of mitigation of project related changes in groundwater quality are discussed in Appendix C of the GDM, and are also summarized in the text of the GDM, Section 4.1.

F-4 The pre-dredging disposal plan would have a greater impact on ocean resources than the authorized 1986 plan which did not include ocean disposal. The 1986 plan, on other the hand, proposed the disposal of 9 million cubic yards at Alcatraz, whereas the pre-dredging plan envisions the disposal of 7 million cubic yards at the Alcatraz site.

F-5 At the Corps' request, the Service provided two planning aid letters for the draft SEIS, and at the Corps' request (by letter of August 6, 1987) agreed to provide a draft Supplemental Coordination Act Report by November 15, 1987 as soon as biological survey reports were available. These reports were received by the Service along with the Draft SEIS on October 5, 1987; however, the Service stated that they would be unable to furnish a draft Supplemental Coordination Act Report until January 15, 1988. On January 15, 1988 the Service provided a letter indicating that no Supplemental Coordination Act Report would be provided and that additional studies were required. The Corps has considered the comments of the Service received to date. The Corps has provided the Service with all available data and reports, necessary funding and a schedule for the Supplemental Coordination Act Report submission. However, the Service has not addressed the studies already conducted (Nybakken, et al. 1983; [illegible], 1987a and 1987b), nor have they provided the Corps with the rationale, objectives, scope or detail of proposed new studies.

F-6 [illegible] presents the potential for effects on commercial and sport fish[illegible] associated with disposal of dredged material at the Alcatraz [illegible] at the ocean sites. The analysis of potential effects was prepared using the best available data addressing fisheries [illegible] operations. [illegible] data indicated that the proposed disposal operations would not cause significant adverse impacts on either in-bay or ocean fisheries. (See SEIS Section 4.3.1. and 4.3.2).

F-7 As described in the SEIS (Section 4.3), the potential for disposal impacts to the Bay estuarine and offshore marine biota has been fully assessed based on best available data. Except for the bottom impacts, the overall impact to offshore marine and estuarine biota is expected to be minor.

F-8 No measures to mitigate adverse impacts on the resources have been proposed or suggested because no significant impacts have been identified. Furthermore, in previous project reviews by the Fish and Wildlife Service, no measures were suggested to mitigate any suspected impacts.

F-9 The need for a detailed economic analysis of project impacts on commercial and sport fisheries and supporting industries is contingent on identification or anticipation of impacts. None have been identified based on best available data. Although there were many comments received regarding this particular aspect, no specific impacts of disposal or economic data have been provided by the National Marine Fisheries Service, Fish and Wildlife Service or other agencies in their comments to the Draft SEIS. Additional discussion of this issue may be found in response GI-57, Citizens for a Better Environment letter, November 20, 1987.

F-10 Both of the ocean disposal sites evaluated in the SEIS been cleared by the Minerals Management Service letter of January 22, 1988.

F-11 A discussion has been added to the SEIS, Section 4.3.1 and revised in the GDM, Section 4.2.

F-12 Comment noted, see SEIS, Sections 3.3.3 and 4.2. Also see responses to comments F-3 and F-9, Department of Commerce, NOAA, National Marine Fisheries Service letter, October 28, 1987.

F-13 Seen response to EPA Comments F-35 and F-36.

F-14 Comment noted, see SEIS, Section 3.3.1, 3.3.2 and 3.3.3.

F-15 See responses to comments F-6 and F-9.

F-16 Potential for impacts on marine resources has been considered in the SEIS, Section 4.3. In accordance with statutory requirements, the selection of an appropriate ocean disposal site is based on solely one factor. A number of factors, including fishery concerns, were considered pursuant to 40 CFR 228.5 and 228.6 as described in the SEIS (Section 3.4).

F-17 Baseline or trend assessment requirements related to dredged material disposal are to be developed on a case-by-case basis. The Fish and Wildlife Service has suggested that long-term studies of alternatives be performed before disposal occurs. Comment F-20 (below) indicates that at least three years of sampling be accomplished. Seasonal surveys over three years have been conducted. The determination rendered was based on the collective body of data including these field studies, all available literature, and any data describing potential effects.

F-18 Planning aid letters, as referenced on page 2 in the first paragraph of the commenting letter, specifically identified coordination (see response to comment F-5 above). The Corps has considered the views of the Service throughout project development as indicated by the Coordination Act Report received for the Oakland feasibility study and EIS, and planning aid letters received during preparation of the SEIS. The Oakland project is not new to the Service nor has the historic use of the Alcatraz disposal site been directly attributable to the stated fisheries decline. Once a disposal plan was selected for final consideration and results of biological surveys were available, this information was provided to the Service to assist in their consultation with the Corps. A Supplemental Coordination Act Report was requested at that time. The concerns and recommendations of the Service are more fully discussed in the [illegible]. However the Service has not fulfilled the Corps' request to provide the Supplemental Coordination Act Report even though [illegible] funds were provided for this service. (See Fish and Wildlife Coordination section, Appendix B.)

F-19 Based on recent reports of contaminated sediments and the fear of the potential availability of contaminants from the sediments, dredged material disposal at Alcatraz has become controversial. Although the Corps has provided the results of more recent dredged material disposal studies to the Service indicating that dredged material disposal results in minor, short-term turbidity and disposal of uncontaminated sediment has no measurable impacts on fisheries, the Service continues to object to in-Bay disposal on the [illegible], often citing outdated studies and providing no additional substantive evidence that biological resources are being [illegible] affected by the disposal activities. Furthermore, the Service has never outlined specific studies that would be necessary to [illegible] impacts. Moreover past disposal at the Alcatraz site has been allowed in accordance with the regulatory guidance in effect at the time of disposal and with the concurrence of both the Regional Water Quality Control Board (RWQCB) and the San Francisco Bay Conservation and Development Commission (BCDC).

F-20 The ocean dredged material disposal site was selected as the place where dredged material disposal would have acceptable environmental effects and is within operational and economic limits. Two seasons of field sampling have been undertaken in the vicinity of site 2M and a third season of testing is underway. It has been determined that dredged material disposal at an "extremely deep water site" would be too costly (see Analysis, Appendix F of the SEIS), and thus study of such a site was not conducted.

F-21 Although requested, a Coordination Act Report was not provided by the Fish and Wildlife Service (see response to F-19 and F-[illegible]).

F-22 Sites 2, B2, B3, B4, B5, and the Service's unspecified deep-water sites all lie beyond the Zone of Siting Feasibility (ZSF). Many factors were utilized to delineate the ZSF including economics, environmental concerns, fisheries and navigational safety. In fact, all factors as listed in 40 CFR 228.5 and 228.6 have been considered in selecting the preferred ocean site.

F-23 Correction is noted (SEIS, Section 2.6.1).

F-24 The discussion of ebb-tide restricted disposal in the SEIS (SEIS, Section 2.6.1) has been expanded to include the Service's complete position.

F-25 Some small portion of discharged sediments may return to navigation channels (see SEIS, Section 3.3). Also response to comment F-12.

F-26 Comment noted, see SEIS, Section 3.4.7.

F-27 The Service has been requested to prepare a Supplemental Fish and Wildlife Coordination Act Report and has been consulted throughout the preparation of this SEIS.

F-28 Comment noted. See responses to F-8, F-13 and F-[illegible].

F-29 Comment noted.

United States Department of the Interior
NATIONAL PARK SERVICE
GOLDEN GATE NATIONAL RECREATION AREA
FORT MASON, SAN FRANCISCO, CALIFORNIA 94123

IN REPLY REFER TO:

L30 (WR GOGA)

November 12, 1987

William Angeloni
Chief, Planning and Engineering Division
Army Corps of Engineers
211 Main Street
San Francisco, CA 94105 1905

Dear Mr. Angeloni:

It has come to our attention that dumping and/or core sampling and removal of dredged materials by the Corps of Engineers in the waters near Alcatraz Island may be occurring within the boundary of the Golden Gate National Recreation Area. All such activities are prohibited on park land except when a permit has been issued. The National Park Service holds exclusive federal jurisdiction at Alcatraz from the Island to 300 yards beyond the low water line around the island. F-1

If any of your activities fall within our jurisdiction we request that you cease them until we have had an opportunity to consider your request for a permit through the appropriate procedures.

Please contact my office at 556 2920 to initiate a permit request.

Sincerely,

Brian O'Neill
General Superintendent

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 1905

December 23, 1987

Office of Counsel

Brian O'Neill
National Park Service
Fort Mason
San Francisco, California 94123

Dear Mr. O'Neill:

This is in response to your letter to William Angeloni dated of November 12, 1987 in which you requested that the Corps apply for a permit from the National Park Service [NPS] for its navigation projects in the vicinity of Alcatraz Island. For the reasons [illegible] below, we must decline to do so.

We have reviewed the statutes and regulations upon which you base your request, and we do not concur that a permit is required. 16 U.S.C. § 460bb-3(c) provides:

> The authority of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary [of the Interior] and the Secretary of the Army and which are consistent with both the purpose of sections 460bb to 460bb-5 of this title and the purpose of existing statutes dealing with water and related resource development.

The language "mutually acceptable" implies that Congress intended that the two Secretaries would resolve any conflict in their authorities by mutual agreement, not by permits.

You appear to base your requirement for a permit on 36 C.F.R. Part 3, Boating and Water Use Activities. This Part prohibits a number of activities in NPS waters such as operating a vessel under the influence of alcohol, allowing a person to ride on gunwales, or surfing in swimming areas. It does not prohibit dredging, discharging dredged material, or [illegible].

We would be happy to meet with you to discuss our activities and responsibilities under Federal law.

Sincerely,

Galen H. Yanagihara

Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

United States
Environmental Protection
Agency

Regional Administrator
215 Fremont Street
San Francisco CA 94105

Region 9
Arizona, California
Hawaii, Nevada
Pacific Islands

EPA

December 7, 1987

Colonel Galen H. Yanagihara
District Engineer
U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, California 94105-1905

Dear Colonel Yanagihara:

The Environmental Protection Agency (EPA) has reviewed the Draft Supplemental Environmental Impact Statement (SEIS) and the General Design Memorandum (GDM) for DEEP DRAFT NAVIGATION IMPROVEMENTS, OAKLAND OUTER AND INNER HARBORS, ALAMEDA COUNTY, CALIFORNIA. Our detailed comments on this document are enclosed.

Under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, EPA is required to review and comment on this Draft SEIS. In addition, we are providing follow-up comments to our November 24, 1987 letter on the proposed ocean site designation under Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA).

EPA is committed to protecting water quality and habitat value in San Francisco Bay and the offshore environment through its regulatory and operating programs. Activities that may seriously impact Bay and offshore resources must be studied thoroughly and precisely to provide an adequate basis for the decision-making processes established by NEPA, the MPRSA, and the Clean Water Act (CWA). This is especially true for large-scale dredging projects which can disturb potentially contaminated sediments and adversely affect water quality and living resources. Because of concerns over projects of similar scope, the U.S. Army Corps of Engineers (COE), the San Francisco Regional Water Quality Control Board (RWQCB), and EPA have developed more extensive and thorough testing procedures now proposed in the COE's Public Notice (PN) 87-01. F-1

We have significant concerns about the Draft SEIS's overall scientific analysis of sediment chemistry and biology. EPA believes that some of the bioassay results in the Draft SEIS are environmentally significant and demonstrate the need for more thorough sediment analyses. In EPA's opinion, the tests for the Oakland Inner and Outer Harbor sediments are inadequate F-2

to accurately characterize potential sediment toxicity throughout the project site. Also, the tests on the sediments from the Alcatraz disposal site have not been completed; therefore, we are unable to judge the preferred alternative's overall environmental impact. F-3

In addition, EPA believes the baseline data for the ocean disposal site is not adequate and does not conform to MPRSA requirements. F-4 Finally, we are concerned about the preferred alternative and its potential for adversely affecting both Bay and offshore resources. F-5 Our concerns are explained in more detail in the enclosed comments.

Because of the concerns summarized above, we have classified this Draft SEIS as a "3" - Inadequate (See attached "Summary of Rating Definitions and Follow-up Actions"). Our rating is based on our review of the project for consistency and compliance with NEPA, MPRSA, and the CWA. At this time, EPA believes the Draft SEIS inadequately assesses potentially significant environmental impacts and proposes a disposal option that may adversely affect Bay and offshore resources.

EPA believes it will be necessary to provide more sediment testing data and ocean site baseline information in order to accurately evaluate project dredging and disposal alternatives, and fully disclose any adverse environmental impacts which may result from the proposed action. F-6 Other alternative disposal options (e.g., direct ocean disposal) should also be analyzed more thoroughly. F-7 If these issues are not adequately resolved prior to the Final SEIS, this proposal could be a candidate for referral to the Council on Environmental Quality (CEQ).

Much of the necessary information is being developed for the MPRSA Section 102 ocean site designation process. EPA believes that the Final SEIS should be delayed until an ocean site is formally designated under Section 102 of the MPRSA. We believe the emphasis should be placed on the Section 102 site designation process because it would provide the [illegible] information to evaluate all feasible ocean disposal sites and judge among the proposed disposal options. F-8

For example, an option for the COE would be to phase the proposed dredging project. It is our understanding that the Port of Oakland can accommodate the arrival of some deeper draft ships on an interim basis by dredging a smaller quantity of sediments from certain areas of the Inner Harbor. If environmental analyses show compliance with Section 404 of the CWA, these dredge materials could then be disposed at the Alcatraz disposal site. The final disposition of the major portion of dredge materials could be determined after EPA and the COE complete the ocean site designation process under Section 102 of the MPRSA. F-9

However, if the COE decides to pursue an ocean site designation under Section 103 of the MPRSA, much more biological, chemical and oceanographic information will be necessary to substantiate that there would be no adverse environmental impact from the proposed action. F-10 For this approach, EPA would recommend that the Draft SEIS be revised and distributed for public review because of the amount of information needed and the overall public and agency concern about this project.

As you know, we have had several discussions with your staff about these issues and the project's construction schedule. EPA looks forward to working with you and your staff in designing further environmental studies. Please send five copies of future NEPA documents to this office at the same time they are filed with our Washington, D.C. office. Please call me if you have any questions about our comments. Your staff may contact Mr. Rick Hoffmann, Office of Federal Activities, at (415) 974-8191 or FTS 454-8191.

Sincerely,

John Wise

for JUDITH E. AYRES
Regional Administrator

Enclosure (15 pages)

cc: Jennifer Joy Wilson, Assistant Administrator, External Affairs, EPA-HQ
Walter Abernathy, Executive Director, Port of Oakland
E.C. Fullerton, Regional Director, National Marine Fisheries Service
Patricia Sanderson Port, Regional Environmental Officer, Department of the Interior
Pete Bontadelli, Acting Director, California Department of Fish and Game
Alan Pendleton, Executive Director, Bay Conservation and Development Commission
Roger James, Executive Officer, Regional Water Quality Control Board, San Francisco Bay Region

Sediment and Water Quality Comments

EPA has serious concerns with the results and scope of the sediment analyses presented in the Draft SEIS. Given the large concentration of industrial facilities in the Oakland Harbor area, EPA is concerned about the potential for sediment contamination in certain areas of the proposed project.

EPA has previously requested extensive sediment testing for major dredging projects in the Bay where toxic "hot spots" were suspected. For example, a comprehensive sediment testing program was conducted for the U.S. Navy's homeporting action. EPA has also worked extensively with the U.S. Army Corps of Engineers (COE) and the Regional Water Quality Control Board (RWQCB) on developing a comprehensive revision to the sediment testing program for dredge and fill projects (PN 87-01) under Section 404 of the Clean Water Act (CWA). Due to the dredging quantities and potential for contaminated sediments in the Oakland Inner and Outer Harbor area, EPA believes that critical Section 404 project decisions should be based on the type of analyses described in PN 87-01. F-11 This type of information is needed to determine the project's compliance with the Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA. For this project, the information would also be used to evaluate the consistency of the proposed action with the MPRSA. F-12

The Draft SEIS cites PN 87-01; however, it appears that the procedures and guidance outlined in the PN have not been used. F-13 Some of the bioassay test results show significant differences between the dredging sites and the Alcatraz disposal site, but chemical tests are lacking for the same areas. F-14 EPA believes further testing is required to adequately characterize the dredging sites and determine the proposed project's consistency with the Marine Protection, Research and Sanctuaries Act (MPRSA) and the CWA.

The discussion related to ocean disposal, including site characterization, alternative site analyses, and comparison of the proposed dredged material to an ocean reference site, is also inadequate. F-15 We understand that some of this information is being prepared for the Section 102 site designation process. Much of this information should have been in this Draft SEIS to allow for a meaningful analysis of disposal options. EPA Region 9 has determined that concurrence on the MPRSA Section 103 site designation request and accompanying public notice is not possible at this time (see EPA Region 9's letter dated November 24, 1987). F-16

Some of our most significant concerns regarding the CWA Section 404 and MPRSA Section 103 actions are summarized below.

1. Sediment bioassay results show statistically significant results in certain areas of Oakland Harbor (p. A-19). This information, combined with an analysis of percent survival in Tables 7 through 23 (pp. A-20 to 36), indicates that some of these results may be environmentally significant. EPA's Ocean Dumping Regulations at 40 CFR 227 prohibit dumping of material that is significantly toxic to marine organisms. The SEIS should thoroughly explain the COE's interpretation of these and subsequent testing results. F-17

2. In general, the chemical and biological tests presented in the Draft SEIS are inadequate to ensure that significant impacts to the Bay and offshore environment would be avoided. For the most part, the conclusions presented in the Draft SEIS about potential environmental impacts are unsubstantiated (e.g., GDM, p. 31). The test results presented in the Draft SEIS included only 5 bioassays, elutriate tests, and limited bulk sediment tests to characterize 7 million yd^3 of proposed dredged material. The value of 5 bioassays is questionable when attempting to evaluate the toxicity of large stretches of the Oakland estuary and 7 million yds^3 of dredged material. More extensive sampling is required to completely understand potential sediment toxicity throughout Oakland Harbor, and to evaluate the potential impacts of dredged material disposal. Attachment A outlines EPA's specific requirements for sediment testing at the Oakland Inner and Outer Harbor areas and the Alcatraz disposal site. F-18

3. Testing and sampling at the Alcatraz dump site has not been completed (p. 69); additional bioassay testing on sediment core samples are required. At this time, EPA must disagree with the statement that "no unacceptable adverse effects on water quality from the disposal of dredged material from the Alcatraz disposal site are expected." More extensive sampling and testing are needed to accurately determine the potential adverse effects of the "pre-dredging" preferred option (See Attachment A). This type of information is necessary to provide a clear basis for choice among options, as required by NEPA. F-19

4. The background chemical data and necessary quality assurance/quality control (QA/QC) data are not presented in the Draft SEIS. The SEIS should include information on field and laboratory methodologies, analytical detection limits, raw data summaries, sample means and standard deviations, control and blank information, and a complete description of the QA/QC measures. All values reported for chemistry F-20

should be on a dry weight basis, not wet weight. This information will help us in determining the proposed action's environmental impacts. F-21

5. EPA cannot accurately evaluate the potential environmental impacts of the Oakland Harbor project to the proposed MPRSA Section 103 ocean disposal site because there is a general lack of detailed biological, chemical, and physical oceanographic information for the ocean disposal site. As stated in our letter of November 24, 1987, we cannot concur on an ocean site designation under Section 103 of the MPRSA. Some of our specific concerns regarding this action are as follows: F-22

   a. The chapter on the Affected Environment is basically a narrative description of the offshore environment, rather than a scientific analysis based on an adequate data base. F-23

   b. No baseline surveys of the ocean disposal site are presented in the Draft SEIS (p. 52) that include information on physical oceanography, sediment quality, or biological resources for any of the alternative sites. Much of this kind of information is currently being developed by the COE for the ocean site designation under Section 102 of the MPRSA. F-24

   c. The level of detail for the proposed MPRSA Section 103 site should be equivalent to the studies conducted and proposed for the MPRSA Section 102 site. F-25

6. The SEIS should discuss a wider range of alternatives, and analyze other dredging and design variations that would accommodate future vessel traffic and reduce or avoid potentially adverse impacts from dredging and disposal. Other alternatives and dredging options should include the following: F-26

   a. Phasing the project by dredging only critical portions necessary to accommodate new vessel traffic until a decision is made on a permanent ocean disposal site under Section 102 of the MPRSA, or until more complete information is provided on a Section 103 disposal site. A detailed dredging plan (quantities, locations, and timeframes) should be presented in the SEIS. It is our understanding that, at least initially, a smaller amount of dredging would be sufficient to accommodate the Port of Oakland and the arrival of deeper-draft ships. The Inner Harbor could be dredged to -38 feet MLLW (approximately 500,000 yds^3) and adequately accommodate the deeper-draft ships. Sediment toxicity would need to be evaluated in accordance with PN 87-01 to adequately demonstrate compliance with Section 404(b)(1) Guidelines. F-27

If sediment analyses show no adverse environmental impacts and demonstrate compliance with Section 404 of the Clean Water Act, EPA believes this material could then be disposed at the Alcatraz disposal site without a significant impact to the site's overall capacity.

If the SEIS continues to propose an ocean site designation under Section 103 of the MPRSA, the COE should commit to immediately dedesignating that site once the MPRSA Section 102 site is selected and available for use. F-28

b. An analysis of deeper ocean disposal sites off the continental shelf (in excess of 100 fathoms). In particular, the SEIS should give site B2 the same *level of analysis* as the other ocean sites (1M, C1, etc.). EPA acknowledges that safety of marine transportation vessels is an essential consideration in ocean site designation. The SEIS should discuss whether other methods of navigational surveillance and confirmation of actual disposal (p. 21) are available and acceptable to the U.S. Coast Guard (USCG), such as the *method employed* by the USCG to monitor sludge disposal vessels off the New York-New Jersey coast. The SEIS should also discuss ways the radar net can be improved to allow tracking of vessels farther out to sea. We understand that a *Zone of Siting Feasibility* report will soon be completed. We would appreciate the opportunity to review this report as soon as it is available. We also recommend that it be attached as an appendix to the SEIS. F-29

c. EPA shares the concerns of other regulatory and resource agencies [U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), *Bay Conservation* and Development Commission (BCDC), California Department of *Fish and Game* (CDFG), and the RWQCB] regarding the COE's preferred alternative. The Draft SEIS acknowledges that this alternative "would have the greatest impact (on biological resources) of the action plans" (p. 74). Therefore, we believe alternative 4 (direct ocean disposal) should *be evaluated more thoroughly*. Differences in cost figures should be clearly explained and substantiated. Potential mitigation costs should also be taken into account (See comment #10). This information is critical in deciding whether this disposal option is the least-damaging, practicable alternative. F-30

d. An *analysis* of upland disposal for at least part of the dredged material if the material fails to meet the criteria for Bay or ocean disposal. F-31

7. The statement "Direct transport to the nearshore ocean site of all of the Oakland material would also be allowed at the contractor's option" (p. iv) indicates that the contractor would, in effect, manage the disposal of dredged materials. This is inconsistent with the management authority given to the COE and EPA under the Clean Water Act and the MPRSA. This statement must be deleted. F-32 F-33

8. The Draft SEIS points out that the life of the project is *50 years and that 31 million yds*^{3} *of sediments could be* disposed at the site over this time period (p. 16). The SEIS should evaluate the potential impacts on biological resources and water quality in this time frame, including all cost/benefit analyses. F-34

9. Mitigation to offset and/or prevent adverse impacts at the *dredging locations has not been presented*. The *SEIS should* discuss the use of silt curtains and site monitoring of the water column at the dredging sites. NMFS states that "approximately 124 acres of shallow, subtidal habitat will be converted to maintained-channel habitat" (Letter to the COE, 10/28/87). The *SEIS should discuss mitigation for this impact.* F-35

10. There appear to be several discrepancies throughout the document and the GDM regarding the project's cost/benefit analyses. Mitigation costs should also be included for all alternatives. In addition, costs to Bay and ocean fishing enterprises from the potential loss of fisheries resources *in the short- and long-term should be included in the SEIS.* F-36

11. The economic comparison between ocean disposal sites should have included a cost comparison as well as a mileage (e.g., steaming time) comparison in the economic analysis. The SEIS should present cost figures substantiated by a detailed discussion. F-37

12. General Comments:

o The SEIS and GDM should provide a map that highlights those locations to be dredged, not just a bathymetric chart. F-38

o Maps of the offshore and in-Bay areas should include the location of the BART site (p. 23) and areas of the study area that may have oil and gas potential. F-39

o Please send us Appendix C, Characterization of the *Merritt/Posey Aquifer*. F-40

o The relevance of the South Tower Reference site should be explained (Fig. 3.4). F-41

o The List of Preparers should include the labs that performed the chemical and biological analyses, and the contractors used in document preparation. F-42

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION*

Environmental Impact of the Action

LO—Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC—Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO—Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU—Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1—Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2—Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3—Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

ATTACHMENT A

SEDIMENT TESTING REQUIREMENTS FOR THE OAKLAND INNER AND OUTER HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT

A. Need for Further Testing

EPA Region 9 believes that existing data and information are sufficient to require Tier 3 level testing (see latest version of PN 87-1). Tier 3 level testing is also necessary to satisfy in-Bay disposal (40 CFR 230.61) and ocean disposal (40 CFR 225 to 228) requirements. The need for Tier 3 level testing is based on:

1. Inadequate discussion of some information provided in the DSEIS,
2. The proposal to dredge 7 million yd^3 of material from the Oakland Harbor area,
3. The proposal to dredge 2.7 million yd^3 of material from the Alcatraz disposal site,
4. The results of bioassay tests that show significant toxic responses, and
5. Other available references and documents that describe toxic areas in the Oakland Inner and Outer Harbor area.

B. General Requirements for Testing

1. Tests should be performed using EPA's 301(h) Program Guidance Documents listed below for all of the field sampling, physical and chemical analyses of sediments, and bioassay/bioaccumulation tests. Strict attention shall be paid to all quality assurance/quality control (QA/QC) requirements. EPA Region 9 should be consulted regarding any questions or interpretations of the 301(h) Program Guidance Documents.

   a. U.S. Environmental Protection Agency. 1987. Quality Assurance/Quality Control (QA/QC) for 301(h) Monitoring Programs: Guidance on Field and Laboratory Methods. Office of Marine and Estuarine Protection, Washington, D.C. EPA 430/9-86-004. 275 pp., 2 appendices.

   b. U.S. Environmental Protection Agency. 1987. Evaluation of Survey Positioning Methods for Nearshore Marine and Estuarine Waters. Office of Marine and Estuarine Protection, Washington D.C. EPA 430/9-86-003. 54 pp., 2 appendices.

   c. U.S. Environmental Protection Agency/Army Corps of Engineers. 1977. Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters. Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MI. 19 pp., 8 appendices.

d. Tetra Tech, Inc. 1985. Bioaccumulation monitoring guidance: 1. Estimating the potential for bioaccumulation of priority pollutants and 301(h) pesticides discharged into marine and estuarine waters. Final program document prepared for the Marine Operations Division, Office of Marine and Estuarine Protection, U.S. Environmental Protection Agency. EPA Contract 68-01-6938. Tetra Tech, Inc., Bellevue, WA. 69 pp.

e. Tetra Tech, Inc. 1985. Bioaccumulation monitoring guidance: 3. Recommended analytical detection limits. Final program document prepared for the Marine Operations Division, Office of Marine and Estuarine Protection, U.S. Environmental Protection Agency. EPA Contract No. 68-01-6938. Tetra Tech, Inc., Bellevue, WA 23 pp.

f. Tetra Tech, Inc. 1985. Bioaccumulation monitoring guidance: 4. Analytical methods for U.S. EPA priority pollutants and 301(h) pesticides in tissue from estuarine and marine organisms. Final program document prepared for the Marine Operations Division, Office of Marine and Estuarine Protection, U.S. Environmental Protection Agency. EPA Contract No. 68-01-6938. Tetra Tech, Inc., Bellevue, WA. 113 pp.

g. Tetra Tech, Inc. 1986. Analytical methods for U.S. EPA priority pollutants and 301(h) pesticides in estuarine and marine sediments. *Final program document prepared for the* Marine Operations Division, Office of Marine and Estuarine Protection, U.S. Environmental Protection Agency. EPA Contract No. 68-01-6938. Tetra Tech, Inc., Bellevue, WA. 113 pp.

2. *Alternate chemistry protocols may be used if:*

   a. The protocols have detection limits that are comparable to EPA's *301(h) protocols,*

   b. The protocols incorporate the appropriate clean-up procedures found in EPA's *301(h) protocols*, and

   c. A written request for alternate protocols must be approved by EPA Region 9 prior to their use.

3. All data obtained during the course of this sampling study, including physical, chemical and bioassay/bioaccumulation tests shall be statistically compared to analyzed samples taken from a reference site, considered to be characteristic of the disposal site, that is acceptable to both EPA Region 9 and the Corps.

4. Five grabs shall be collected at each of three appropriately spaced stations within the reference site (i.e., the Alcatraz CWA Section 404 disposal site or the proposed ocean disposal site). The grab samples shall be taken using a 0.1 m^2 Smith-McIntyre grab sampler. Enough sediment shall be obtained to

complete all required tests.

The five grabs taken at each station shall be composited to produce one station sample. Physical, chemical, bioassay and bioaccumulation tests shall be conducted on each of the three station samples separately. This information will be used to characterize the reference site.

5. EPA Region 9 strongly recommends that the full spectrum of EPA's 126 Priority Pollutants be analyzed. At a minimum, chemical analyses for the selected contaminants listed in C.4 below shall be performed on each of the composite samples collected at the dredge site (see C.2 below) and the reference site.

6. To determine compliance with Federal water quality criteria [Clean Water Act, Section 304(a)(1)] and California Water Quality Standards defined in the California Ocean Plan, EPA Region 9 may require testing of the water column at the dredge site and/or the disposal site during the permitted activity. Analysis for EPA's 126 Priority Pollutants and organotin compounds may be required, or the complete set or subset of parameters listed in C.4 below.

7. The bioassay and bioaccumulation tests listed in C.4 shall be conducted on samples from the dredge sites, the reference site, and control sediments from the location where the test species were collected.

   a. Appropriate reference toxicant tests, approved by EPA Region 9, shall be conducted for each bioassay test species using a heavy metal and an organic compound.

   b. The results of the bioassay and bioaccumulation tests from the sampling stations shall be compared statistically to the results obtained from the reference station and the control sediments.

C. <u>Testing of the Oakland Sediments</u>

1. At a minimum, the procedures defined in the final version of the Corps of Engineers' Public Notice 87-01 for Tier 3 testing should be followed. The number and location of sampling stations should be based upon the amount of dredged material proposed for disposal and the proximity of potentially toxic sites to the project area.

   a. EPA requires that precise and accurate information be provided by the Corps and/or the Port of Oakland to indicate where dredging will occur and the quantities proposed for removal from the Inner and Outer Harbor channels. This information is important to determine the number and appropriate locations of all sampling stations.

b. The Corps and the Port of Oakland, in cooperation with EPA Region 9 staff, will determine the exact location of any RCRA-permitted or CERCLA facilities along the harbor. This information is important for the precise positioning of sample stations in these areas.

2. EPA Region 9 has prepared a preliminary map of the project area with the proposed dredging areas divided into 15 sampling stations (Figure 1). Each area should have a minimum of five cores taken to project depth, plus the overdredged depth, to be composited to make one sample for sediment chemistry analyses, bioassay tests and bioaccumulation tests. Enough sediment should be obtained to perform all required tests. The exact location of the cores will be provided when the information requested in C.1. is provided. The Corps, the Port of Oakland, and EPA Region 9 should meet to determine the final number and locations of the core stations.

3. The Corps shall use the Alcatraz disposal site as a reference site for compliance with the 404(b)(1) Guidelines. The Corps shall use the proposed ocean disposal site as a reference site for comparative analyses required under EPA's Ocean Dumping Regulations. Each of these two reference sites should be characterized in a similar fashion by using the testing procedures described under C.4 below.

4. Testing of composite sediment samples shall consist of the following parameters for each sampling area shown in Figure 1:

PHYSICAL CHARACTERIZATION(a,b)

a. Grain Size Analysis
b. Total Solids/Water Content (% solids)
c. Total Organic Carbon (0.1%)
d. Oil and Grease [20.0 mg/kg (wet weight)] - Use Infrared Spectrophotometry
e. Total and Water Soluble Sulfides [0.1 mg/kg (dry weight)]

(a) = All analyses must be conducted using Corps/EPA Region 9/ RWQCB-approved methodologies that are suitable for marine sediments and which yield the required detection limits with good precision and accuracy. Additional contaminants may be included if a specific site has a documented history of the contaminants in the vicinity and they are not included in this primary list.

(b) = Detection limits are indicated within parentheses or brackets.

u-6 sites, Inner-5 sites, Lower-4 sites   Page 5

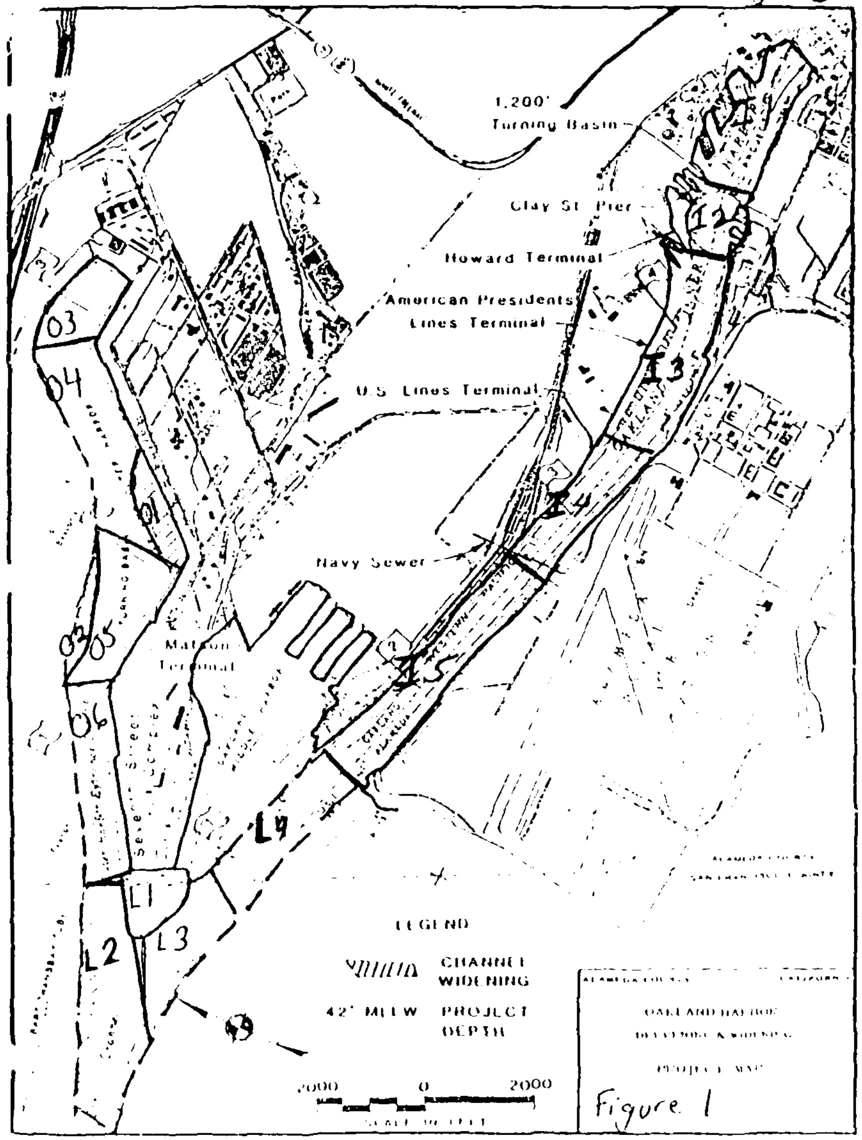

Figure 1

SEDIMENT CHEMISTRY TESTING[a,b] (all values reported on a dry weight basis)

a. Metals
   (1) Antimony (1.0 mg/kg)
   (2) Cadmium (0.1 mg/kg)
   (3) Chromium (0.1 mg/kg)
   (4) Copper (0.1 mg/kg)
   (5) Lead (0.1 mg/kg)
   (6) Mercury (0.02 mg/kg)
   (7) Nickel (0.1 mg/kg)
   (8) Silver (0.1 mg/kg)
   (9) Selenium (0.1 mg/kg)
   (10) Thallium (1.0 mg/kg)
   (11) Zinc (2.0 mg/kg)

b. Pesticides
   (1) Aldrin (0.5 ug/kg)
   (2) Chlordane and Related Compounds (5.0 ug/kg)
   (3) Dieldrin (0.5 ug/kg)
   (4) DDT and Derivatives (1.0 ug/kg)
   (5) 4,4, DDE (0.5 ug/kg)
   (6) Endrin (0.5 ug/kg)
   (7) Endosulfan I (2.0 ug/kg)
   (8) Endosulfan II (0.5 ug/kg)
   (9) Endosulfan Sulphate (10.0 ug/kg)
   (10) Hexachlorocyclohexane Isomers (0.5-1.0 ug/kg)
   (11) Toxaphene (30.0 ug/kg)

c. Other Contaminants
   (1) Arsenic (0.1 ug/kg)
   (2) Cyanide (0.02 ug/kg)
   (3) Organotin Compounds: Mono-, Di-, and Tributyltin (1.0 ug/kg)
   (4) Petroleum Hydrocarbons
      Total (i.e., F1 and F2 hydrocarbons) (20.0 ug/kg)
   (5) Phenols:
      Total (20.0-100.0 ug/kg)
      Total Chlorinated Phenols (20.0-100.0 ug/kg)
      Pentachlorophenol (100.0 ug/kg)
      Phenol (20.0 ug/kg)
      2,4 dichlorophenol (20.0 ug/kg)
      2,4-dimethlyphenol (100.0 ug/kg)
   (6) Polychlorinated Biphenyls (PCBs):
      Total (20.0 ug/kg)
      Individual Aroclors 1242, 1254, and 1260 (20.0 ug/kg)
   (7) Polynuclear Aromatic Hydrocarbons (PAHs), for each PAH listed below (20.0 ug/kg):
      Total PAHs
      Acenaphthene
      Acenapthylene
      Anthracene
      Benzo (a) anthracene
      Benzo (a) pyrene

      Benzo (g,h,i) perylene
      Benzo (k) flouranthene
      Benzo (b) flouranthene
      Chrysene
      Dibenzo (a,h) anthracene
      Fluoranthene
      Fluorene
      Indeno (1,2,3,-c,-d) pyrene
      Naphthalene
      Phenanthrene
      Pyrene
   (8) Pthalates, Total (10.0 ug/kg)
   (9) Other compounds may be required based upon the information obtained concerning the proxmity of RCRA-permitted and CERCLA locations adjacent to the Inner and Outer Harbor areas (see C.1.).

BIOASSAY TESTS[a]

a. 96-hour suspended particulate phase bioassay using the following test species:

   (a) *Acanthomysis sculpta*;
   (b) *Citharicthys stigmaeus*; and
   (c) *Mytilus edulis*, *Strongylocentrotus purpuratus*, or *Crassostrea gigas* for the larval development bioassay.

b. 10-day solid phase bioassay using the following test species:

   (1) *Acanthomysis sculpta*,
   (2) *Macoma nasuta*, and
   (3) *Nephtys caecoides*.

c. 10-day solid phase bioassay test using *Rhepoxynius abronius* or *Ampelisca abdita*.

d. The contractor shall use protocols defined in reference B.1.c above, appropriate ASTM guidance in the case of *R. abronius*, or EPA approved protocols for *A. abdita*. EPA Region 9 will provide additional references for the larval developmental bioassay upon request.

BIOACCUMULATION TESTS[a,b]

a. Bioaccumulation tests shall be conducted to determine whether the compounds measured under the sediment chemistry testing have the potential to bioaccumulate in the tissues of the selected test species.

b. 20-day bioaccumulation tests using the following test species:

   (1) *Acanthomysis sculpta*;
   (2) *Macoma nasuta*; and
   (3) *Nephtys caecoides*, or *Nephtys arenaceodentata*.

c. The following detection limits shall be obtained for all bioaccumulation analyses:

(1) Metals and Nonmetals (report all values in dry weight)
Copper and Mercury (0.01 mg/kg)
Antimony, Chromium, Nickel, Selenium and Thallium (0.02 mg/kg)
Arsenic, Cadmium, Lead and Silver (0.1 mg/kg)
Zinc (1.0 mg/kg)

(2) Pesticides detection limits shall be between 0.1-5 ug/kg (dry weight) using capillary column GC/ECD instrumentation.

(3) PCB detection limits shall be between 5-20 ug/kg (dry weight) using capillary column GC/ECD instrumentation.

(4) PAH detection limits shall be 10 ug/kg (dry weight) using GC/MS detection.

5. The sediment quality analyses for the dredging sites and the reference site (i.e., the Alcatraz disposal site and the ocean disposal site) shall be reported in the following format:

a. Location of Study Areas - Including a project site plan showing sediment sampling stations. The use of appropriate electronic positioning equipment may be required to accurately and precisely locate the sediment sampling stations.

b. Materials and Methods - Including the laboratory protocols and references used for sediment and biological analyses, statistical procedures, along with a discussion of the sediment sampling procedures and sample clean-up procedures used.

c. Results - Including summaries and raw data sheets.

d. Discussion - Including comparisons and contrasts with historical data and statistical comparisons with the disposal site.

e. Conclusions - Including data analysis and suitability of the material for disposal as determined by the comparison (e.g., statistical) of the material to the disposal site.

f. References - Including all references used in the field sampling program, laboratory and statistical data analyses, as well as historical information used in site comparison work.

g. Quality Assurance/Quality Control Information.

D. Testing of Alcatraz Sediments

1. EPA Region 9 recognizes that new information on the composition of sediments at Alcatraz has been obtained by the Corps. However, for the purposes of ocean disposal of this material, EPA requires that similar testing as that described for the Oakland Harbor sediments (i.e., sediment chemistry, bioassay tests and bioaccumulation tests defined under C.4 above) be conducted to characterize the sediment at Alcatraz, the proposed dredging site.

2. The data and information obtained to characterize proposed dredged material at the Alcatraz site should be compared to similar information gathered at the proposed ocean disposal site. Results of the comparisons will be used to determine whether this material is suitable for disposal in the ocean.

3. The Corps should define the exact locations and dredging depths that would be dredged at Alcatraz. Sampling cores should be taken to project depth plus the overdredge depth. The number of cores and precise location should be proportional to the amount of dredged material proposed for removal. At a minimum, EPA recommends that 15-20 cores be analyzed individually to adequately characterize the 2.7 million yd^3 of dredged material proposed for removal from Alcatraz.

File Name: EPA12-7-88 Comment Categories: 2,3,4,5,7,9,11

RESPONSE TO COMMENTS

Agency/Group/Individual: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION 9 (EPA)
Date of Letter: December 7, 1987

F-1 Testing procedures referenced in this comment have not been agreed upon by all three agencies (COE, RWQCB, and EPA), and Public Notice 87-01 has not been finalized. Testing of dredged material has been performed in accordance with regulations governing section 404 of the Clean Water Act and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, P.L. 92-532, also commonly referred to as the "Ocean Dumping Act" (see SEIS, Appendix A). Also see responses to comments F-11, F-12, and F-17.

F-2. The Corps has performed additional testing at the Schnitzer Steel (formerly Moore Drydock) and Alameda Gateway (formerly Todd Shipyard) sites. See Appendix A for an analysis of the results.

F-3 Additional sediment core samples were obtained from the Alcatraz disposal area to a depth of -72 feet MLLW. These cores have been tested in accordance with the Ocean Dumping Regulations. These test results are presented in the SEIS, Section 3.3.6 and Appendix A.

F-4 A baseline survey of one potentially viable ocean site (1M) has been undertaken conforming with MPRSA guidance. Baseline surveys are designed to establish base conditions at a site before disposal of dredged sediments begins and monitoring is undertaken. They are not utilized in the site selection process. Also see response to comment F-24.

F-5 Comment noted. See discussion on bay and ocean fishery resources in the SEIS, sections 4.2, 4.3 and 4.4.

F-6 The Corps has performed additional sediment testing in Oakland Harbor and has conducted a baseline survey in the ocean. These data and interpretation are presented in the SEIS and its Appendices. See responses to comments F-17, F-18, F-19, F-22 and F-24.

F-7 Additional information describing the direct ocean disposal alternative has been included in the SEIS, section, 2.7.

F-8 The Environmental Protection Agency was delegated the authority in Section 102 of MPRSA to designate ocean disposal sites. The Corps of Engineers has agreed to assist in the ocean disposal site designation process by providing information to EPA for their ocean disposal site designation. The Section 102 process should not be confused with the authority delegated the Corps under Section 103 of MPRSA to select sites for disposal of dredged material. The Corps is not required to "evaluate all feasible ocean disposal sites" under 103 of the Act, but must evaluate the selected 103 site by the criteria found at 40 CFR Parts 227 and 228. The Corps has done this and found that the use of ocean disposal will not "unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities" [Section 102(a) and Section 103(a)]. See the Zone Site Feasibility (ZSF) Analyis (Appendix F) for more detail

F-9. EPA's suggestion to phase the authorized Oakland harbor project is noted. However, the Final SEIS and the Record of Decision must address the fate of all the dredged material from the authorized Federal project. The disposition of some of the material could not be deferred to a later unspecified date without addressing it in the present SEIS. Either ocean disposal or Alcatraz disposal could accommodate all Oakland sediment which meets the requirements of the Ocean Dumping Regulations or Section 404 of the Clean Water Act. The Corps is using the Section 103 MPRSA authority because the schedule for ocean disposal site designation by EPA under Section 102 of the Act is uncertain and is likely to take more than a year. For every month the construction of the -42 foot Oakland Harbor deepening is delayed, there is an approximate $2 million loss in national benefits.

F-10 Comment noted. The Corps is collecting additional data while pursuing an environmentally acceptable site as required by the regulations. The standard of evaluating ocean disposal as indicated in this comment - "no adverse environmental impact from the proposed action" - can not be reasonably be achieved. EPA regulations specifically identifies the standard as "no unacceptable adverse effect" (See 40 CFR 227.4).

F-11 See response to comment F-1. In determining the extent of testing to be performed on sediments from Oakland Harbor, the Corps evaluated adjacent land use activities and determined that there was a potential for the sediments to contain elevated concentrations of contaminants. Because of this concern and the fact that ocean disposal was an alternative, the Corps determined that it was necessary to perform the testing required under Section 103 of the MPRSA and its implementing regulations. The Corps believes that bioassays and bioaccumulation testing required for ocean disposal were rigorous enough to protect resources in the Bay. The parameters included in the tissue and sediment analyses were the contaminants of concern at the time of the analyses (December, 1986-February, 1987).

F-12 The Corps believes that testing conducted on sediment from Oakland Harbor and the Alcatraz disposal area complies with Section 103 of MPRSA, EPA's implementing regulations (40 CFR 220) and the joint EPA/COE implementation manual for dredged material disposal in conjunction with Section 103 of MPRSA. Results from the testing are discussed in Appendix A).

F-13 All references to PN 87-1 have been eliminated from the SEIS because the draft public notice has not been adopted. However, the major elements of "tier 3 testing" in the draft public notice (bioassay and bioaccumulation testing) were performed on material from Oakland Harbor except for material from the turning basin where additional testing has recently been completed. See data presented in the SEIS, Appendix A.

F-14 The introductory section of Appendix A explains the Corps' approach in its interpretation of the bioassay data and explains why statistical significance does not necessarily indicate an ecologically significant impact in the field. While additional chemical analyses of the sediment would assist in providing an inventory of chemical contamination, the bioassays and bioaccumulation data provide information concerning the bioavailability of any contaminants in the sediment. This information is sufficient to make a decision concerning the acceptability of the Oakland material for disposal at Alcatraz or in the ocean. The reference material for the bioassay tests was obtained from a site in the vicinity of the ocean disposal site (coordinates: 37° 29' W; 122° 42' 30" N). Although appropriate for Bay disposal, Alcatraz material was not used as a reference. We believe that a test using sediment from the ocean as the reference material is a more conservative test than a test using Alcatraz material. Furthermore it also allows for an evaluation of the Oakland material for ocean disposal. Since the ocean reference site has not previously been used as a disposal site, it should contain lower concentrations of contaminants typically associated with Bay sediments.

F-15 The discussion in the SEIS (Section 2.7) has been expanded. However, the use of sediment from the vicinity of the ocean disposal site as a reference material for the bioassay and bioaccumulation test provides the requested comparison of dredged material to the ocean reference site.

F-16 Comment noted. A final determination of concurrence or non-concurrence from EPA has been requested.

F-17 The Corps of Engineers has performed further evaluation of the test results from the Oakland Harbor project in relation to ocean disposal. Refer to Appendix A of the SEIS for the interpretation of the data.

F-18 The [illegible] biological tests presented in the Draft SEIS and Appendix A were reviewed by technical specialists from the Corps of Engineers, Waterways Experiment Station. The results were found to be adequate [illegible] that no unacceptable adverse environmental impacts [illegible] complying with 40 CFR 227.13(b); however, they do not [illegible] of any negative impacts. The finding of suitability of the material has been evaluated from a representative [illegible] of the project area. There are no documented areas of significant [illegible] contaminants within the Oakland [illegible]. There are, however, two areas within the proposed turning basin in the Inner Harbor suspected of contamination. Additional testing has been performed for the areas adjacent to Schnitzer Steel and Alameda Gateway (previously utilized by Moore Drydock and Todd Shipyards). See Appendix A of the SEIS for discussion of the results. Due to the number of variables that may be involved, a complete understanding of sediment toxicity is a topic of extensive on-going research beyond the scope of this project. Based on the present level of knowledge of dredged material effects and the results of tests performed to date, the dredged material from Oakland Harbor has been found to be acceptable for Alcatraz or uncapped ocean disposal, with the exception of materials from areas adjacent to Schnitzer Steel and Alameda Gateway by Waterways Experiment Station scientists. Additional testing of sediments from the entire Oakland project as described in Attachment A of the EPA letter is not believed necessary. Appendix A of the SEIS has been modified to included a more complete discussion of the Corps' analysis of the test data. The General Design Memorandum (Section 3.16) discusses the capping design for contaiminated material for the ocean site alternative.

F-19 Additional testing of material from the Alcatraz site was completed in February 1988. The results of the testing at the Alcatraz disposal site are described in the SEIS (Section 3.3.6 and Appendix A). The additional testing for the Alcatraz site does not reflect the desired program itemized in Section D, (Attachment A of the commenting letter) that includes extensive sediment chemistry to be performed under the Section 301(h) protocols for effluent limitations related to NPDES permits. The extent of testing requested in the commenting letter has no bearing on the statutory requirements for evaluating potential of dredged material to cause environmentally unacceptable effects in the marine environment. Although attaining a laboratory standard for data accuracy and precision is laudable, the Section 301(h) protocols are not appropriate for sediments. Adequate information exists to make a reasonable choice among the options.

F-20 It is not clear what background chemical data are referred to in the context of this comment. However, all appropriate QA/QC data for bioaccumulation data has been included in Appendix A.

F-21 Values reported for chemistry data related to dredged material have been customarily reported in wet weight. Dry weight values have not been previously required and are not essential in the evaluation of effects. In fact, FDA-type limits, to which bioaccumulation data are compared, are given on a wet weight basis. The testing conducted for Oakland Harbor material indicates that a good estimate of the dry weight concentration in sediment is two times the wet weight concentration. In addition, testing has shown that the worms and clams used in bioaccumulation testing are approximately 85 percent water. Therefore, a conversion from wet weight to dry weight can be made.

F-22 Succinct characterizations of the alternative disposal sites have been included in the SEIS (SEIS, Sections 2.9) as mandated by

CEQ Regulations. Detailed studies of the preferred and other candidate sites are included by reference in the SEIS. Also see response to comment F-23.

F-23 The Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508) were followed in preparing this section of the draft SEIS. Refer to section 1502.15. The requested "scientific analysis based on an adequate data base" is not required. 40 CFR Part 228.2(a)(3) calls for a description of the characteristics of the proposed disposal site for receiving dredged material.

F-24 A baseline survey was conducted to support designation of an offshore site under Section 102. Baseline surveys for alternative sites are not necessary for determining site acceptability pursuant to Section 103 of MPRSA. See response to comment F-4 above on baseline surveys.

F-25 The studies referenced in the SEIS are the same reports that will be used in the EPA's Section 102 site designation process. They will also be referenced, although not bound, in the Site Designation EIS undertaken by EPA and the Corps under Section 102 of the MPRSA.

F-26 A range of disposal alternatives was addressed in the individual Final EIS's for *Deep-Draft Navigation Improvements*, Oakland Outer and Oakland Inner Harbors (as referenced in Section 1.1 of the SEIS). Both Final EIS's determined that disposal at the Alcatraz site was in the overall public interest. The draft SEIS addressed the concerns of placing material from the authorized *Oakland Harbor project at the Alcatraz disposal site. The choice of* disposal alternatives for the total amount of material to be disposed is necessarily limited. Responses to the more detailed comments follow in F-27 through F-31.

F-27 *See response to comment F-9.*

F-28 The Corps of Engineers can specify disposal of dredged material at a 103 disposal site in the absence of a feasible EPA 102 designated disposal site. When EPA designates a feasible ocean site under Section 102, the 103 site *may be dedesignated.*

F-29 Based on available information, an acceptable site can be located within the Zone of Siting Feasibility (ZSF) bounded by the GFNMS boundary. A site off the continental shelf is outside of the ZSF, and therefore none has been included as a candidate site. The ZSF analysis report has been included as Appendix F to the Final SEIS. The Corps of Engineers must weigh all relevant factors, including safety, costs and environmental acceptability, in making a reasonable determination.

F-30 The estimated costs have been described in the GDM. Substantiation of cost information is proprietary because the Government estimate could be compromised at the time of bid preparation. *In addition, the identification of an appropriate ocean* disposal site for dredged material is based on an environmentally acceptable, reasonable alternative. Based on public comments for a more desirable disposal site. Site B1 was included as an alternative ocean disposal site. See SEIS Section 2.5 for a description of sites considered in detail.

F-31 A discussion of upland disposal for material not complying with the ocean dumping regulations is premature without knowledge of the potential mobility of contaminants in an oxidized environment, i.e., upland.

F-32 The dredging contractor will not manage disposal operations. Based on the suitability of the preferred ocean disposal site, the unrestricted disposal of dredged material from Oakland Inner and Outer Harbors, except materials from near Schnitzer Steel and Alameda Gateway, has been determined to be acceptable. The direct ocean disposal of Oakland material at an ocean disposal site has been evaluated as an implementable alternative plan. Based on our analyses, both alternative disposal plans are environmentally acceptable. Nevertheless, prior to discharge of dredged materials in the ocean, regulations require that the proposed ocean disposal be reviewed by EPA pursuant to Section 103 of MPRSA. The EPA ultimately will determine the availability of an ocean site to receive dredged material.

F-33 The referenced sentence has been eliminated from the Final SEIS.

F-34 This comment has been addressed in the Final SEIS. See Section 3.4.

F-35 No mitigation measures related to the authorized dredging were described or specifically identified by any reviewing agencies during the projects feasibility studies. The use of silt curtains at dredging sites is considered unnecessary due to the limited biological resources affected by dredging operations. See the response comment F-4 to National Marine Fisheries Service.

F-36 No specific mitigation measures have been identified by the resource agencies or Corps. The ocean disposal site selection process includes avoidance or minimization of impacts as a routine matter. The capping of any contaminated materials, likewise, is an integral part of the plan. A monitoring program is described in the SEIS (Section 4.6).

F-37 The GDM, Section 6 and the SEIS, Section 2.4.5 present adequately detailed cost figures.

F-38 A map showing the locations to be dredged has been included in the SEIS, Figure 2.1.

F-39 Maps of the offshore and in-Bay areas have been included to provide the requested information. See SEIS, Figure 2.6.

F-40 A copy of Appendix C of the Draft CDM was provided to EPA (January 14, 1988) as requested.

F-41 The selection of the south tower site as a reference site was based on reconnaissance level study by Kinnetics Laboratories in 1985 in which various sites were investigated for their suitability as disposal sites. Kinnetics Laboratories found that the south tower site was located in an area of relatively high currents in the vicinity of the Golden Gate where coarse grained material would tend to settle to the bottom. Generally, grain size analyses indicate that the bottom sediments are silty sand. Thus, it was inferred that the sediments could represent an uncontaminated site that would be appropriate as a reference site for comparison purposes. The bioassay testing as referenced in this comment was performed under the San Francisco District's Disposal Management Program and was not intended to determine the suitability of material from Alcatraz for ocean disposal. However, extensive bioassay and bioaccumulation testing of core samples from Alcatraz to determine the suitability of the material for ocean disposal has been completed. The preliminary results are presented in the SEIS, Section 3.3.6 and in Appendix A.

F-42 A list of preparers, laboratories and contractors involved in document preparation has been included in Section 5.0 of the SEIS.

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Governor
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607
Phone: Area Code 415
464-1255

November 25, 1987
File No. 2198.09(DAM)

Colonel Galen H. Yanagihara
District Engineer, San Francisco District
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

Attn: Regulatory Functions Branch

Subject: Draft SEIS Oakland Outer and Inner Harbors Deep-Draft Improvements SCH# 87081823

Dear Colonel Yanagihara:

The Draft Supplement to the Environmental Impact Statement (SEIS) on the proposed Oakland Outer and Inner Harbors Deep-Draft Improvements was reviewed and I have the following comments.

GROUNDWATER

Effort of the Corps of Engineers (COE) to address concerns of the Regional Water Quality Control Board, the Department of Water Resources and Alameda County with regard to the groundwater impacts associated with the project is commendable. The COE has been responsive in gathering and evaluating available resource data to identify existing impacts due to past dredging projects.

The draft SEIS theorizes that channel deepening, by itself, will not cause degradation of the resource beyond the existing condition. It also concludes that existing water quality in the Merritt/Posey Aquifer is of "questionable quality" and that there is no current utilization of the ground water resource. From the conclusions in the Draft SEIS, it would appear that groundwater utilization is defined as that which is used for drinking water. The COE's own report on the Merritt/Posey Aquifer identified groundwater usage from existing Alameda County records. Although the existing records show that groundwater usage is primarily for irrigation, it still constitutes a use. It should be recognized that the known use of the aquifer is restricted to current records and does not recognize non-documented use. Recognizing the limitations of the COE's evaluation and the misinterpretation of groundwater usage, conclusions indicating the aquifer is not presently used are not accurate and statements to that effect should be deleted or modified. S-1

In addition to the question of use is that of water quality. The Draft SEIS indicates that the Merritt/Posey Aquifer is of "questionable quality". What is the definition of "questionable quality"? If records indicate the existence of groundwater usage, then sufficiently good quality water exist to meet these uses. The COE's evaluation of the Merritt/Posey Aquifer did not in any manner evaluate existing water quality. Therefore, conclusions regarding water quality should not be made without solid evidence such as water quality sampling data to support them. The Department of Water Resources study of 1981 concluded that water quality in the vicinity of the Oakland Harbor in the Merritt/Posey Aquifer meets Secondary Drinking Water Standards. This conclusion would seem to contradict the COE's conclusions regarding water quality. S-2

Conclusions indicating that the salt water wedge in the Merritt/Posey Aquifer will remain stable, unless increase usage occurs, appears to be based on sound scientific evidence. It is true that past dredging in the harbor has exposed approximately 62% of the Merritt/Posey Aquifer to the bay and evidence of salt water intrusion exists. It is also true that an increase in the area of exposed Merritt/Posey Aquifer due to the proposed dredging would increase the rate of salt water intrusion should increased groundwater pumping occur. The Merritt/Posey Aquifer is not a major fresh water resource in and of itself. This should not, however, detract from the value of the resource or permit further degradation. S-3 The Merritt/Posey Aquifer is not the only fresh water aquifer underlying the Alameda-Oakland harbor area. Besides the Merritt/Posey Aquifer, a much larger aquifer underlies the Alameda and Oakland areas. The geologic relationship between the Merritt/Posey and underlying Alameda Aquifer is not well defined. This uncertainty and the possible future utilization of the Alameda Aquifer make the protection and management of the Merritt/Posey Aquifer critical.

Protection and management of the aquifers may be difficult due to the uncertainty of the existence and locations of abandoned wells, and hydrogeological relationships which may connect what appear to be two separate aquifers. S-4 These natural and artifical connections, if they exist, could provide a free path for the migration of water between the systems. With such uncertainty surrounding aquifer interrelationships, monitoring of existing conditions becomes extremely important. S-5 In addition, Alameda County is diligently working to characterize the quantity and quality of groundwaters in the East Bay Plains area. The emphasis of this effort is geared to the future management and use of groundwaters. It is imperative that COE and the regulatory community address protection of these groundwater resources. In light of the growing importance of groundwater as a source of potable water, the Regional Board must consider its protection. The Regional Board is considering requiring the COE to develop and implement a groundwater monitoring network and program. The requirement for groundwater monitoring would remain in effect until the uncertainty surrounding the physical and geologic separation of the groundwater resources is resolved, or until Alameda County can implement an effective ground water management program for the Merritt/Posey and Alameda Aquifers.

CHEMICAL AND BIOASSAY DATA

The water quality impacts associated with this project extend beyond those for the protection of groundwater and include impacts to surface water and biological communities. The chemical and bioassay data from the Oakland Inner and Outer Harbor analyses provide insufficient information to determine whether the dredged sediment is suitable for ocean disposal. The COE should coordinate with the EPA and incorporate into the SEIS an endorsement by both agencies that the material is suitable for ocean disposal. S-6

If the material is not suitable for ocean disposal and in-bay disposal is pursued, then the Regional Board staff recommends that Waste Discharge Requirements be prescribed for the disposal site. The SEIS should evaluate the sediments in accord with Section 230.60, Volume 40 of the Code of Federal Regulations. History of the industrial areas on the perimeter of the dredging should be investigated and sediments adjacent to industrial areas like Schnitzer Steel and Todd Shipyard, where toxic chemicals have been used and/or spilled, must be sampled extensively to assure that dredged sediments will not be carriers of contaminants and that contaminated sediments will be disposed at a proper disposal site. S-7 Monitoring at the disposal site would include both pre- and post- project monitoring of the water column and sediment. Results of the monitoring program should be utilized in a management plan to mitigate adverse effects. S-8

QUESTION OF A DREDGE SPOILS SLURRY FOR DISPOSAL AT ALCATRAZ

The Draft SEIS identifies that the preferred disposal option involves the predredge of 2.5 million cubic yards of sediment from the Alcatraz disposal site for disposal at a designated ocean site. This predredge would increase the capacity of the Alcatraz site so that the spoils from the Oakland Harbor project and other projects around the bay could be disposed at that site. The continued management of the Alcatraz site would require all dredge spoils to be in a slurry prior to their disposal. This preferred disposal option does not, however, adequately S-9

address the impact that the slurry from 7 million cubic yards would have on the bay. There should be no misconception that the water quality impacts associated with the slurry requirement is a necessary evil because there are other alternatives. Although recent allegations of the drop in sport fishing and fish populations are not verified, such adverse impacts are possible. The resuspension of sediments in the water column can decrease D.O., increase sulfide, increase ammonia, suffocate fish, and bury spawning grounds. The COE should address these concerns in the SEIS and propose appropriate monitoring and mitigation.

The Regional Board is aware of the deep concern of recreational and commercial fishery groups about disposal of dredge spoil in slurry form at the Alcatraz disposal site. Issuance of Waste Discharge Requirements are being considered for the disposal site as mentioned above. Also, the cumulative impact of this project in conjunction with other new work and maintenamce projects needs to be addressed in greater detail if the Alcatraz site is to continue to be considered for disposal. S-10 In light of this I believe the preferred alternative for disposal would be for all dredge spoils to go to a designated ocean disposal site.

If you have questions concerning the letter, please contact Dennis Mishek, area code 415, 464-0433.

Sincerely,

Roger B. James
Executive Officer

Copy:
Mr. Keith Quan, Port of Oakland
Ms. Nadell Gayou, State Resources Agency

File Name: RWQCB11-25-87 Comment Categories: 1,2,3,4,5

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SAN FRANCISCO BAY REGION (RWQCB)
Date of Letter: November 25, 1987

S-1 Comment noted. Any statements in the General Design Memorandum (GDM) stating that the aquifer is not presently being used have been removed.

S-2 References to the quality of the existing water in the Merritt/Posey aquifer have been removed. However, the value of the Merritt/Posey aquifer as a resource is questionable as has been noted at many meetings with the Corps and RWQCB.

S-3 The concern expressed by the RWQCB is recognized.

S-4 Management and protection of the Alameda aquifer due to the existence of abandoned wells may indeed be very difficult to control. The hydrogeological relationships that may connect the two aquifers have not been established. The monitoring program should detect changes in water quality.

S-5 A monitoring program is being coordinated with RWQCB and the Alameda County Flood Control and Water Conservation District (ACFCWD).

S-6 Comment noted. Ocean disposal is located outside of State jurisdiction as related to Sections 401 and 404 of the Clean Water Act. Additional information related to suitability of dredged material from the Oakland Harbor project is presented in the Final SEIS (See Appendix A). The Ocean Dumping Regulations and the joint EPA/USACE Implementation Manual (1977) governing the ecological evaluation of dredged sediments were followed. Bulk chemistry data is not required by the statutory regulations to determine the suitability for ocean disposal, since the relationship between chemistry data of marine sediments and potential ecological effect can not be established (Brannon et al., 1975; Bricker, 1974; Lee and Plumb, 1978). It should be noted that the regulations and the implementing guidance allow flexibility in testing and interpretation of the data by the reviewers. With this in mind, the San Francisco District coordinated the testing of sediments from Oakland Harbor with the Corps of Engineers' Waterways Experiment Station who developed the testing protocols together with EPA. Coordination of the test results with EPA is continuing.

S-7 Because of concerns about possible contamination from land-based activities at the Schnitzer Steel site and past activities at Todd Shipyards (presently Alameda Gateway), additional testing was performed at these sites. These data are presented in the SEIS (Sections 4.2.2 and 4.2.2) and Appendix A.

S-8 Comment noted. A Section 404(b)(1) evaluation was furnished to the Regional Board by separate letter dated January 21, 1988. It describes elements of a monitoring plan that would be conducted at the Alcatraz disposal site for the predredging alternative.

S-9 Comment noted. These concerns are addressed in the SEIS (Section 4.6).

S-10 Cumulative impacts of disposal of dredged sediments at the Alcatraz Site are addressed in the SEIS, Section 4.5 and in the Section 404(b)(1) Evaluation submitted to the Regional Water Quality Control Board.

State of California — The Resources Agency

Memorandum

To: Gordon K. Van Vleck
Secretary for Resources
1416 Ninth Street
Sacramento, California 95814

Date: November 2, 1987

Attention: Gordon F. Snow Ph.D.
Projects Coordinator

From: Department of Fish and Game

Subject: Draft Supplement to the Environmental Impact Statement (DSEIS) Oakland Inner and Outer Harbor Improvements SCH 87081823

The Department of Fish and Game (Department) has reviewed the U.S. Army Corps of Engineers (COE) Draft Design Memorandum Number 1 and DSEIS for deep draft navigational improvements to Oakland Inner and Outer harbors. The project includes widening of both Inner and Outer harbor channels, creating a uniform depth throughout both channels of -42 feet mean lower low water, and construction of a new turning basin with realignment of another. Although most of the environmental documentation for both projects has been completed, the purpose of this supplement is to evaluate a new proposal for the disposal of 7.0 million cubic yards of dredge materials generated by this project. The need for a supplement arose from mounding problems at the COE dredge material disposal site near Alcatraz Island (SF 11).

The Department finds the DSEIS inadequate in several significant respects, including the discussion and determinations regarding water quality and sediment chemistry issues, the biological assessments and choices of disposal alternatives for dredge material, and the socio-economic analysis of resource-related impacts. In addition, the Department believes that the project alternative preferred by the COE, Alcatraz disposal with predredging, would result in significant adverse impacts on fish and wildlife resources and the people who use and enjoy them. The Department recommends direct ocean disposal of all dredged material at ocean Site B1, as we believe that among the alternatives listed in the DSEIS, this alternative would cause the least damage to fish and wildlife resources and their use. S-1

Water Quality and Sediment Chemistry: Although the DSEIS concludes that the material to be dredged from Oakland Harbor is suitable for Alcatraz disposal, we note with concern that this material tested higher for numerous trace metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury nickel, and zinc) than the substrate currently at SF 11. The bioaccumulation studies showed strong pollutant mobility for chromium, lead, and zinc, while the elutriate tests demonstrated a similar finding for copper. In addition, several suspended particulate animal bioassays and solid phase animal bioassays showed significantly different negative results when compared to reference samples. S-2

Clearly, the resuspension and accumulation of these sediments as a result of disposal at Alcatraz could be toxic or otherwise deleterious to sensitive aquatic organisms. Furthermore, virtually nothing has been done to evaluate the potential effects of sulfide toxicity or dissolved oxygen depression at the disposal site. S-3

As a result of these findings and deficiencies, the Department recommends that additional samples of project sediment be taken and analyzed for heavy metal toxicity. We further suggest that any sediments which are found to cause significant mortality in toxicity tests not be disposed of in the marine environment. S-4

Disposal Alternatives: The options for disposal include: 1) no action, 2) unrestricted Alcatraz disposal, 3) Alcatraz disposal with predredging (2.7 million cubic yards) and material rehandling to a nearshore ocean disposal site, and 4) direct ocean disposal of all 7.0 million cubic yards. Additionally, the document discusses four candidate ocean disposal sites. The DSEIS preferred alternative is the predredge option (#3) with disposal at a nearshore ocean site.

1. No Action - The Department recognizes the necessity of dredging activity, new or maintenance, for keeping California's shipping and fishing industries competitive and our recreational boating and fishing communities viable; however, we continue to see voluminous in-bay disposal as a major threat to the estuaries' fragile resources. In our view, "no action" is not a practical alternative for helping solve the seemingly complex problems being experienced at the Alcatraz disposal site. S-5

2. Unrestricted Disposal at Alcatraz - Under this alternative, we see continued impacts to Bay resources in terms of both direct habitat losses and the indirect effects of substrate and water column contamination. It is apparent that the great quantities of clamshell-dredged material which would be released at the Alcatraz site could eventually result in losses of valuable sandy and rocky habitat nearby. S-6 On the other hand, the remaining slurried volume would create turbidity and potential chemical contamination, the effects of which are more subtle and often do not become apparent except in the long term. Fish and wildlife resources and their uses near the Alcatraz site would continue to be impacted. S-7

   Therefore, as with the previous alternative, the Department does not feel that this is an appropriate option for the disposal of Oakland Inner and Outer harbors dredge material.

3. Predredging at Alcatraz - As stated in the DSEIS, this is the alternative preferred by the COE. However, before we

evaluate its particulars, the issue of slurry disposal needs to be addressed. The DSEIS is clear in its presentation of the events which led up to the restriction against other forms of disposal, namely the mounding at Alcatraz. Identified in 1982, this accumulation of dredge material continued to be a problem into 1986. At this point, slurry disposal became a requirement in hopes of reducing the rate of mounding. Slurry is known to enhance dispersion and, in the case of Alcatraz (a high energy area), it was expected that most material would enter suspension and be redistributed, even though localized turbidity levels predictably would be very high. The DSEIS claims, in fact, that slurry disposal has been successful in reducing mounding by 50 percent when compared to consolidated clamshell disposal.

Just recently, however, members of the commercial passenger fishing vessel (partyboat) industry, representing United Anglers and themselves, brought to the attention of our Department, other resource agencies, shipping and dredging industry representatives, and the COE, problems they have encountered catching fish in central Bay during 1986 and 1987. The fishermen claim that "muddy water" was frequently and unexpectedly present during the months of May to October, which constitute the bulk of their season. The Department subsequently reviewed physical environmental data (turbidity, temperature, and salinity) taken monthly at three central Bay stations from January 1980 through September 1987. We also analyzed partyboat log data for these same years, through August 1987. The information that we have evaluated to date supports the fishermen's contention that their 1986-87 catch was substantially down when compared to the 1980-85 time period. The data also show that the turbidity of the water in the vicinity of the Alcatraz disposal site was measurably higher in 1986-87 versus 1980-85. This rise in turbidity in recent years was particularly evident during the May to October time frame, historically considered clear-water months. S-8

It remains unresolved, though, as to whether there is a causal relationship, as the fishermen claim, between elevated turbidity levels, slurry-dominated dredging activities, and a depressed sportfish catch, or, as the COE alleges, that turbidity resulting from disposal is of short duration and constitutes such a minor fraction of the Bay system's total sediment load, that it is an unlikely source of any demonstrated resource-use problems. S-9 However, it is the Department's view that sufficient circumstantial evidence exists to raise serious questions about current management practices at the Alcatraz site and that the burden of proof S-10 currently rests with the COE to either explain the aforementioned trends in terms of naturally occurring physical events, or to conduct rigorous studies at the site to answer these critical questions. S-10

The predredge alternative in the DSEIS is unacceptable to the Department because it promotes the slurry disposal of the entire 7.0 million cubic yards at Alcatraz and proposes to aggravate existing turbidity problems by predredging 2.7 million cubic yards and rehandling this material for removal to an ocean disposal site. In fact, the predredging activity is proposed for the peak sportfishing period. The DSEIS also acknowledges that predredging and slurry disposal may increase the potential for release of contaminants (previously discussed). S-11 Habitat loss problems will not be reduced, as 37.5 percent of the slurried material is estimated to be retained at the Alcatraz site, thus returning 2.7 million cubic yards to the site. S-12

Additional short-term and long-term fishery resource problems could occur relative to valuable anadromous species, which utilize central Bay as a migratory corridor, or such species as northern anchovy and Pacific herring which spawn in the Bay; resident species bear even greater risks.

Therefore, the Department recommends that the Final SEIS provide more complete analysis of fishery problems relating to predredging and slurry disposal; and we argue most strongly against this alternative on the basis of substantial predicted and potential adverse impacts to the Bay's fishery resources. S-13

4. Direct Ocean Disposal - The disposal of all 7.0 million cubic yards at a designated ocean site is the alternative of choice for the Department. Exercise of this option would eliminate many of the environmental concerns related to the project and, as iterated by the DSEIS, it is the most environmentally sound of all the alternatives. S-14

The Department does have serious concerns, however, with the ocean site (1M) selected by the COE in this document. We have previously expressed our displeasure (see Department letter, Appendix B, DSEIS) with the failure of the COE to include a deepwater (greater than 100 fathoms) alternative for final consideration in previous designation documents; that shortcoming has been repeated in this process. S-15 Furthermore, the fishery information used to evaluate previously dismissed offshore sites and the remaining two mid-shelf and two nearshore candidate sites in the DSEIS is both insufficient and out-of-date. S-16

We do not believe that Site 1M, located 15.6 miles from the Golden Gate in approximately 25 fathoms of water, meets all of the criteria for the selection of an ocean disposal site (40 CFR 228.5), namely that the site be beyond the continental shelf if feasible and, more importantly, that "the site be selected to minimize interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries and shell fisheries. . ." S-17

Department information shows that Site 1M, is located in or near primary California halibut trawling grounds, intense ocean salmon sport and commercial fishing locations, and valuable Dungeness crab fishing, spawning, and nursery areas. Although the DSEIS acknowledges the presence of these fisheries at 1M, it greatly underestimates their strength relative to the other candidate sites. By comparison, Site BI (Department's preference) is substantially less productive for these fisheries, has relatively lower benthic species abundance, and is further from amenity areas as well as the environmental perturbations and seasonal influences of the Bay. S-18

A monitoring program for the ocean site ultimately designated for this project is somewhat a separate issue, but will be addressed here. We note that the proposed plan (DSEIS, p. 76-80) provides little in the way of specific biological studies. No one need be reminded that a comprehensive monitoring plan at Alcatraz could have provided early detection, and possibly some resolution of the problems we are experiencing there today. The Department suggests a series of scoping sessions to develop a more appropriate and detailed plan in advance of designation. S-19

The Department's full recommendation on the alternatives presented in the DSEIS is the direct disposal of the entire 7.0 million cubic yards from Oakland Inner and Outer harbors to ocean Site BI. We further recommend that materials found to be toxic under the recommended testing program should be disposed of at approved land disposal sites, rather than in the marine environment. S-20

Socio-economics: Although our recommended combination of alternatives is described in the DSEIS as the most costly, we do not believe that this document adequately addresses the cost/benefits to the resources and their users for any alternative. As an example, consider a few of the concrete economic specifics of recreational fishing. A conservative estimate of the partyboat industry's annual economic value is three-quarters of a million dollars; however, partyboat fishing represents merely 17 percent of local saltwater sport fishing S-21 effort (National Marine Fisheries Service data). If we incorporate the expenditures of private boat owners (48 percent) and pier/beach fishermen (34 percent), plus multiply these figures by expansion factors that measure the movement of these monies through the local economy, it is apparent that we are dealing with sportfishing economic benefits valued in the millions of dollars annually. In addition, there are the potential economic impacts to the annual 20-30 million dollar Pacific herring fishery which have not been addressed in the DSEIS. S-22

In our view, a complete socio-economic analysis would clearly demonstrate that the greatest economic benefit to the public would not come from the predredge alternative, but from direct ocean disposal at an environmentally sound site.

In closing, we wish to reiterate that the subject DSEIS is substantially inadequate because it does not address so many of the salient points within the major issues of water quality, resource assessment, and socio-economics. Furthermore, it appears that these deficiencies have led the COE to select one of the most damaging alternatives available for disposal of dredge material from Oakland Inner and Outer harbors. S-22

Department personnel are available to discuss our concerns in greater detail. To arrange for discussion, contact Robert N. Tasto, Marine Resources Laboratory, 411 Burgess Drive, Menlo Park, CA 94025, telephone (415) 326-0324.

Pete Bontadelli

Pete Bontadelli
Acting Director

File Name: CDFG11-2-87 Comment Categories: 2,3,4,5,7,9

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA DEPARTMENT OF FISH AND GAME
Date of Letter: November 2, 1987

S-1 Comment noted. In selecting the proposed offshore site, all factors as described in 40 CFR Part 227 and Part 228 were considered. The rationale for site selection is detailed in the SEIS section 2.7.

S-2 As discussed in Section 3.2.2 and 4.2.2 of the SEIS and Appendix A to the SEIS, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a result of disposal of this material (Brannon et al. 1975; Bricker, 1974; Lee and Plumb, 1978). Only a very small fraction of the contaminants present may be available for uptake by an organism. For that reason, bioassay and bioaccumulation testing are conducted.

It is true that the bioaccumulation results showed statistically higher concentrations of chromium, lead, and zinc in the tissue of clams exposed to sediment from several areas within Oakland Harbor than in tissues of clams exposed to a reference sediment. However, a statistically significant bioaccumulation in organisms living in a test sediment as compared to organisms living in a reference sediment does not necessarily imply that an ecologically important effect will occur in the field. Statistical differences in test data are only used as a tool to evaluate the variation in the response of test organisms. For this reason, a number of factors must be evaluated including the magnitude of the difference from the reference as well as the comparison of the actual tissue concentration to values reported in the literature and FDA type limits. Appendix A to the SEIS has been modified to include a more thorough discussion of the bioaccumulation data. The Corps' evaluation of this data did not indicate that any of the metals were highly mobile.

Elutriate testing of material from Oakland Harbor indicated that only one station (Oakland Inner Ice) had a copper concentration exceeding the State Water Quality Objective by 1.2 times. However, mixing zone calculations (Appendix A) indicate that water quality standards would not be exceeded as a result of Oakland Harbor dredging, Alcatraz disposal or ocean disposal of project material for either of the parameters or the sites for which testing has been performed.

Although several suspended particulate phase animal bioassays and several solid phase bioassays showed statistically greater toxicity in the test sediment as compared to the reference sediment, this does not necessarily indicate that adverse toxicity will occur in the field. Appendix A has been modified to include a more detailed description of the Corps' analysis of these data (Appendix A). The findings indicate that there is little potential that unacceptable adverse toxicity impacts will occur in the field. It is the Corps best professional judgement that, after evaluating the results of toxicity and bioaccumulation testing collectively, the material from Oakland Inner and Outer Harbors, with the exception of sediments from areas adjacent to Schnitzer Steel and Alameda Gateway (formerly Todd Shipyard), are suitable for disposal at Alcatraz or an ocean site.

S-3 The San Francisco District analyzed the bioassay and bioaccumulation data with the assistance of personnel from Waterways Experiment Station, (WES). WES is a research facility of the Corps of Engineers that studies dredged material disposal and environmental effects nationwide. The analysis indicates that resuspension or accumulation of sediment from Oakland Harbor (excepting material from Schnitzer and Alameda Gateway) at Alcatraz would not be toxic or otherwise deleterious to sensitive aquatic organisms.

The sediment from Oakland Harbor is known to contain only very low levels of hydrogen sulfide. No odor of hydrogen sulfide was detected during the sampling or testing of this material. Therefore, disposal of material from Oakland at Alcatraz should not result in the release of toxic concentrations of hydrogen sulfide.

There should be little or no reduction of dissolved oxygen at the disposal site due to the discharge of dredged material from Oakland Harbor. In fact, whether dredged by clamshell or hydraulic methods, the materials' oxygen demand will be partially satisfied. During disposal there will be an oxygen reduction as more demand is satisfied, but most of that reduction will occur in the zone of impact. The demand will be rapidly satisfied as the material settles and reaeration occurs during water column mixing at the site. Hydraulic dredging operations may aerate the dredged material as it is pumped into the hopper (USACE, 1976, DDS, Appendix C: 74) such that the water column might even experience an increase in dissolved oxygen. The SEIS has been modified to include a discussion of this concern (see SEIS, Section 3.3.5).

S-4 Comment noted. Additional testing has been conducted on two areas (the Schnitzer Steel and Alameda Gateway sites) within Oakland Harbor. Capping the contaminated material with clean sediments was considered feasible and is proposed to make the material suitable for open water disposal. A *capping design* is included in the GDM.

S-5 Comment noted. The "voluminous" nature of dredged material disposal within San Francisco Bay is small when compared to the natural suspended sediment loads being transported in Bay waters. Generally, disposal operations represent a redistribution of sediments that are already highly mobile in this estuarine system. In-bay disposal, based on available data, has not been shown to pose a significant threat to the estuary's biological resources.

S-6 Direct habitat losses at the Alcatraz site from the discharge of material removed from the Oakland project would be minimal. The Alcatraz site has been used since 1894. Natural tidal influences subject the area to physically harsh conditions. The disposal site does offer habitat to some species; resident organisms are adapted to a harsh environment or they would not be there. Therefore, significant habitat loss at the Alcatraz site is not anticipated.

The potential indirect effects on water column contamination have been addressed by using elutriate analyses that demonstrated no significant adverse effect. With respect to the indirect effects on substrate contamination, the proposed sediments to be dredged must meet regulatory requirements in order to be discharged.

S-7 The marine resources in the neighborhood of the Alcatraz site have been affected by disposal activities for decades and will continue to be disrupted whenever disposal occurs there. Short-term turbidity increases are an intrinsic part of an aquatic disposal activity. On the otherhand, potential chemical contamination of the disposal site and adjacent areas is prevented by sediment testing programs prior to dredged material discharge.

S-8 It is a widely known phenomenon that sediment laden waters from the shallow areas of the Bay and Delta and the relatively clear coastal waters sweep back and forth across the Central Bay with each change of the tide. The enormous tidal prism of San Francisco Bay affects the distribution of water properties, eg. salinity, turbidity, etc., of large areas of the Gulf of the Farallones, Central Bay, and to a lesser extent, South Bay and San Pablo Bay. An estimated 170 million cubic yards of sediments are suspended annually by wind generated waves and currents in the shallow areas of the Bay. Sediment suspended in San Pablo Bay on a typically windy summer afternoon can be transported miles to the ocean or miles upstream to the Delta with the next tidal cycle. The interface between the sediment carrying water from upstream and the relatively clear water from the ocean can be viewed from boats, planes, bridges, or even office buildings in San Francisco. The interface is most distinguishable in the summer months. Fishermen working San Francisco Bay should expect to frequently encounter "muddy water" during windy periods. Fishermen in the central portion of the Bay should expect the muddiest water near the end of an ebb tide during windy days or at the end of an ebb tide immediately after the windy period. (Also see response F-3, Department of Commerce, NOAA, National Marine Fisheries letter, October 28, 1987.)

S-9 Comment noted. Data collected during 1986 for two disposal operations at the Alcatraz site indicated that turbidity increases were short termed and localized (SAIC, 1987b). Maximum turbidity found in disposal plumes was exceeded by naturally occurring levels of suspended sediments in some shallow areas of San Francisco Bay by several times. Additionally, it was determined that background levels of suspended sediment in the vicinity of the disposal site were controlled by the tidal stage. Ambient turbidity levels were not significantly influenced by the rate of disposal nor by current velocity as might be expected if resuspension of sediment contributed significantly to local turbidity. (Also see response F-9, Department of Commerce, NOAA, National Marine Fisheries letter, October 28, 1987.)

S-10 The circumstantial evidence (e.g., turbidity data from three Central Bay stations and the documented decline in catch for the same period) fails to consider normal year-to-year variation in fish catch and overall turbidity data for all stations in the Bay that may indicate an estuarine-wide trend.

Turbidity measurements in the vicinity of the Alcatraz disposal site have clearly demonstrated the back and forth movement of turbid and relatively clear water across the site (Winzler and Kelly, 1985; SAIC, 1987b). Readings have been taken continuously, or at very short intervals, to show the pattern and to detect increases due to dredged material disposal. Results have shown that turbidity in the near vicinity of the site is overwhelmingly correlated with stage and not with the intensity of disposal activity or with the speed of the currents.

The data provided by the Department, to lend credit to the fishermen's claim of unexpected "muddy water", consist of measurements taken at only three sites in the central portion of the Bay. The readings were taken once a month using a secchi disk, which measures surface light penetration. The measurements were not repeated at the same point in the tidal cycle.

Without data from other measurements of turbidity taken throughout the Bay over a longer period of time, it is unsound to declare that Central Bay was more turbid because of slurry disposal. The Department of Fish and Game states that turbidity in 1986-87 was higher than 1980-85. It is not mentioned that the highest turbidity was in 1983. Turbidity of an "unexpected" level in 1987 was the third highest of those data presented for 1980-87. Fishing is inferred to be bad due to turbidity, but fishing in 1983, during the highest turbidity, was good. Fishing in 1986 was better than 1987. However, turbidity in 1986 was higher than in 1987. Finally, dredge material disposal during the fishing season of 1986, the period of time that the Department reports the highest level of turbidity, was at the lowest level of disposal activity for several years. Careful analysis of the data supplied by the Department does not show any correlation between dredged material disposal and turbidity levels.

S-11 Dredging of the dense clays and sands of the Alcatraz site by clamshell dredge is not likely to significantly increase turbidity or suspended sediments in the disposal site. The sediments mounded at the site have not previously been dispersed by currents at the site, and are unlikely to disperse rapidly during dredging with a 10 to 25 yd^3 clamshell bucket. Anchoring a clamshell dredge in the disposal site will reduce disposal activity during the time period identified as the peak sportfishing period. See response to comment S-2 on potential for contaminant release.

S-12 See response to comment S-6.

S-13 Additional information related to fishery resources that may occur in the vicinity of the site and within the Bay has been included in the SEIS (Section 3.3.7) as has further discussion of slurry disposal (Section 3.3.3).

S-14 Comment noted.

S-15 The U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers have developed the concept of delineating the area in which it would be operationally and economically feasible to transport and discharge dredged material prior to locating candidate ocean disposal sites. Candidate sites are then chosen from within the bounds determined and evaluated for suitability as dredged material disposal sites. The demarcated area is called the Zone of Siting Feasibility (ZSF). A Zone of Siting Feasibility Analysis has been prepared for dredged material disposal in the Gulf of the Farallones off San Francisco (see Appendix F of the Final SEIS). The ZSF has been determined to be the area included by a 24 nmi radius drawn from Pt. Bonita.

40 CFR 228.5 (e) requires, "whenever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used." The requirement is satisfied in this case because any site beyond the edge of the continental shelf lies outside of the determined Zone of Siting Feasibility (ZSF). Almost anywhere along the west coast of the United States, a ZSF *extending* 24 nmi offcoast would include several potential sites of depth greater than 100 fathoms. Because the continental shelf is relatively wide off San Francisco in the Gulf of the Farallones, the designated ZSF does not include a deeper site. Depth however, is not a factor that determines operational or economic feasibility. Because use of any hypothetical site outside of the ZSF has been determined to be impracticable using the ZSF analysis, study and sampling of such a site was not performed.

S-16 All available fishery data were used in the assessment of candidate ocean sites. Both historic and site-specific data have been evaluated. Reasons for the elimination of sites beyond the ZSF have been described previously. No single factor was used in the site selection process.

S-17 See response to comment S-15. Site 1M was preferred in the Draft SEIS for disposal of dredged material because it satisfies the general and specific criteria specified in 40 CFR 228.5 and 40 CFR 228.6. A succinct discussion of compliance with each of the criteria is presented in the Final SEIS, Sections 2.4.5 (d) and (e).

S-18 Comment noted. The bottom area of Site 1M would cover approximately 2 km^2 (0.6 nmi^2). Due to the deeper depths and the fact that material spreads as it falls through the water column, the bottom area of Site B1 would cover 10 km^2 (3 nmi^2). Based on available data, the region of dungeness crab fishing extends over a broad range including areas closer to the Gate and within the marine sanctuary. The crab resource is known to occupy the area on the shelf to 50 fathoms and beyond. It is calculated that the bottom area affected at Site B1 is five times greater in size than at Site 1M. The statutory guidance also provides for considering sizing of the site (40 CFR 228.5(d)) to minimize the impacts on benthic resources, manage monitoring considerations; and allow for effective corrective action if needed.

S-19 Comment noted. Specific elements of a monitoring program at the ocean disposal site have been described in the SEIS (Section 4.6). The EPA and Corps of Engineers are preparing guidance on generic monitoring activities for dredged material ocean disposal sites. Suggestions of specific monitoring activities, their objectives and design, would be welcomed.

S-20 Comment noted. Material found to have potential for adverse effect in the marine environment in accordance with the statutory requirements will not be placed in the ocean without capping as described in comment S-4.

S-21 Data contained in the comment is appreciated. The potential economic impacts from the disposal of dredged material to fishery resources have been determined to be insignificant. The determination is based on the nature of the impacts associated with dredged material disposal as described in the SEIS and the multitude of other major factors that may contribute to variability in fish catch and fish distribution. A more complete description of the potential economic impacts on commercial fishing can be found in the SEIS, Section 4.4.2.

S-22 Comment noted. After review of the comments received on the Draft SEIS, further examination of the available data has not indicated that the proper disposal of Oakland Harbor material at an offshore ocean site would lead to substantial harm of water quality, fishery resources, or significantly impact fishery economics.

State of California — Business, Transportation and Housing Agency

Memorandum

To : Norma Wood
State Clearinghouse
1400 Tenth St., Rm. 121
Sacramento, CA 95814

Date : November 3, 1987

File No.: ALA-000-PM-32.52
SCH 87081823
ALA000003

From : DEPARTMENT OF TRANSPORTATION - 4

Subject: Draft SEIS of the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements

Caltrans has reviewed the above-referenced document and forwards the following comments:

1. The widening and deepening of the Oakland Outer and Inner Harbor channels will certainly increase the "efficiency and cost-effectiveness" of deep-draft navigation; result in a "reduction in ship transit time"; allow "larger vessels" to navigate the channels; and will "eliminate tidal delays". The consequences of all of these improvements will no doubt result in an increase in the number and size of deep-draft vessels navigating the channels and, therefore, a concomitant increase in cargo volumes delivered to the docks can be assured. This will necessitate an increase in truck traffic (please refer to the attached memorandum) which will, ultimately, impact the State Highway System. There was no mention in the document of any of these points nor were any mitigation measures prescribed. These matters need to be addressed in the EIS. S-1

2. Caltrans has established the following guidelines to aid interested parties in their preparation of environmental documents concerning matters germane to Caltrans. The EIS should address the traffic impact in terms of:

   a. Trip generation, distribution and assignment;

   b. ADT, and AM and PM peak hour volumes for State Route 880 and for all significantly effected streets & highways, including freeway ramps and crossroads, and controlling intersections, for the existing and future conditions; S-2

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   c. Future conditions with project traffic, and with traffic generated by all approved developments in the area cumulatively; coverage should include all traffic that would affect the facilities evaluated, and should not be limited to projects under the jurisdiction of the lead agency; S-3

   d. Mitigations that consider highway and non-highway improvements and services. All mitigations being proposed should be discussed, including financial, scheduling considerations, and implementation responsibilities in the environmental document. S-4

3. Some of the proposed improvements, such as the "extension of stone blanket protection over the Bay Area Rapid Transit (BART) Transbay Tube and the relocation of six anode trays and support platforms", may have the potential to *disrupt BART service and* schedules and may present a safety risk to BART commuters during the period of construction. In addition, upon completion of the deepening and widening of the channels, will the addition of deep-draft vessels (and the resultant increase in displacement) present an increased collision or erosion risk to the Transbay Tube and its blanket protection? Caltrans suggests that these matters be examined and that various means used to prevent this risk from happening are identified. To date, Caltrans has not seen any indication of BART involvement in the review of these matters. In view of the potential impact on BART facilities, it is *recommended* that BART be consulted on these issues. S-5

4. Finally, in light of the recent media exposure with respect to slurry dredging in the San Francisco Bay, and the complaints of the local fisheries concerning this method, it is suggested that other alternatives be considered, as well as various mitigation measures. S-6

Thank you for including Caltrans in the environmental review process. We look forward to reviewing the EIS. Should you have any questions regarding these comments, please contact Rick Clennan of my staff at (415) 557-9298.

for [signature]
GARY P. ADAMS
District CEQA Coordinator

Attachment

RC:em

cc: LO, GEQ, BR/MJJ, GA, RC

File Name: CALTR11-3-87 Comment Categories: 7,9,10

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA DEPARTMENT OF TRANSPORTATION, (CALTRANS), DISTRICT 4
Date of Letter: November 3, 1987

S-1 Comment noted. Increases in container traffic are dependent on macro economic factors such as economic growth, exchange rates, commodity flows, changes in relative prices, etc. Deepening of the channels will increase the efficiency of moving this cargo. The Port of Oakland is planning to implement major landside facility improvements to accommodate anticipated growth in marine terminal operations. Landside projects will consist of two categories of improvements: 1) improvements to railroad operations and railroad yard facilities to increase the efficiencies of rail transport of containers to inland destinations, and 2) dockside/landside improvements to increase the efficiency of container handling, storage and dispatch capabilities, as well as roadway network improvements to facilitate container transport from ship to rail.

1) Rail Improvements:

A substantial amount of new container tonnage moving through the West Coast is "intermodal" traffic that previously would have been routed to or from the Far East through ports on the U.S. East Coast or by water. The recent improvements in railroad equipment and services have now made it more cost effective and timely to route almost all of the Pacific Basin freight destined to virtually every point in the U.S. through West Coast ports. An indication of the steamship industry's committment to intermodal service is the fact that the newest generation of container ships that are being built are too large to fit through the Panama Canal.

The Port is working with all three of the Railroads (Union Pacific, Southern Pacific, and Denver and Rio Grand Western railroads) serving Oakland to increase the height of tunnels in the Sierra Nevada and San Bernadino mountain ranges. These higher clearances are needed for double stack container trains when loaded with the extra high, 9.5 foot containers that some steamship lines have recently added to their service. The Port has recently committed $5 million towards this effort.

The Port is also developing a joint permit system with the City of Oakland to insure the safe and legal movement of heavy containers between marine terminals and off-dock container loading facilities and railyards.

2) Landside Improvements:

Since much of the Port's marketing strategy involves improved rail service, equally imperative has been the effort to "vacate" or control the streets over which the transfer of containers between marine and rail terminal occurs. In order to enhance its position as an intermodal gateway, the Port is capitalizing on its proximity of its marine container terminals to its intermodal rail facilities through the Port-owned Intra-Port Street Network program.

The Southern Pacific and Union Pacific railroads are located at the center of the Port Harbor area, within a 1.5 mile radius of all 19 of the Port's containership berths. These facilities are connected to the container terminals by streets that are within the Port's area of jurisdiction, but owned in part by the Port, the City of Oakland, or the private sector. Acquisition or "vacation" of certain streets not now owned by the Port is currently underway to consolidate all harbor area roadways into one intra-Port street network. Maintenance and improvement functions would be assumed by the Port and the Port would have sole permitting authority for vehicles operating over the roadway network. With the harbor area roadways combined under Port ownership and control, the container terminals will be effectively integrated with the intermodal rail facilities permitting extremely cost-effective transfer of containers between ship and rail.

The significant increases in cargo volume that would move through Oakland over the next two decades will be "intermodal" traffic. This is cargo destined to, or originating at points beyond the Continental Divide. All of this container traffic will need to move between marine facilities and rail terminals in order to be transported inland by rail.

The balance of container growth, labeled "local", represents cargo that will be transported by truck throughout the local area. This traffic, whose growth is largely dependent on the growth of the local Bay Area population, is projected to grow by 3% per year. This is consistent with the Gross Regional Product growth rate of 2.9% as contained in ABAG Projections '87. This growth will occur regardless of whether the deep-draft navigation improvements in the Oakland Inner and Outer Harbors take place or not.

This projected truck growth is not anticipated to cause a significant impact to the State Highway System. As the May, 1985, CALTRANS Report entitled "San Francisco Bay Ports Access Study" indicates, the percentage of (Oakland) port-related traffic currently using the regional access routes "is relatively small (the highest being 2.7 percent of both peak hour and total traffic along State Route 17 [now I-880])." Pages 197-8. The report goes on to state that "Though future increases in port-related traffic are projected to be relatively small, overall roadway volume increases are expected to be substantial. Port responses to these problems may lie in diverting and encouraging rail mode freight movements, and through port and city support of state and local efforts to improve the efficiency of both the highway and the transit system network." As discussed above, Port efforts in improving the local roadway network, improving the efficiency and cost-effectiveness of rail transport, as well as working with city/state efforts to augment the capacity of the regional highway system, (i.e. Measure B transportation projects) will contribute to this end.

S-2 Thank you for the guidelines. Our response per your guidelines follows in this response and responses S-3 and S-4.

a) Trip Generation: Over the next five years (1988-1993), 380,400 additional container boxes per year could be generated by the proposed project over existing levels. Of this incremental container growth, 48,800 will be distributed out of the port area by truck, and 331,600 will be transported by rail, based on current and projected mode split trends.

1. Truck Trips:

Assuming each container that is distributed by truck generates two truck trips per box, the increase in annual truck trips resulting from 5 year growth will amount to 97,600 truck trips per year, or 325 truck trips per day (300 working days/year).

2. Rail Movements:

i) Truck traffic induced by movement of containers from dockside to the rail terminals will be internal to the Port, that is, will not impact local streets or state highways. This traffic portion is estimated to equal 663,200 annual truck trips or 2,211 average daily truck trips.

ii) The 331,600 containers will be distributed to double stack trains with 10 containers per car and 20 cars per train. This distribution will generate 1658 additional train movements per year or approximately 5.5 additional trains per day. Most of these trains are expected to be diverted north to Richmond along Southern Pacific's mainline. All State highways are grade separated across this line between Richmond and Oakland; consequently, the added train movements will not impact the state highway system.

3. Trip Distribution and Assignment:

The trip distribution of the additional 325 daily truck trips that will move in and out of Port of Oakland harbor areas is as follows (based on current distribution patterns):

33 trips (10%) - west on I-880 to/from San Francisco
101 trips (31%) - north on I-80
3 trips (1%) - east on I-980
189 trips (58%) - south on I-880

S-3 b) ADT, AM, and PM peak hour volumes for State Route 880: The largest percentage of added truck trips will be distributed south on I-880 for a total of 189 average daily truck trips. Approximately 20 truck trips, or 10%, will be generated during the AM and PM peak hours. Currently, I-880 carries 203,000 average daily trips south of Oak Street. The added truck trips from this project would increase total daily traffic on I-880 by less than 1/10 of 1%. The added truck trips distributed by the other 3 routes would also increase ADT on each respective freeway by less than 1%.

S-4 c) Future Conditions: Given the small increases of project-related truck trips to be added to State Route 880 and the even lower projected increases on other state facilities, the future conditions can not be measured and would remain unchanged whether or not the project is approved and regardless of cumulative growth. (A 10% increase in trip generation is usually required to change the level of service by one level.)

S-4 d) Mitigation: The current congestion on I-880 and I-80 is a regional problem to which all growth in the region contributes and which consequently requires regional solutions and mitigation. The proposed project is estimated to contribute a very small proportion of traffic to the regional highway system. The proportion is small enough that the difference between with or without the project cannot be reasonably measured in terms of resultant freeway or on/off ramp levels of service. Therefore, no highway mitigation measures dedicated exclusively to the dredging project have been included.

S-5 Comment noted. Please see response C-1 to the Bay Area Rapid Transit District letter, July 20, 1987.

S-6 The recent "slurry" requirement did not significantly influence Central Bay turbidity. Studies of the disposal site indicated that turbidity levels are not correlated with the rate of disposal (SAIC, 1987). With respect to recent fisheries declines being an outgrowth of the slurry requirement, history at the disposal site suggests otherwise. Historically, most Corps of Engineers dredging in San Francisco Bay has been accomplished with hopper dredges which produce a slurried disposal material. This practice continued for many decades. Turbidity resulting from dredge disposal is a very temporary effect, especially when compared with wind wave and run-off caused turbidity. Also, recent attempts to have clamshell dredgers slurry their dredged material before disposal have been unsuccessful. The equipment is not capable of producing an homogeneous slurry. Therefore, there has been no significant change in historic operational procedures or Alcatraz water quality. In view of the above information, we do not believe that recent attempts to have all materials disposed at Alcatraz in a slurried form could be an important contributing factor in the declining fish harvests.

State of California   Business, Transportation and Housing Agency

Memorandum

To: ED BOYLE
District CEQA Coordinator

Attention: Rick Clennan

Date: October 9, 1987
File: Ala-000-32.52 (TP)
Ala-880-32.52 (TS)

From: DEPARTMENT OF TRANSPORTATION- District 04
Transportation Studies Branch

Subject: Oakland Harbors Navigation Improvements Design Memo and Supplemental EIS, USACE

The following is in response to your request of 10/2/87 for review of and comments to the subject document. Focused on Demand Traffic Projections, the comments are for your consideration in conjunction with input by other functional units, as applicable.

Sections 6.5.1 thru 6.5.3 appear to limit the expected project benefits to "transportation savings" and "reduction of ship transit time", without reference to increases in cargo volumes.

However, the obverse of Section 4.4.1.b of the Draft Supplement may be interpreted to imply that with the project, vessel traffic would increase. Larger vessels would then access Oakland Harbor, and a gain in business (and cargo volume and land traffic) would occur. S-1

If such benefits are expected to occur, the resultant increase in truck traffic would impact parts of the State highway system- possibly significantly - and should be addressed.

E. Kohn
ERNEST KOHN
Associate Transportation Engineer
Transportation Studies Branch

Attachment : Subject Document

EK:nw
cc: ECB-BLC, EK

File Name: CALTR10-9-87

Comment Categories: 10

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), DISTRICT 4, TRANSPORTATION STUDIES BRANCH
Date of Letter: October 9, 1987

S-1 See response to comment S-1, CALTRANS letter - 11/3/87.

State of California — The Resources Agency

Memorandum

Date: NOV 1 3 1987

A-38

To: Gordon F. Snow, Ph.D., Assistant
Secretary for Resources
The Resources Agency
1416 Ninth Street, Room 1311
Sacramento, CA 95814

From: Department of Water Resources

Subject: SCH 87081823, Draft SEIS Oakland Outer and Inner Harbors

We have reviewed the subject Draft Supplement to Environmental Impact Statement (SEIS) which was transmitted by the State Clearinghouse Notice of Completion, dated October 3, 1987, and have the following comments and recommendations.

Page 30, Section 4.1c, last paragraph:

This paragraph states that a ground water model was presented by the contractor. The model would allow a prediction of impacts on the Merritt/Posey Aquifer due to future development on the Oakland Bayshore area according to the SEIS. The paragraph also states that the modeling program is not proposed for implementation with the Oakland Harbor deepening project. Every effort should be made to optimize the monitoring and data evaluation efforts of the U. S. Navy and the U. S. Army Corps of Engineers in the area. Monitoring and possible modeling should be designed to determine effects on the Alameda Aquifer as well as the Merritt/Posey Aquifer. S-1

The paragraph states that installation of monitoring wells along two lines in the Inner Harbor area is being considered for implementation. The paragraph also states that these monitoring wells along with present Navy monitoring would provide sufficient data to demonstrate that there will be no impacts on the ground water in the area. This conclusion cannot be made until the data are collected and evaluated. It is possible that such an evaluation could show that, (1) additional monitoring wells are needed, or (2) that the ground water will be impacted. S-2

Continued coordination with local and State water agencies will maximize the results of the ground water study.

For further information you may wish to contact Carl Hauge of my staff at (916) 322-7164. Thank you for the opportunity to review and comment.

James U. McDaniel

James U. McDaniel
Chief, Central District

File Name: DWR11-13-87 Comment Categories: 1

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA STATE DEPARTMENT OF WATER RESOURCES (DWR)
Date of Letter: November 13, 1987

S-1 Comment noted. A monitoring program is being coordinated with RWQCB and Alameda County Flood Control and Water Conservation District for both aquifers.

S-2 Comment noted. It is recognized that the paragraph (Section 4.1c) in question draws premature conclusions. It has been rewritten. Please see the revised Section 4.1 of the General Design Memorandum for the revision.

STATE OF CALIFORNIA — GEORGE DEUKMEJIAN, Governor

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
THIRTY VAN NESS AVENUE SUITE 2011
SAN FRANCISCO CA 94102-6080
PHONE (415) 557-3686

November 16, 1987

Colonel Galen H. Yanagihara
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, California, 94105-1905

SUBJECT: Draft Supplement to the Final Environmental Impact Statement for the Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements; Inquiry File No. AL.OA.794.01; BCDC Consistency Determination No. CN 12-87, SCH 8708123

Dear Colonel Yanagihara:

Thank you for requesting our comments on the Draft Supplement to the Final Environmental Impact Statement (DSFEIS) for the Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements. As we understand it, the project would involve deepening the Oakland Inner and Outer Harbors to a depth of -42 feet MLLW (plus a two-foot allowable overdredge), by dredging approximately 7.0 million cubic yards of material. The preferred alternative involves disposing the dredged material at the Alcatraz disposal site. This would be preceeded by dredging approximately 2.7 million cubic yards from the Alcatraz site for disposal at an ocean site 16 miles from the Golden Gate Bridge. On February 14, 1984 we commented on the Draft Environmental Impact Statement. Although the Commission has not considered the DSFEIS, our staff comments are based on the Commission's law, the McAteer-Petris Act, the San Francisco Bay Plan, and our federally approved coastal managment program. S-1

Effects On Aquifer

We continue to be concerned, as stated in our previous comments, that the proposed project may damage aquifers in proximity to the project, by dredging of impermeable mud sediments that would result in saltwater intrusion into the underlying Merrit/Posey aquifer. We are further concerned that if interconnections exist between the Merrit/Posey aquifer and the much larger Alameda aquifer, then the Alameda aquifer may also be exposed to saltwater contamination. The FEIS had previously asserted that the project would not uncover the aquifer. However, the DSFEIS finds, by reference to a report entitled "Groundwater Monitoring Program" (GMP), that the project would uncover the aquifer and also that the aquifer already has been uncovered through past activities. Based on these findings, the report concludes that further uncovement would not exacerbate saltwater intrusion into the aquifer. S-2

The DSFEIS also includes combined comments on the GMP report from the San Francisco Bay Regional Water Quality Control Board (Regional Board), the State Water Resources Control Board (State Board), and the Department of Water Resources (DWR). These comments state that "The available data... are still too few to characterize both the present hydrologic and water quality conditions and the potential impacts of the proposed dredging," and include requests for further specific information. Therefore, it is not possible for our staff to conclude that sufficient information and analysis has been performed to support a conclusion of no adverse impact on the aquifer. The DSFEIS should consequently be amended to respond to the concerns contained in the Regional Board's, State Board's, and DWR's combined comment letter. S-3

This is important because the Commission's San Francisco Bay Plan policies on Dredging state, in part, that:

> To protect underground fresh water reservoirs (aquifers), (a) all proposals for dredging that could penetrate the mud "cover" should be reviewed by the Regional Water Quality Control Board and the State Department of Water Resources, and (b) dredging or construction work should not be permitted that might reasonably be expected to damage an underground water reservoir. Applicants for permission to dredge should be required to provide additional data on ground water conditions in the area of construction to the extent necessary and reasonable in relation to the proposed project. S-4

If it can be shown that further uncovering of the aquifer will not likely increase saltwater intrusion, we nevertheless request that monitoring of the saltwater wedge be included as a mitigation measure to corroborate this conclusion. Further, we request that any monitoring plan for the aquifer should include contingency measures to be implemented should the dredging result in increased saltwater intrusion into the aquifer. These measures should include, but not be limited to, those discussed in the Groundwater Monitoring Program on page 35. S-5

Sediment Quality

Sediment quality testing in the DSFEIS shows significant amounts of pollutants in the Oakland sediments. Additionally, bioassay tests performed to measure sediment toxicity show statistically significant toxicity compared to reference sediments in the speckeled sanddab, mussel larvae, polychaete, and amphipod tests. Bioaccumulation tests also showed statistically significant bioaccumulation of certain pollutants. However, the analysis of these results in the DSFEIS concludes that the sediments are not polluted to a level that would have significant environmental impact. S-6

Our concern is whether the level of toxicants in these sediments will have significant adverse effects and how experimentally measured toxicity should be interpreted in that determination. Unfortunately, there is not S-7 presently sufficient information to base exacting standards of allowable pollutants in sediments for open water disposal and, in fact, there are no present standards to apply in this instance beyond water column standards. In essence, the Corps has used the available information and the judgement of its experts to reach a determination that the adverse impacts of disposal will not be significant. Unfortunately, much of the rationale used in that determination is not included in the DSFEIS. S-8

We agree with the statement in the DSFEIS that statistically significant differences in toxicity between test and reference sediments do not necessarily indicate that adverse impacts would occur in the field. However, we believe that the DSFEIS does not include sufficient discussion and analysis to support its conclusion that the levels of pollutants and toxicity in the sediments to be dredged will not result in significant adverse impacts. Therefore, we request that the DSFEIS be amended to include further discussion substantiating this conclusion. In particular, we believe the categorical statement in the DSFEIS (page A-3), that measured toxicity less than fifty percent higher than controls signifies no cause for concern about unacceptable adverse toxicity in the field, requires further discussion and supporting analysis. S-9

Additionally, we note that sediment test Site 3dd has elevated levels of pollutants compared to other test sites. As you know, Site 3dd is in proximity to the Schnitzer Steel facilities and is cross-channel from the Todd Shipyard. Schnitzer has recently discovered toxic pollutants in upland soils adjacent to the areas proposed to be dredged. We are concerned that sediments in this area may have more extensive contamination problems. We suggest that you coordinate with the Regional Board and the Environmental Protection Agency (EPA) to determine if further testing should be performed in this area. S-10

Finally, the DSFEIS states on page 69 that bioassays and bioconcentration tests on core samples of Alcatraz sediments have not yet been completed and analyzed. These tests should be completed, analyzed, and included in the SFEIS before reaching any conclusions regarding unacceptable adverse impacts from Alcatraz redredging. S-11

In its independent consideration of sediment pollutant and toxicity data as part of consistency review of the proposed project under the CZMA, the Commission will rely heavily on the technical expertise of the Regional Board and the EPA, in addition to the analysis provided by the Corps. S-12

Use Of The Alcatraz Disposal Site

The DSFEIS states on page 33 that 2.7 million cubic yards will be predredged from the Alcatraz site for disposal at an ocean site. However, pages 8 and 42 of the General Design Memorandum for the project state that the amount to be predredged from Alcatraz is approximately 2.4 million cubic yards. Is this differential due to the dredging to be performed by the Port of Oakland? S-13

It is our understanding that the amount of material to be predredged from Alcatraz is based upon estimates of sediment retention at Alcatraz. We are concerned that if actual sediment retention rates are significantly greater than estimated, then the Alcatraz site could reach capacity and become unavailable for other Bay dredging projects. The DSFEIS should address this possibility. S-14

Our staff is also concerned about possible adverse impacts of disposing 7 million cubic yards of sediments at the Alcatraz site, in combination with the 2.7 million cubic yard predredging of Alcatraz. As you know, dredging and disposal of sediments can cause adverse impacts through increases in turbidity, resuspension of pollutants from sediments, clogging of marine organism's gill and feeding organs, smothering of benthic organisms, and burial of Bay substrate. In addition to direct dredging and disposal impacts at the Alcatraz site, according to the estimates of sediment dispersion contained in the DSFEIS, approximately 4.3 million cubic yards of sediments will mobilize off of the Alcatraz site, during and after disposal. When considered in combination with other continuing and planned disposal projects at Alcatraz, we believe this alternative would constitute a substantial intensification of activity at the Alcatraz site and are concerned about its potential for significant adverse impacts. S-15

In discussing whether the impact of Alcatraz disposal will be significant, the DSFEIS correctly states that Bay waters support a large annual sediment load. However, although sediment transport dynamics in the Bay are still poorly defined, it is our understanding that the dynamics of Bay sediment movement exhibit wide temporal and spatial variations. In contrast, all of the project's in-Bay disposal will occur at the Alcatraz site in the Central Bay and may not be limited to periods of natural high turbidity. Further, we are puzzled by the conclusion in the DSFEIS summary, on page V, that a 7 million cubic yard deepening of shoreline areas for disposal in a highly dispersive Bay site, is "not considered additive to the overall sediment dynamics of the Bay system." While not adding new sediments to the Bay system, moving these sediments from a sediment sink to an area of high dispersion, would appear to us to be additive to Bay sediment dynamics, especially in the Central Bay. S-16

Therefore, we believe that the DSFEIS should include further information regarding sediment dynamics and turbidity in the Central Bay and more specifically consider the impact of any sediment and turbidity regime changes, both on the area surrounding the Alcatraz disposal site in particular and the Central Bay in general. This analysis should include, but not be limited to, fishery resources and benthic communities. S-17

The DSFEIS states, on page 37, that the adverse impacts of disposal at Alcatraz, such as turbidity or nearby benthic changes, are "short term" effects and are not significant. While each disposal episode may be short-term, repetitive dredging and disposal operations will continue for a period of at least ten months. Therefore, we believe the DSFEIS should further consider the cumulative effect of dredging and disposal operations at Alcatraz. S-18

The adverse impacts of disposal at Alcatraz, such as increased turbidity and pollutant resuspension, may also be increased by the slurry requirement instituted by the Corps to maximize dispersion. Bay fisherman have reported that the fishery in the Central Bay has been declining in recent years and has totally collapsed this summer. The fisherman believe that these declines may be due to increased turbidity and covering of Central Bay fishing areas due to dredge disposal at Alcatraz. Preliminary analysis by the California Department of Fish and Game seems to indicate that turbidity in the Central Bay during the summer months may have increased over the last several years. While no causal links have been demonstrated between fishery concerns and dredge disposal, we believe that these concerns are of a sufficiently serious nature that they should be addressed in relation to the proposed project. S-19

The DSFEIS recognizes the adverse impacts of the Bay disposal option and concludes that the direct ocean disposal alternative would have fewer environmental impacts (p 37); consequently, the direct ocean disposal alternative is cited as the Environmental Quality Option (p 35).

The Commission's San Francisco Bay Plan policies on Dredging (page 15) state, in part, that:

> To prevent sedimentation resulting from dredging projects, mud from future dredging projects should be disposed of in one of the following ways: (a) placement on dry land, (b) placement as fill in approved fill projects, (c) barging or piping to suitable disposal sites in the ocean, or (d) if no other alternative is feasible, dumping in designated parts of the Bay where the maximum amount will be carried out the Golden Gate on the ebb tides; areas should be designated for this purpose upon approval by the Army Corps of Engineers....

Based upon the information contained in the DSFEIS concerning use of an ocean disposal site, staff must conclude that use of the direct ocean disposal option is "feasible" as stated in the Bay Plan policies. Therefore, based on the Bay Plan policies and our concerns that the cumulative adverse impacts of the Bay disposal alternative could result in significant adverse impacts, we request that the preferred alternative be changed to the direct ocean disposal alternative. S-20

If the Corps ultimately adopts the Alcatraz disposal alternative, we request that a program be adopted to monitor the environmental impacts of dredging and disposal operations at Alcatraz, including impacts on fishery resources and benthic communities. Further, we request that measures be included to mitigate for any significant adverse impacts identified. S-21

Ocean Site

All the alternative ocean disposal sites are outside the Commission's permit jurisdiction. However, the California Coastal Commission has jurisdiction over the ocean coastline outside the San Francisco Bay and implements the federal coastal zone management program for those areas. S-22

Therefore, the DSFEIS should be amended to identify the Coastal Commission's authority, establish whether ocean disposal would directly affect the coastal zone, and discuss the project's consistency with the Coastal Commission's management plan. S-22

Conclusion

We believe that the FEIS should be amended to include the information requested in this letter, in order to allow the Commission to better evaluate the consistency of the proposed project with its law and policies. Pursuant to the Commission's dredging policies and due to concerns for potential adverse environmental impacts, we request that the preferred alternative be changed to the direct ocean disposal alternative. If you have any questions concerning this letter please contact Steven Goldbeck of my staff. Thank you again for the opportunity to comment on the DSFEIS.

Sincerely yours,

Alan R. Pendleton

ALAN R. PENDLETON
Executive Director

ARP/sg

cc: Resources Agency
Port of Oakland
Roger James, Regional Board
Environmental Protection Agency
Peter Douglas, California Coastal Commission
Robert Tasto, California Department of Fish and Game
United Anglers
Schnitzer Steel

sup 10.25 87

File Name: BCDC 11-16-87 Comment Categories: 1,2,3,4,5,9,11

RESPONSE TO COMMENTS

Agency/Group/Individual: SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION (BCDC)
Date of Letter: November 16, 1987

S-1 Comment noted. The planned improvements at the Port of Oakland are in accordance with the San Francisco Bay Plan.

S-2 The Merritt/Posey aquifer is now and has been exposed to salt water intrusion for more than a thousand years. Presently, the aquifer is exposed over approximately 62 percent of the project area. The deepening is expected to increase the exposure within the project limits by an additional 25 percent (Geological Resource Consultants, Inc., 1987). The existing exposure to salt water intrusion has been demonstrated by monitoring conducted by the Navy (see Final General Design Memorandum, Section 4.1). Neither the San Antonio aquifer or the Alameda formation is exposed, and neither will be encountered by the channel deepening project.

S-3 The final GDM contains an amended section on groundwater that responds to the concerns of the Regional Water Quality Control Board (RWQCB) and Department of Water Resources (DWR) (GDM, Section 4.1).

S-4 Additional information has been included in the amended section on ground water (GDM, Section 4.1). This information indicates that salt water intrusion has occurred. The proposed improvement should not cause further intrusion.

S-5 A program has been developed, in conjunction with the Navy's monitoring program, to monitor both the Merritt/Posey Aquifer and the Alameda Formation. This program is expected to be in operation by spring 1988 and has been coordinated with RWQCB and Alameda Flood Control and Water Conservation District (ACFCWCD). A discussion of potential mitigation measures has also been added to the text of the amended ground water section (GDM, Section 4.1).

S-6, S-7, S-8 Comment noted. Appendix A has been expanded to include a more detailed discussion of the procedures and rationale used in the sediment quality determination. The material from Oakland Harbor, with the exception of sediment from areas near Schnitzer Steel and former Todd Shipyard location, is suitable for unrestricted disposal in the ocean or at Alcatraz. Additional testing was performed for the areas near Schnitzer and Todd. (see SEIS, Appendix A)

S-9 Comment noted. Appendix A has been modified to include the requested information.

S-10 Comment noted. Additional testing was performed in the Schnitzer-Todd area as presented in Appendix A.

S-11 The results of the additional testing of sediment from the Alcatraz disposal site are included in the SEIS, Section 3.3.6 and in Appendix A.

S-12 Comment noted.

S-13 Comment noted. The General Design Memorandum (GDM) has been corrected to indicate the proper yardage.

S-14 The 2.7 million cubic yards of sediment to be removed from the Alcatraz site represents a very conservative estimate of the *amount of material expected to be retained at the site* (see the Final GDM, Section 3.5). Retention of dredged sediments at the site at a rate significantly exceeding 37.5% is considered extremely remote based on both historical data and recent studies (SAIC, 1987).

S-15 The effects described have been addressed in the Oakland Outer Harbor Deep-Draft Navigation Improvements, Final EIS (1981) and Oakland Inner Harbor Deep Draft Navigation Improvements, Final EIS (1986) for the dredging and disposal activities. With respect to the proposed disposal of 7.0 million cubic yards at the Alcatraz site, this will be an intensification of activity at the site. However, the pre-dredging of material away from the Alcatraz site and transport out of the Bay system will result in no net bathymetric gain. Therefore, it is a practicable means to minimize the impact on other continuing disposal projects. In addition, the planned disposal activities at the Alcatraz site related to other Bay work projects have been considered. The uncertainties associated with the projects and the final outcome of disposal plans specifically related to these projects have also been described in the SEIS (Section 3.3).

S-16 The conclusion in the draft SEIS will be changed in the final SEIS to read, "not considered significantly additive to the overall suspended sediment regime of San Francisco Bay." Please see discussion of the Bay's sediment regime in the SEIS, Section 3.3.

S-17 Description of fishery resources and benthic communities and their potential impacts in the vicinity of the Alcatraz disposal site have been included in the SEIS (Section 3.3.7).

S-18 The cumulative effects of dredging and disposal operations at the Alcatraz disposal site are discussed in the SEIS (Section 4.3).

S-19 This comment has been addressed as suggested. See Responses to comments S-8 and S-9 of the Department of Fish and Game's comment letter, dated November 2, 1987.

S-20 *Comment noted. Direct ocean disposal is now the preferred* alternative.

S-21 Comment noted. With the Alcatraz predredging alternative monitoring investigations during the dredging/disposal to identify any adverse environmental effects associated with the project would be conducted.

S-22 The California Coastal Commission (CCC) has stated that disposal at the ocean disposal site will not affect the land and water uses within their jurisdiction (See Coordination, CCC letter of October 7, 1987).

STATE OF CALIFORNIA - STATE LANDS COMMISSION — GEORGE DEUKMEJIAN, Governor

STATE LANDS COMMISSION
1807 13TH STREET
SACRAMENTO, CALIFORNIA 95814

November 2, 1987

File Ref.: SD 87-10-07

U. S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco CA 94105-1905

Gentlemen:

The staff of the State Lands Commission has received your draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Draft Design Memorandum No. 1 and Supplement to the Environmental Impact Statement, Alameda County and has found that portions of the proposed dredging described therein will involve State land for which no permit has been issued.

This is to advise that you will need to secure a dredging permit from the State Lands Commission for the use of the state-owned mineral reserve lands involved.

S-1

Enclosed is information relative to the Commission's application requirements. Should you require additional information or assistance in preparing the application, please contact me at (916) 322-6375.

Your early response and cooperation in this matter will be appreciated.

Sincerely,

Linda Martinez

LINDA MARTINEZ
Dredging Coordinator

Enc.

cc: Port of Oakland
66 Jack London Square
Oakland CA 94607

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

December 3, 1987

Environmental Branch

Ms. Linda Martinez
State Lands Commission
1807 13th Street
Sacramento, California 95814

Dear Ms. Martinez:

This is in response to your letter dated November 2, 1987 concerning our Oakland Harbors project (Your file reference: SD 87-10-07). Your letter stated that portions of the proposed dredging would involve State land and that the project would require a dredging permit from the State Lands Commission.

Congress authorized deepening the Oakland Harbors by the Water Resources Development Act of 1986 for the express purpose of improving navigation.

In doing so, Congress exercised its dominant right under the Commerce Clause of the Constitution to make reasonable improvements in navigation without the need to apply for state permits. This right is known as the navigation servitude and it attaches to all navigable waters regardless of the ownership of the underlying lands or minerals. See, Hancock V. Train, 426 U.S. 167(1976), and EPA V. State Water Resources Control Board, 426 U.S. 200 (1976).

The Corps of Engineers is required by its own regulations (33 CFR 230) to provide information about the project and its impacts to the State of California for review and comment. Copies of the supplemental environmental impact statement on the Oakland Harbor deepening were sent to the State Resources Agency as well as to the California Department of Fish and Game, Regional Water Quality Control Board, State Historic Preservation Officer, and your office for review and comment. The expiration of this comment period was November 9, 1987. We will also submit request for a Consistency Determination on the proposed project to the San Francisco Bay Conservation and Development Commission.

We welcome and respect the advice of the State Lands Commission and other interested State agencies, but we decline to apply for a permit from the Commission.

Questions regarding the legal aspects of this matter may be directed to Mr. John Eft of our Office of Counsel, (415)974-0365. Other questions may be directed to Ms. Patricia Duff of our Environmental Branch, (415)974-0441.

Jay K. Soper
Jay K. Soper
Executive Engineer

ABAG
ASSOCIATION OF BAY AREA GOVERNMENTS
Mailing Address: P.O. Box 2050 Oakland, CA 94604 2050

December 21, 1987

To: US Army Corps of Engineers, San Francisco

Re: Ocean Disposal of Dredge Spoils from Oakland Harbors - ACH #7286
Federal Direct Development

The Association of Bay Area Governments has reviewed information concerning your Federal project and under special authorization of the Executive Board, staff is clearing it for timely action. Because the ABAG Executive Board will not be meeting this month, staff will report this action to it at the earliest possible moment.

By submitting to us a notice of your federal project you initiated this process. We placed our ABAG stamp in an appropriate space showing ABAG action and clearance. This clearance letter informs you of the conclusion of regional intergovernmental review and provides you with a record of ABAG action to be included with your official records.

Executive Order 12372 is intended to foster a spirit of intergovernmental partnership. ABAG's review, as part of the State process, is designed to aid in the exchange of views between Federal officials and local elected representatives. The Executive Order requires that your agency inform the State Clearinghouse of actions taken on this particular project.

Please let us know if we can be of further service to you.

Sincerely,

Gary Binger
Planning Director

Enclosure

Representing City and County Governments of the San Francisco Bay Area
Metro Center ■ Eighth & Oak Streets ■ Oakland ■ (415) 464 7900

BART
BAY AREA RAPID TRANSIT DISTRICT
800 Madison Street
P.O. Box 12688
Oakland, CA 94604 2688
Telephone (415) 464 6000

July 20, 1987

Mr. William Angeloni
Chief, Planning/Engineering Division
Department of the Army
San Francisco District,
Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

Reference: Oakland Outer Harbor Project

File: 09BM

Dear Mr. Angeloni:

We have reviewed Figure 12 and Plates 1 and 2 from your draft General Design Memorandum. Implementation of the work show on these drawings does not require modifications to BART facilities. C-1

We are concerned, though, about the possibility of accidental damage to our cathodic protection anodes and cables. To minimize this, we ask that your construction documents specifically alert the contractor of their location and require that caution be used when working near them. C-2 Additionally, we would like to be notified when your work is about to start so we can monitor our cathodic protection rectifiers. C-3

Thank you for the attention you have given us on this project.

Yours truly,

William G. Snyder
Manager, Civil/Structural Engineering

WGS:jd

File Name: BART7-20-87 | Comment Categories 10

RESPONSE TO COMMENTS

Agency/Group/Individual: BAY AREA RAPID TRANSIT DISTRICT (BART)
Date of Letter: July 20, 1987

C-1 BART reviewed Figure 12 and Plates 1 and 2 from the draft GDM and concluded that implementation of the work shown on these drawings will not require modification to BART facilities.

C-2 Comment noted. A statement to this effect will be included in the plans and specifications.

C-3 Comment noted. BART staff will be notified when work is to commence.

COUNTY OF ALAMEDA
PUBLIC WORKS AGENCY
399 Elmhurst Street • Hayward CA 94544-1395
(415) 670-5480

November 6, 1987

Colonel Galen H. Yanagihara
District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

Dear Colonel Yanagihara:

SUBJECT: COMMENTS ON THE SUPPLEMENT TO THE ENVIRONMENTAL IMPACT STATEMENT FOR THE OAKLAND OUTER AND INNER HARBORS DEEP-DRAFT NAVIGATION IMPROVEMENTS

At the present time, the San Francisco Regional Water Quality Control Board (RWQCB) and the Alameda County Flood Control and Water Conservation District (ACFCD) are working on a 205(j) groundwater study for the Bay Plain area of Alameda County. This area extends from the Alameda County-Contra Costa County border on the north to the City of Hayward-Union City boundary on the south. An immediate follow up joint groundwater study by ACFCD and the State of California Department of Water Resources (DWR) is planned for early 1988.

We note with interest the comments in the SEIS, Section 4.1. Groundwater, page 29 and 30 dated September 1987. Nowhere is there mention of the extent of any present saltwater intrusion in the Merritt/Posey Aquifer. One of the problems we have is the possible intrusion of saltwater from the Merritt Aquifer to the Alameda Aquifer through deep wells acting as conduits between aquifers. Leakage through the San Antonio formation is another possible problem when the deeper dredging is accomplished. Information on the extent of saltwater intrusion is valuable in determining control measures for new drilling and for destroying old, deep abandoned wells. C-1

The Alameda Aquifer contains water of good quality and is generally used by industry. The Merritt Aquifer has domestic use during periods of drought for watering and other supplemental uses to reduce the demands on imported water. We do not dismiss either aquifer because of its limited usage. C-2

An important part of the two studies mentioned in the first paragraph above is the design of a new monitoring network of wells. In your SEIS there is this sentence, "A monitoring program which will install wells along two section lines in the Inner Harbor area is being considered for implementation." We fully support some type of monitoring program which is acceptable to all the agencies involved, and which could be an important supplement to our own future Bay Plains monitoring network. These, along with the Navy effort in the area, will allow the collecting of sufficient data to assess the impacts on the groundwater in the area. C-3

Yours very truly,

ROBERT C. BITTEN
DEPUTY DIRECTOR, PUBLIC WORKS AGENCY

cc: Carl J. Hauge, DWR
Dan Tempelis, RWQCB
Kenneth Muir, Consultant

RCB:RJ:jrm

File Name: ALA11-6-87

Comment Categories:
1,9

RESPONSE TO COMMENTS

Agency/Group/Individual: COUNTY OF ALAMEDA, PUBLIC WORKS AGENCY
Date of Letter: November 6, 1987

C-1 A monitoring program to operate in conjunction with the Navy monitoring plan will be implemented to measure movement of the wedge in the Merritt/Posey aquifer as well as quantify any degradation of the Alameda aquifer. The wedge is not expected to move unless there is increased draw down of the wells in the Merritt formation. This potential exists whether the dredging is accomplished or not.

C-2 Comment noted. All indications are that there will be no change to either aquifer due to the dredging activities. A monitoring plan is being implemented to identify any unanticipated impacts.

C-3 A monitoring plan is being developed in cooperation with the RWQCB and Alameda County Flood Control District for both the Merritt/Posey aquifer and the Alameda formation. This program is expected to be in operation by Spring 1988.

SAN FRANCISCO CLEAN WATER PROGRAM

City and County of San Francisco
770 Golden Gate Avenue
(415) 554-7633

Mailing Address: P.O. Box 360, San Francisco, California 94101
(415) 431-9430

November 9, 1987

U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94109

Attn: Ms. Patricia Duffy

Dear Ms. Duffy:

The following are our comments on the Draft Design Memorandum #1 - SEIS for the Oakland Outer and Inner Harbor's Deep Draft Navigation Improvements, September 1987.

Major Concerns

1) The Notice of Availability and the Abstract indicate the disposal at the ocean site will be limited to 2.4 million cubic yard of pre-dredged material from the Alcatraz site. However, on page 16 of the SEIS you indicate that site sizes (for ocean sites) was based on an initial disposal of 7.0 million cubic yards and a total 50-year project life requirement of 31 million cubic yards. Under the preferred (predredging) alternative will there be additional disposals at the ocean site subsequent to the initial 2.4 million cubic yards? C-1

2) On page 15 of the SEIS, you indicate that Tetra Tech has not published the results of their dispersion modeling. Without having these results of the dispersion modeling, we are unable to comment on whether there could be any measurable adverse impacts from the combined effects of the dredge disposal and our effluent disposal through the Southwest Ocean Outfall. C-2

Minor Comments

SEIS Table 1. Our edition of the FDA source document for this Table indicates FDA has also set Action levels in selected seafoods for mirex, kepone, mercury, chlordane and lindane. C-3

SEIS Table 47. Standard Deviations are meaningless and should not be shown for data sets where the majority of values are "less than" values. C-4

The table indicates chromium and zinc tissue levels were significantly different between control and Alcatraz clams. However, the text (and our analysis) suggest these differences are not statistically significant. Also the "Table 5" referenced in the footnote to Table 49 does not make sense. C-5

SEIS Table 5 and Elsewhere Elutriation levels are compared to California Ocean Plan levels for both Bay and Ocean discharges. For Bay discharges the comparison should be to the Water Quality Standards adopted by the Regional Water Quality Control Board for San Francisco Bay as part of the December 1986 amendments to the Basin Plan. C-6

We apologize for the last minute timing of our comments, however, we did not receive the document until November 6, 1987.

In the past, we have made all of our Ocean Outfall studies available to the Corps and are prepared to provide the Corps with the results of our ongoing studies on request. Several of the Corp's physical and biological studies undertaken for the ocean disposal site are of potential use to us in our ongoing studies and we would like to obtain copies of the Crops studies listed on the attachment. C-7

If you have any questions on our comments, please contact Dave Jones at 554-7633.

Very truly yours,

Michele Pla

Michele Pla, Director
Planning & Control

Attachment: As noted.

CORPS REPORTS REQUESTED BY THE CLEAN WATER PROGRAM

Kinnetic Laboratories Incorporated, 1985. San Francisco Bay Dredged Material Disposal Site Survey. Report prepared for the U.S. Army Corps of Engineers, San Francisco District.

Nybakken, J. and W. Broenkow, M. Silberstein, P. Slattery, A.R. Flegal, G. Knauer, R. Risebrough, B. Antrium. 1984. Baseline Survey and Site Selection for Ocean Disposal, Gulf of the Farallones. Moss Landing Marine Laboratories. Report prepared for the San Francisco District Corps of Engineers.

Parr, T. an K. Kutchins, M. Stevenson, and F.C. Newton. July 1987. Draft Report. Second Season Testing Program (April 1987) Baseline Physical and Biological Analysis of Potential Ocean Disposal Sites Offshore San Francisco. Kinnetic Laboratories Incorporated. Report prepared for the San Francisco District Corps of Engineers.

Stevenson, M. and T. Parr. February 1987. First Season Testing Program Baseline Physical and Biological Analysis of Potential Ocean Disposal Sites. Kinnetic Laboratories Incorporated. Report prepared for the San Francisco District Corps of Engineers.

Tetra Tech, Inc. 1987. Sediment Dispersion Modelling... Report in preparation for the U.S. Army Corps of Engineers, San Francisco District.

Tetra Tech, Inc. July 20, 1987. Zone of Siting Feasibility Analysis San Francisco Dredged Material Ocean Disposal Site Evaluation. Kinnetic Laboratories, Inc. Report prepared for the San Francisco District Corps of Engineers.

File Name: SFCWP11-9-87 Comment Categories: 2,3,11

RESPONSE TO COMMENTS

Agency/Group/Individual: SAN FRANCISCO CLEAN WATER PROGRAM
Date of Letter: November 9, 1987

C-1 The proposed alternative, as described in the Draft SEIS, indicated that 2.4 million cubic yards of material from the Alcatraz site would be taken to the ocean site. In order to assess the direct to ocean disposal alternative, the ocean site was sized in terms of the maximum amount of material that could be placed there. The total new work dredging at Oakland Harbor, including 50 years of maintenance dredging (using an estimated 500,000 cubic yards annually), was estimated to be 31 million cubic yards. The estimates in the Final SEIS have been revised to reflect the aforementioned quantities.

C-2 The Sedimentation and Dispersion Analysis, San Francisco Dredged Material Ocean Disposal Site Evaluation (Tetra Tech, 1987) has been published. No measurable amount of sediment is predicted to move from either of the alternative ocean disposal sites toward the Southwest Ocean Outfall through dispersal or resuspension.

C-3 The tables are not meant to be a complete listing of FDA-type limits but a listing of those contaminants for which bioaccumulation testing was conducted. Mirex, Kepone, and Indole were not included in the tables because the tissue of test organisms was not analyzed for these parameters. Chlordane was inadvertently left off the tables and has been added. We are not aware of an FDA action level for mercury. However, there is one for methylmercury which is not included in these tables because it was not measured. Methylmercury is not routinely included in bioaccumulation testing.

C-4 There is no single generally accepted method for dealing with the case where data have values less than the detection limits. The method that was employed is one of the more commonly used techniques for dealing with this problem.

C-5 The boxes around the zinc and chromium data in Table 49 indicate that statistical tests were performed on the data for these two parameters. Statistical tests were not run on the other data because the mean values for the control and reference tissue samples were lower than the means for the Alcatraz tissue samples. The statistical analyses indicated that the concentrations of zinc and chromium in the clams exposed to Alcatraz sediment are less than or equal to the concentrations in clams exposed to reference and control sediment. The reference to Table 5 in the footnote to Table 49 has been removed.

C-6 Comment noted. The elutriate data should be compared to the Water Quality Objectives contained in the RWQCB's December 1986 amendments to the Basin Plan. However, elutriate data must be compared to the acute toxicity criteria which corresponds to the instantaneous maximum in the Basin Plan. Unfortunately, the amendments only include an instantaneous maximum for zinc. This value has been added to the analysis. For the remaining parameters, the Ocean Plan levels are being used.

C-7 Available copies of existing reports will be provided or may be reviewed at the San Francisco District Office.

LAW OFFICE OF
BIELEN AND PETERSON
A PROFESSIONAL ASSOCIATION
SUITE 101
100 WEBSTER STREET
OAKLAND CALIFORNIA 94607
TELEPHONE (415) 893-1515

THEODORE J. BIELEN, JR.*
RICHARD ESTY PETERSON
OF COUNSEL
*A PROFESSIONAL CORPORATION

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5 November 1987

Rod Chisholm, Chief
Environmental Branch
U.S. Army Corps of Engineer
San Francisco, Ca.

RE: ALCATRAZ MUD DUMP

I surf in San Francisco Bay at Fort Point and at Ocean Beach. Each outing a surfer spends 3-4 hours in the water and becomes very familiar with water conditions. Coastal surf in September and October has developed a noticeably smell and discoloration. I am concerned that dredge mud is continuing to be dumped off Alcatraz in ever increasing quantities and is contributing to these adverse conditions. While the Army Corps spokesman stated that mud dumping contributes only 3% to bay turbidity and that virtually all turbidity is wind caused, I nevertheless advocate bay mud dumping be stopped for the following reasons:

1. A 3% added turbidity, like compound interest, accumulates sediments for future dispersal.

2. Local periodic concentrations far exceed bay wide averages.

3. Dredged mud, potentially contains toxins.

4. Most importantly, unlike oxygenated surface detritus, dredged mud has undergone reduction by anerobic microbes, and is thus oxygen starved, resulting in excessive oxygen depletion when released into an oxyginated environment.

GI-1

To determine if other surf users had a similar aversion to bay mud dumping and bay pollution I circulated a petition and in less than three hours, obtained approximately 100 signatures from surf user's at recent surf event at Ocean Beach. Notably only two individuals declined to sign, and not because they were not in favor of halting bay mud dumping.

Surfers are generally not known for their activism. However,

it appears that they comprise a solid base of opposition to bay and ocean pollution, including the Army Corps monitored mud dumping. I plan to form a loose knit organization call UNITED SURF RIDERS AGAINST OCEAN POLLUTION to provide input from a surf user's perspective on ocean pollution matters.

Respectfully,

Richard Esty Peterson

RICHARD ESTY PETERSON

REP:kr

Attached articles disclose this & other concerns & some solutions.

File Name: BP11-5-87 Comment Categories: 4

RESPONSE TO COMMENTS

Agency/Group/Individual: RICHARD ESTY PETERSON, LAW OFFICES OF BIELEN AND PETERSON, OAKLAND, CA.
Date of Letter: November 5, 1987

GI-1 Coastal waters in later summer and fall off Ocean Beach are affected by the annual upwelling season that brings cool nutrient rich waters to the surface along the coast. Known current patterns suggest that the source of water that had "developed a noticeable smell and discoloration" will lie to the west of the site and that dredge material disposal in the Bay is not remotely associated with the phenomenon in question. It is suggested that the commenter contact the Environmental Protection Agency regarding the water quality at Ocean Beach. Cumulative impacts of this project are discussed in Section 4.5. of the Final SEIS; turbidity at the Alcatraz disposal site is presented in Section 3.3.4, of the Final SEIS; potential contamination is addressed in Appendix A of the Final SEIS; and oxygen depletion at the disposal site is discussed in Section 3.3.5, of the Final SEIS.

CALIFORNIA NATURAL RESOURCES FEDERATION

Affiliated with the National Wildlife Federation

November 23, 1987

Colonel Galen Yanagihara
District Engineer
San Francisco District
U. S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105 1905

RE: SEEIS on the Oakland Outer and Inner Harbour Navigation Improvements

Dear Colonel Yanagihara:

California Natural Resources Federation is *the State* Affiliate of the National Wildlife Federation and is the fastest growing conservation organization in the State. On behalf of our 12,000 members, I would like to express our concerns regarding the SEEIS, the EIS and the project as proposed.

We fully endorse the comments provide to you by the United Anglers of California in their October 19, 1987. We have the following additional comments.

The negative impacts of increased turbidity to aquatic habitat of the Bay, low dissolved oxygen level(s) resulting from removal and deposition of sediment at the Alcatraz site have not been adequately addressed in the DEIS or DSEIS. GI-1

Negative impacts to biological productivity of the Bay from the Alcatraz removal and deposition of sediment have not been adequately addressed. In particular, impacts on primary productivity, benthic and finfish production from [illegible] habitats, [illegible] have been insufficiently evaluated. GI-2

Although impacts to the commercial fishing industry received some attention in the DSEIS, negative impacts to [illegible] fishing participation and [illegible] to the [illegible] and recreational fisheries industry, [illegible] the charter industries have received inadequate assessment. GI-3

[illegible] the following problems exist with the EIS:

1. [illegible] Water Act: Disposal at the Alcatraz [illegible] is not consistent with the 404 (b)(1) guidelines [illegible] because this is a Corps project [illegible] permit is not required. Instead the Corps must include a 404 Evaluation in the EIS, and submit the EIS to Congress *before any actual discharge of dredge or fill material*, and before either authorization or appropriation of funds for the project. The Corp has included a 404 evaluation as Appendix D in the DSEIS. However, there are two basic problems:

A. There appears to be nothing in the EIS that indicates the 404 evaluation has *actually been* submitted to Congress for consideration prior to authorization or appropriation in accordance with 404(r).

B. The 404 evaluation is inadequate and indicates the disposal at Alcatraz is inconsistent with the guidelines and would be in violation of 404. GI-4

2. Compliance with the 404 (B)(1) guidelines:

A. 40 CFR, Sec. 230.10 (a): "No discharge of dredged *or fill material shall be permitted if there is a* practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem..." Practicable alternatives include no disposal into waters of the United States, and disposal at other locations. An alternative is practicable if it is available and feasible. The Corps alternatives analysis concedes that direct ocean disposal is a practicable alternative with less adverse impact on the aquatic ecosystem. The only apparent reason for choosing an Alcatraz disposal alternative is cost. GI-5
Furthermore, the Corps has not adequately considered an alternative which reduces the amount of dredged material, either by eliminating or reducing the scale of the harbor deepening project. GI-6 There is no discussion of the need for the deep draft vessels, which are to be accommodated by the proposed deepening. GI-7
Because practicable alternatives exist, the Alcatraz disposal is inconsistent with the guidelines and violates 404.

B. 40 CFR Sec. 230.10 (b): the guidelines also prohibit the discharge at Alcatraz if it contributes to a violation of an applicable water quality standard. The Corps DSEIS indicates that it will comply with this provision by attaining water quality certification from the State, but there is no evidence that this has occurred. The limited information in the EIS indicates the disposal may, in fact, contribute to water quality violations, particularly when viewed in combination with other similar disposal activities which have occurred and which are planned in the future. GI-8

2960 Tenth Street Berkeley, CA 94710
Phone (415) 848 2211

The guidelines also prohibit the discharge which will cause or contribute to "significant degradation" of the waters of the U. S. Effects contributing to such degradation include individual and cumulative adverse impacts on finfish, shellfish, aquatic ecosystem diversity, productivity, and stability, and recreational, aesthetic, and economic values. The guidelines require the Corps to make specific findings which establish that such effects will not occur. The guidelines specifically require findings on the impacts of increased suspended particulates/turbidity, impacts on aquatic ecosystems, cumulative impacts on the aquatic ecosystem, and secondary effects on the aquatic ecosystem. The Corps discussion of these determinations is either insufficient, or supports a finding of significant degradation. This, then, provides a second basis for finding that disposal at Alcatraz violates 404. GI-9

Finally, the guidelines prohibit the discharge unless appropriate and practicable steps have been taken to minimize potential adverse impacts on the aquatic ecosystem. The DSEIS does not propose adequate measures, including direct ocean disposal, to minimize the effects of dredged disposal on the aquatic ecosystem. This prohibition is a third basis for finding that the Alcatraz disposal violates 404. The Corps' Findings of Compliance in Appendix D are inadequate and not supported by the DSEIS. GI-10

Thank you for the opportunity to comment.

Sincerely,

Richard L. Hubbard

Richard L. Hubbard
Executive Director

File Name: CNRF11-23-87 | Comments Categories: 2,11,12,9

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA NATURAL RESOURCES FEDERATION

Date of Letter: November 23, 1987

GI-1 Expanded discussion of turbidity is presented in Section 3.3.4, of the Final SEIS. There should be little or no reduction of dissolved oxygen at the disposal site due to the discharge of dredged material from Oakland. The SEIS has been modified to include a discussion of the concern (see SEIS, Section 3.3.5).

GI-2 The referenced impacts have been addressed and considered. See Section 4.3 in the Final SEIS.

GI-3 A discussion of recreational fisheries in the affected waters has been added to the Final SEIS.

GI-4 Section 404 (r) of the Clean Water Act does not require that a 404(b)(1) evaluation be submitted to Congress for consideration prior to authorization or appropriation. It does state that if the 404 evaluation is submitted to Congress with the EIS that state water quality certification is not required. A 404(b)(1) evaluation was submitted to Congress along with the FEIS for the Oakland Inner Harbor project.

GI-5 The impacts to the aquatic environment in terms of acceptability have been considered.

GI-6 The Corps' original feasibility study for the Inner Harbor optimized the depth of construction to be -42 feet MLLW. The optimum design for this channel required removal of 4.2 million cubic yards (mcy). For the Outer Harbor the optimum depth was found to be -43 feet MLLW with 7.3 mcy of material being removed. Through a series of Washington level investigations, the Outer Harbor was determined to have an optimum depth of -42 feet MLLW, the same as the Inner Harbor. This reduced the dredging quantities to 4.9 mcy for the Outer Harbor. The authorized channels were simulated at the Computer Aided Operations Research Facility (CAORF), United States Maritime Administration, Kings Point, NY 11024. The results of this modeling indicated that the channels could be made narrower in places and still provide safe passage of the design ships (one-way traffic only). This modeling resulted in the present plan of 3.6 mcy for the Inner and 2.8 mcy for the Outer Harbors. This reduced the overall amount of material to be dredged by 5.1 mcy.

GI-7 Section 3.7 of the GDM describes the vessels to be accommodated by the deeper channel, and Section 3.8 the requirements.

GI-8 The Corps of Engineers has applied for water quality certification from the State for disposal of material from Oakland Harbor at the Alcatraz disposal site. Appendix A has been expanded to include a more complete discussion of the test results provided in the submittal to the RWQCB.

GI-9 The basic nature of the aquatic environment of San Francisco Bay must be clearly recognized in order to appreciate the determinations made in the Section 404(b) Evaluation. A more detailed description of the natural physical processes of the Bay is presented in Section 3.3.1 of the Final SEIS. The biological impacts are described in Section 4.3, and the cumulative impact are described in Section 4.5 of the SEIS.

GI-10 Based on the analysis of potential adverse impacts on the aquatic ecosystem, the material from Oakland Harbor (with the exception of Schnitzer Steel and Alameda Gateway) is acceptable for disposal either at Alcatraz or in the ocean at a designated disposal site (see SEIS, Appendix A).

California Striped Bass Association

STATE CHAPTER
P.O. BOX 9345
STOCKTON CALIF 95208

November 17, 1987

Colonel Galen Yanagihara
U.S. Army Corps of Engineers
211 Main Street
San Francisco, California 94105-1905

Dear Colonel Yanagihara:

On behalf of the 3500 members of the California Striped Bass Association I have been directed to send a *formal* letter of protest concerning the dumping of dredge spoils off Alcatraz Island.

If this type operation is allowed to continue it will no doubt cause irreversible damage to our now dwindling sports fishery.

The drastic effects of this operation in San Francisco Bay if allowed to continue will not only effect the sport fishery industry there, but the Sacramento-San Joaquin Delta Region as well. GI-1

We, therefore recommend that the U.S. Army Corps of Engineers direct those responsible for this act to order that future dredge spoils be placed elsewhere, preferably somewhere off the coast of California. By doing this there would be no adverse impact on our sports fishery industry.

Respectfully Submitted

Jay R. Sorensen

Jay R. Sorensen, Executive Director
California Striped Bass Association

cc: Members, State Board of Directors, C.S.B.A.
Calif. Dept. of Fish & Game
United Anglers of California
file

"Dedicated to the Preservation, Conservation and Propagation of Striped Bass"

File Name: CSBA11-17-87 Comment Categories: 5

RESPONSE TO COMMENTS

Agency/Group/Individual: CALIFORNIA STRIPED BASS ASSOCIATION, STOCKTON, CA

Date of Letter: *NOVEMBER 17, 1987*

GI-1. The causes of dwindling sport fisheries are many and include fresh water diversions, overfishing and environmental contamination. To attribute "irreversible damage" to fisheries solely to disposal of dredged material is unreasonable. Please refer to response to GI-57, Citizens for a Better Environment letter, November 20, 1987.

November 5, 1987

TO: Galen Yanagihara
Colnel, Corp of Engineers
Dept of the Army
211 Main St
San Francisco, CA 94105-1905

We, the undersigned California Voters, vigorously oppose the dumping of dredge materials anywhere inside of the Golden Gate.

SIGNATURE	ADDRESS
[illegible]	447 [illegible], Livermore 94550
[illegible]	[illegible] 95236
[illegible]	[illegible] 95606
[illegible]	563 [illegible] Livermore 94550
[illegible]	[illegible], Linden 95236
[illegible]	3586 [illegible] 94566
[illegible]	[illegible] 94536
[illegible]	928 [illegible] Livermore 94550
[illegible]	[illegible] School St. Fremont 94536
[illegible]	[illegible] Fremont 94536
[illegible]	[illegible] Fremont 94538
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible] 94550
[illegible]	[illegible] Fremont 94536
[illegible]	[illegible]
[illegible]	[illegible] 94550
[illegible]	[illegible]
[illegible]	[illegible] 94542
[illegible]	612 [illegible] Livermore 94550
David [illegible]	42495 Holt St Fremont 94539

November 5, 1987

TO: Galen Yanagihara
Colnel, Corp of Engineers
Dept of the Army
211 Main St
San Francisco, CA 94105-1905

We, the undersigned California Voters, vigorously oppose the dumping pf dredge materials anywhere inside of the Golden Gate.

SIGNATURE	ADDRESS
[illegible]	1373 [illegible] Ct. [illegible] CA 94536
Raymond [illegible]	41125 [illegible] Fremont, CA
[illegible]	441 Malibu Ct [illegible]

87645

a CBE Comment

Comments to the

U.S. Army Corps of Engineers

regarding

Army Corps of Engineers' Draft Design Memorandum Number 1, Draft Supplement 1 to the Environmental Impact Statement for the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements and Notice of Intent to Use Ocean Disposal Site

on Behalf of

Citizens for a Better Environment

and

Save San Francisco Bay Association

and

Oceanic Society

Submitted November 20, 1987

citizens for a better environment

942 MARKET ST SUITE 505
SAN FRANCISCO CA 94102
(415) 788 0690

I. INTRODUCTION

Citizens For A Better Environment (CBE) is a non-profit tax exempt organization concerned with the protection of the environment. It has 25,000 members in California, with more than 20,000 in the SF Bay Area. One of CBE's primary concerns is with the environmental health of San Francisco Bay.

CBE is also submitting these comments on behalf of the Save San Francisco Bay Association, a Bay Area organization concerned with San Francisco Bay's environment, and the Oceanic Society, a national organizations concerned with the protection of the nation's waters including San Francisco Bay and the Pacific Coast. CBE also is being assisted by the law firm of Heller, Ehrman, White & McAufliffe, which is submitting a comment on behalf of CBE addressing legal issues under separate cover.

CBE has reviewed the Army Corps of Engineers' Draft Design Memorandum Number 1, Draft Supplement 1 to the Environmental Impact Statement for the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements (DSEIS) and Notice of Intent to Use Ocean Disposal Site (hereinafter referred to as Corps documents). The comment period at the public hearing on these documents was extended to November 20, 1987. CBE has determined there are serious deficiencies in these documents and that the Corps has chosen the wrong preferred alternative. These comments are generally applicable to all the documents except as specifically noted.

San Francisco Bay is a fragile estuary that is suffering from a cumulative and chronic toxics load that is impairing its fisheries. At the same time, some of San Francisco Bay's ports are embarking upon channel deepening projects that are significantly increasing the disposal of dredge spoils in the Bay. CBE contends that the Alcatraz dumpsite cannot continue to be used and that an appropriate ocean site for direct disposal of dredge spoils should be designated. GI-1

It further must be recognized that the designation of an interim or permanent ocean site must be according to law and good environmental and scientific practices. Untold damage lasting for generations to come may result if the ocean site is not properly located. GI-2

The Corps documents fail to properly assess the impacts of disposal at Alcatraz and the disposal of material in the ocean. The Corps specifically failed to evaluate an appropriate ocean site beyond the outer continental shelf as required by law. Instead, for what appear to be bogus reasons, the Corps rejected any sites beyond the outer continental shelf and disregarded the recommendations of the United States Fish and Wildlife Service (USFWS) and the California Fish and Game Department (CFGD) in choosing an alternative site closer to shore. GI-3 The Corps further has developed a complicated proposal calling for both Bay and ocean disposal that will degrade both environments only for the sake of increasing the benefits of the project to the Port of Oakland. The Corps completely ignored the stressed nature of the S.F. estuary and cavalierly dismissed concerns about turbidity and chronic and cumulative toxic problems in the Bay. GI-4 GI-5

The Corps has now set itself against the recommendations of the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service, the California Fish and Game Department, the Regional Water Quality Control Board (RWQCB), numerous fishermen, environmental groups and the law by insisting upon dumping 7 million cubic yards of contaminated sediment at the Alcatraz dumpsite after predredging 2.4 million cubic yards from the Alcatraz site and dumping it at an inappropriate site in the ocean. GI-6 The Corps is doing all of this even though an alternative of direct disposal to an ocean site beyond the outer continental shelf would satisfy all of these groups' concerns and still be economically feasible for the Port of Oakland. CBE calls upon the Corps to withdraw its inadequate draft, do the proper testing and analysis of all appropriate alternatives, and follow the law in choosing a direct ocean disposal plan. GI-7

II. Disposal at Alcatraz

A. Summary

The Corps documents failed to evaluate properly the disposal of seven million cubic yards of toxic-laden sediments at the Alcatraz dumpsite. The documents disregard applicable state policies describing the cumulative and chronic toxic problems in GI-8 the Bay, misinterpret the bioassay and bulk sediment testing, and completely disregard substantial evidence of turbidity problems in the Bay. The presentation of sediment transport issues was deceptive and ignored scientific data and analysis. Further data gathering and re-evaluation of this alternative is therefore necessary. GI-8

The key error is first described at p. iv of the DSEIS. The DSEIS states that "no regional long-term environmental effects are anticipated." It continues:

> It is the [illegible] position that the Bay system [illegible] current load and that [illegible] turbidity resulting from disposal [illegible] is of short duration, [illegible] localized in the [illegible]
>
> [illegible] sediment from the [illegible] water quality [illegible] Bay [illegible] the marine [illegible] tests including [illegible] and [illegible] not likely [illegible] water quality [illegible]

[illegible] All [illegible]

[illegible]

The DSEIS on p. 63 again discusses the present water and sediment quality of San Francisco Bay. It ignores the cumulative and chronic toxic problems of the Bay and does not indicate it is a stressed estuary. The index has no reference to toxics or the State of California Bays and Estuaries Policy.

As discussed more fully below, this analysis is misleading, inadequate, and unscientific. San Francisco Bay is a stressed estuary in part because of a cumulative and chronic toxic problem. A stressed estuary can be significantly affected by an increase in the disposal of toxic sediments, particular when they are dispersed throughout the estuary. The DSEIS fails to analyze the fate of toxic sediments disposed at Alcatraz and ignores the stressed nature of San Francisco Bay, thereby disregarding applicable governmental policies. GI-9 While the DSEIS claims to have accounted for any toxicity problems through the bioassay testing, in fact the tests are unnecessarily limited and the data gathered is misinterpreted. GI-10 The Corps specifically failed to gather and present other important data necessary to determine the biological effects of in-bay disposal. Finally the DSEIS failed to properly analyze the turbidity concerns that have recently been raised by the Bay Area's sport fishermen. The DSEIS should therefore be rewritten and recirculated. GI-11

B. San Francisco Bay Is A Stressed Estuary

The State Water Resources Control Board is delegated authority by the Environmental Protection Agency to protect water quality in San Francisco Bay under the Clean Water Act. [illegible] State [illegible] law, the State Board [illegible] 1974 [illegible] Bay [illegible]

GI 12

decreased growth, lack of reproduction, and lack of survival. WQ 86 4, p. 21.

... M. ... J. Whipple, M. Moser, "Summary Report of the ... Striped Bass Study,", 1984.

In addition, the Board noted, "A recent study on cumulative impacts of discharges to San Francisco Bay confirmed the detrimental impact on aquatic life.

> ... instances of biological ... with toxic metals and trace ... equal those anywhere in the world. ... of physiological stress in ... contaminated with trace toxicants ... been observed; and the toxicant ... species of bivalve suggest ... to toxicant stress may ... for survival, at least in some ... the Bay. Although most contaminant ... localized, the number of ... the number of ... discharges and accidental ... is an environment of ... suitability for ... of a complete ecosystem ... species most ... of fisheries in the Bay ... away from ... smaller species ... flexibility. [1,8]

[illegible]

GI 13

[illegible]

GI-14

[illegible]

GI-15

reauthorization of 1987. EPA actually initiated an estuary program before passage of this law in part because of the toxic threat to the Bay. The Corps ought to interpret its authority and the available data in light of this Congression expression of concern.

GI-15

Instead, the DSEIS omits all of these policies and evidence in its summary of the present condition of San Francisco Bay. DSEIS, p. 63. There is no excuse for this deficiency, in light of the above summary of scientific data and governmental policies describing the condition of the Bay. CBE specifically alerted the Corps to this issue in its scoping comments of April 28, 1987, which are ignored and not discussed in the Corps documents.

GI-16

The Corps seems intent on assuming that the Bay is a pristine environment with unlimited dilution power, enabling it to assimilate any additional but allegedly minor toxic release from the immediate activity of dredging without significant harm to the environment. This failure to consider the cumulative impact of the proposed action and other actions when added to a baseline of turbidity and toxic loading violates requirements under both NEPA and the Clean Water Act. Applicable NEPA regulations make clear that analyzing effects of an action include consideration of cumulative impact, i.e., the incremental impact of the action when added to the past, present and reasonably foreseeable actions. 40 C.F.R. Sections 1502.16, 1508.7, and 1508.8. The guidelines promulgated under Section 404(b)(1) of the Clean Water Act regarding disposal of dredged or fill material also require

GI-17

consideration of such cumulative impacts. 40 C.F.R. Section 230.1(d), 230.11(g).

As discussed more fully below, the Corps documents fail to follow these regulations and to properly evaluate the impact of the Oakland dredging and other projects on the stressed San Francisco Bay. By doing so, they seriously underestimate the impacts of the dredging and violate the applicable regulations.

GI-17

B. A Stressed Ecosystem Can Be Significantly Affected By the Disposal of Toxic Laden Sediments.

The importance of the Bay being a stressed estuary is that dredge disposal, which in other bodies of water may be acceptable, in San Francisco Bay could cause significant adverse environmental impacts. Thus the CDFG has concluded that dredging plays a *significant role in adding to the cumulative toxic problem.*

GI-18

In testimony on September 4, 1986 before the San Francisco Bay and Development Commission, Don Lollock, Chief of the Environment Services Division of the CDFG stated:

> Our concern for disposal of dredge spoils resides in the following areas:
>
> 1. Excessive rates of spoil deposition can smother important fishery and wetland wildlife resources including food chain organisms and important habitat areas.
>
> GI-19
>
> 2. Disposal of polluted spoils to water areas can contribute to direct toxicity of fishery resources or to rendering such resources unfit for human consumption.
>
> GI-20
>
> 3. Dredging and spoil disposal can cause temporary excessive turbidity which can unduly interfere with sport and commercial fishing and life history stages of certain fisheries. See Appendix C, p. 2.

GI-21

In testimony prepared for the Regional Water Quality Control Board, Associate Water Quality Biologist Michael E. Rugg specifically addressed the toxic effects *from dredge disposal*:

> Historically poor waste treatment and disposal practices resulted in localized sediments which were extremely high in heavy metals or pesticide residues. When these *sediments were later dredged and transported* to disposal sites, the contaminants were carried with them thus distributing *contaminants more widely.*

GI-22

> Benthic organisms, especially those which ingest sediment either through filter feeding modes or direct ingestion have the ability to scavenge, or strip contaminants from such sediments. Recent work has shown that contaminated sediments can even lead to direct mortality of benthic organisms. If contaminants are sufficiently low to avoid lethal effects, they can be taken up by the benthos and bioaccumulate through the food chain to high trophic levels such as striped bass. See Appendix D.

GI-23

The Port of Oakland appears to be the type of hotspot described by Mr. Rugg. The Corps' own data shows that the sediments "contain higher concentrations of trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) than sediments from the *Alcatraz disposal site.*" *DSEIS, p. 40. While the Corps* "expected" higher levels, the data appears to confirm CBE's determination in our report, "Toxic Hotspots in San Francisco Bay", attached hereto as Appendix E, that the Port of Oakland is a hotspot with contaminated sediments which, if dispersed throughout the Bay, could cause serious environmental effects.

GI-24

The Oceanic Society's staff scientist expresses serious concern about the failure of the Corps documents to discuss the impact of dredging upon the cumulative toxics problem in the Bay. Dr. Mary Barber states in her letter of November 18, 1987:

The negative effect of the sediment itself is compounded by the load of heavy metals and petroleum products found in the Oakland harbors. The Oakland sediments with their high contaminant load would be distributed throughout the Bay. The dispersal of these sediments will be magnified by the proposed use of the slurry method, chosen to slow the mounding of the Alcatraz site. The heavy metals will add to the cumulative load of metals in the Bay with the potential of reducing the primary and secondary production (the growth of both plants and the animals that feed upon these plants which together form the bottom links of the food chain) and perhaps the commercially significant sport fisheries. Petroleum hydrocarbons, also found in high concentrations in Oakland sediments, have been identified as playing a role in the decline of the striped bass fishery. We still do not have a clear picture of the point where cumulative, sublethal effects might begin to severely reduce population size and growth potential. For this reason, in-Bay disposal should be rejected. Appendix F, p. 3.

GI-25

Other data suggests a link between contaminated sediments and aquatic life even before dredging. Dr. Robert Spies found positive relationships between toxics in sediments and disease in starry flounder after reviewing areas including the Port of Oakland. R. Spies et al., "Toxic Chemicals In San Francisco Bay Sediments and Fish: Relationships with Mixed-Function Oxidase Activity and Histopathological Abnormalities in Starry Flounder (Platichthys stellatus).

GI-26

As the USGS scientists warned, great caution must be attached to any plans for channel deepening in a stressed estuary. Proper testing to supplement available data and good scientific analysis is an important part of any evaluation. Yet, as discussed below, the Corps failed to do all the testing required and misinterpreted the data it obtained to evaluate in Bay disposal.

GI-27

12

C. The Failure to Analyze the Fate of Sediments Disposed at Alacatraz.

The distribution of toxic sediments by dredge disposal may cause serious adverse environmental impacts, particularly in a stressed estuary. Dr. Douglas A. Segar, at the request of CBE, reviewed the DSEIS. He wrote, "The EIS does not adequately address the fate and potential biological impacts of these contaminants when disposed at the Alcatraz site." See Appendix G., p. i.

GI-27

Segar has in depth reviewed the cumulative effects of dredge disposal at Alcatraz for another project currently under Corps' review, the Navy homeporting proposal. His review of the cumulative effects is equally applicable to this project. CBE refers to that analysis and incorporates it into this comment. As Dr. Segar states:

> [D]redge material contaminant inputs for some metals [in San Francisco Bay] are greater than all municipal and industrial discharges combined, even when appropriate allowance is made for a non-bioavailable fraction in dredged spoils. Therefore, the EIS's conclusion that dredging and disposal of dredged material appear to be an insignificant source of contaminants to the Bay-Delta is technically indefensible and, in fact, wrong. . . .
>
> Not only is dredged material disposal a very large source compared to all others, but it is the dominant source in the parts of Central and northern South Bay within which dredged material is dispersed.
>
> . . . .
>
> Since dredged material is by far the largest source of toxic contaminants within the large areas of Central Bay and northern South Bay

GI-28

GI-29

-11-

> where dispersal from the Alcatraz site occurs, it is reasonable to assume that dredge material disposal may contribute substantially to these impacts. I do not agree with the statement in the EIS that there is insufficient information to assess long-term cumulative impacts of dredging and disposal [citation omitted]. Such data do exist, although more study is undoubtedly needed. See Appendix H, pp. 4, 6 7.

GI-29

A second scientist, Dr. Steven Obrebski of the Tiburon Center for Environmental Studies, concludes in a recent letter discussing the Navy [illegible] that "the effects of dredge spoil disposal in the Bay must be more seriously considered than hitherto." See Appendix [illegible] 2. He explains:

> The Alcatraz site was presumably favored because it was deep and spoils were rapidly [illegible] shoaling developed from [illegible] dumping in the area. While [illegible] to reduce local pollutant [illegible] it can also increase the [illegible] contaminant levels throughout the Bay by making buried contaminants available again [illegible] and uptake by various [illegible]. Furthermore, pollutants are [illegible] more easily dispersed [illegible] the sediment, those that are [illegible] associated with [illegible] and have a greater potential [illegible] pollutants into biota in the [illegible] the evaluation of the [illegible] dredge spoil releases [illegible] we need, [illegible] what [illegible] biologically available [illegible] sediments originating from [illegible] previously buried sediments [illegible] the amounts [illegible] It is not [illegible] that the [illegible] of toxicants in the [illegible] that I [illegible] a large amount of the [illegible]

GI-30

. . . .

> . . . dredge spoils may have a long lifetime within the Bay, and the issue is not whether or not toxicants from dredge spoils enter the water column during dredging and disposa', but what their fate is after they are deposited in dredge spoil dumps.

GI-30

> By ignoring evidence for rapid and widespread distribution of dredge spoils within the Bay the FEIR may underestimate the degree to which dredge spoil disposal and dispersal in the Bay can contribute to increased average levels of toxicants in the tissues of organisms that feed on the bottom biota, such as fish and birds. Specifically, the FEIR ought to have addressed the possibility that dispersal of dredge spoils in the Bay could recycle toxic sediment fractions to the surface of sediments and make them biologically available. Appendix 1, p. 2, 4).

GI-31

Dr. Douglas Segar has estimated that for sediments dispersed from the Alcatraz dumpsite, "scientifically defensible estimates of the fraction of contaminants potentially bioavailable from dredged material at the dispersive Alcatraz site should be 100% for organic compounds and should vary between 10 and 95% for metals, depnding upon the specific metal." Appendix H, p. 3.

GI-32

The DSEIS falls far short of the requirements at 40 CFR Section 1502.22 for evaluating foreseeable significant adverse effects for which complete information is lacking. It provides no data describing the fate of sediments dumped at Alcatraz that disperse into the Bay. There is inadequate discussion of the bioavailability of the toxics as a result of disposal and their impact upon a stressed estuary. See Appendix H. The DSEIS simplistically argues that material constitutes a mere 4%

GI-33

... sediment of the Bay, "of minor ... Bay sediment regime."

GI-33

... is inadequate. Rather, the ... in this area ... evidence suggesting ... have significant ...

GI-34

... Bay Conservation and ...

GI-35

5. Rubin, David, Marine Geologist, U.S. Geological Survey. Presentation to the Bay Commission on Alcatraz mounding problem, September 4, 1986. and Nichols, Fred H., U.S. Geological Survey. Attending the meeting of the Bay Commission's Scientific and Technical Advisory Committee, April 15, 1987. (Footnote in original).

See Appendix J., p. 9.

The Corps' attempt to discount this recirculation of sediments as being of minor significance is rejected by experts. Dr. Obrebski in discussing the homeporting disposal plan noted that the key issue is not the total increase in the sediment budget of the entire estuary but the specific location and path of toxic sediments and whether they increase the toxic load in particular locations and how that might affect the biota. He further stated that this one plan of 1 million cubic yards could increase the amount of disposal by 18%, "a substantial increase." He then showed that the cumulative disposal totals could exceed the volume of annual inflow from the Delta and other tributaries and the outflow from the Bay, concluding that one must be "skeptical of assumptions that dredge spoil transport within the system is not a significant problem in redistributing toxicants throughout the bay." See Appendix I, pp. 4-5.

GI-36

In the case of the Port of Oakland, seven million cubic yards of dredge disposal would be far more significant than the project reviewed by Obrebski. His questions, unanswered by the Corps' documents, are even more pressing for this project:

> The basic questions are (a) where do different fractions of dredge spoil sediment go after they are dumped in the Bay. (b) Where are particularly toxic fractions deposited and how much are they likely to elevate sediment toxicity, toxicant

GI-37

[illegible] and consequent levels in the [illegible] likely to [illegible] toxicity" Id.

GI-37

[illegible] of Bay disposal, the Corps [illegible] testing on the fate of these [illegible] issues. If these issues are not able [illegible] a worst case or incomplete [illegible] analysis based upon the scenario [illegible] that toxic sediments are [illegible] available in a stressed [illegible]

GI-38

[illegible] was improperly

[illegible] experts to review the bioassay [illegible] by the Corps. CBE refers to the [illegible], and Dr. Segar. Dr. Segar's [illegible] project seem equally [illegible] methodologies relying on assumptions [illegible] bioaccumulation studies were [illegible] Appendix H. CBE also refers to the comments [illegible] Quality Control Board and the Bay [illegible] Commission. And CBE refers to Dr. [illegible] that the bioassay test should [illegible] the bioassays "may actually [illegible] of in-bay spoil disposal" because they [illegible] rather than those with heavier [illegible] likely to be dispersed throughout the Bay

GI-39

8

and fail to properly assess the movement of sediments after dredging and disposal. Appendix I, pp. 3-4.

Furthermore, the RWQCB has adopted new testing requirements in cooperation with the Corps. The testing does not appear to have been as extensive as required, including a complete ommission of poly aromatic hydrocarbons from the bulk sediment analysis. CBE requests that the testing be reviewed and a new draft circulated as meaningless analysis by the public and government agencies has been precluded. See 40 CFR 1502.9(a).

GI-40

E. The Corps Failed To Properly Analyze the Turbidity Issue

Sport and commercial fishermen who use San Francisco Bay have noted a sharp decline in the last two years in their catches. The fishermen have alleged the problem is directly related to turbidity problems in the Bay. See Appendices J, and K.; see also attached letters from individual fishermen, appendix L. These claims have also been reviewed by the NMFS and the RWQCB and are considered significant. E.g., See Appendix M. See also Appendix F, p. 2., and Appendix H, p. 7.

Contrary to general assurances in the Corps documents, turbidity apparently has become more than a transient phenomenon. Not only can it lead to short term effects on fish but it could produce changes that could fundmentally damage the Bay's biota.

> The waters of the San Francisco Bay are already stressed, especially considering sediment load and its effect on primary productivity or phytoplankton. Phytoplankton, which is the basis for the

GI-41

> food web in the Bay, including fishery organisms, require light as an energy source for growth. The amount of light penetrating the water column is significantly reduced under turbid conditions. The use of the Bay for disposal of millions of cubic yards of dredged spoil could provide the additional burden that pushes turbidity over the threshold, marking a seriously reduced primary production and reduced fishery production. Appendix F, p. 2.

The turbidity problem is a cause for deep concern and suggests that the disposal of 7 million cubic yards that are slurried at Alcatraz may be a disaster for the Bay. United Anglers summarized the economic effects posed by just the turbidity problem:

> The following sport fisheries have been affected: striped bass, salmon, halibut, shark, perch, flounder, croaker and sturgeon. These fisheries generate millions of dollars annually to local, regional, state and federal economies. The situation has become so serious in recent years that many partyboat businesses may be forced out of operation if the impacts related to spoil disposition is not corrected by the spring of 1988. This in turn will have major economic impacts and will return a severe loss in angling on the Bay. (Emphasis in original). Appendix S, p. 4.

The Corps documents fail to respond adequately to these concerns from both fishermen, state and federal agencies, and numerous scientists. The Corps should seriously review its analysis of turbidity in light of these comments.

GI-42

F. Violation of the Clean Water Act, Section 404(b)(1) and related regulations.

The Corps by failing to fully appreciate the environment effects of disposal at Alcatraz and its impact upon the stressed San Francisco Bay is violating its own regulations. One of the goals

GI-43

of the Corps' regulation of dumping is to "restore" the "chemical, physical, and biological integrity forwaters of the United States through the control of discharges of *dredged or fill material*." 40 CFR 230.1(a). The regulations are to be adaptable, depending upon the "important components of the ecosystem being evaluated." 40 CFR 230.6(a). It is clear that the guidelines are suggesting minimum requirements, which may be strengthened because of the application of state policies. 40 CFR 230.10.

The requirements specifically state that no discharge of dredged *material shall be permitted* "*which will cause* or contribute to significant degradation of the waters of the United States." 40 CFR 230.10(c). Prohibited degradation effects include adverse effects on human health or welfare by affecting fish, shellfish or wildlife, and direct effects on "life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes." 40 CFR 230.10(c)(1)(2). Also of concern are aquatic ecosystem diversity, productivity, and stability. 40 CFR 230.10(c)(3).

GI-43

In addition, by failing to choose an alternative that avoids these impacts, the Corps directly violates 40 CFR 230.10(a):

> [N]o discharge of dredge or fill material shall be permitted if there is a practical alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

GI-44

The Corps has not shown that disposal at a deep ocean site is not practicable, and admits that such disposal would have less adverse impacts on the environment. Assuming that an appropriate ocean disposal site can be identified, which seems likely, CBE believes that the Section 404 (b)(1) regulations requires use of such a site rather than the disposal proposed at Alcatraz. GI-44

III. Ocean Disposal

A. Summary

The Army Corps of Engineers has wrongly eliminated from consideration any sites beyond the Coast Guard radar range. The DSEIS offers bogus reasons for this exclusion, apparently based on concerns about surveillance, monitoring and safety. The Corps has instead chosen an unacceptable site within the radar range, without having done the necessary testing required by law to determine if ocean disposal at this site is even permissible. GI-45

The Corps apparently seeks to reduce the Port of Oakland's costs to the maximum extent, even though it acknowledges that a site beyond the radar range off the continental shelf is economically feasible. CBE supports reducing the costs of this project if possible, but not at cost to the environment, other businesses, and the enforcement of law. GI-46

B. Applicable Regulations Require The Consideration And Selection Of A Site Off the Outer Continental Shelf.

The National Environmental Policy Act requires that the Corps evaluate all reasonable alternatives, including a no-project GI-47

alternative. The Corps acknowledges in the DSEIS that it is bound by regulations to "whenever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that been historically used." 40 CFR 228.5; DSEIS pp. 8, 12-13. GI-47

The only site that has been historically used is a site now within the Farallones National Marine Sanctuary. The Corps correctly states that the use of the site is now prohibited by regulations. DSEIS, p. 16.

The Corps documents further show that an analysis prepared for it by Tetra Tech to determine the feasibility of sites, called the Zone of Siting Feasibility (ZSF), determined that areas within 38 miles from Point Bonita, including sites beyond the Outer Continental Shelf, were economically feasible. DSEIS, p. 9. The study also concluded there were no operational barriers to such sites and that regulations required that such sites be included in the zone. Nevertheless, the Corps limited its evaluation to sites within 24 nautical miles in order to provide "reasonable accountability." DSEIS, p. 9. The DSEIS states, "Although the ZSF includes an area beyond the edge of the continental shelf, the practicable surveillance of the disposal activity was limited to the USCG marine radar net." DSEIS, p. 16. It then states specifically that sites beyond the radar range "have been considered infeasible." DSEIS, p. 16. GI-48

The Corps further elaborates its concept of "accountability" and "surveillance" when discussing the specific criteria of 40 CFR 228.6. The DSEIS states that the Coast Guard has primary responsibility for "documenting compliance with permit conditions, deterrence of unauthorized disposal, and navigational surveillance." DSEIS, p. 21.

GI-49

The DSEIS does add an additional factor, "safety", indicating this concern has been given "significant weight with respect to minimizing potential hazards or navigational problems." No explanation is given of whether or why safety concerns should limit evaluation to sites within 24 nautical miles. No risk assessment or any other study on safety is provided.

Finally, the DSEIS introduces a new problem not previously described. The Corps notes that EPA will have the responsibility to monitor the site. The Corps skirts the feasibility issue, merely saying that monitoring at depths greater than 75 fm is "more difficult" due to the depths in order to accurately sample and frequently monitor with moderate size research vessels. DSEIS, p. 2[illegible]. The DSEIS also discusses vaguely an obstacle due to possible contamination of reference sites, but it does not state that means monitoring is not feasible.

GI-50

This entire analysis is bogus. Its reliance upon the limits of the radar range raises serious questions about the presence of good faith in assessing sites beyond the outer continental shelf and complying with applicable regulations.

The comments of the Oceanic Society discuss the availability of technology to resolve both the surveillance and safety issues. The Ocean Dumping Surveillance System (ODSS) is used for sludge dumpers that had been using a site 12 nm from the shore and are now required to go to a 106 mile site. The Society describes the system and attaches a paper further explaining it. The DSEIS elsewhere admits that "the USCG has indicated that as long as transit of disposal vessels were within the flow of normal traffic and that the actual disposal area was outside of the precautionary area and traffic langes, navigation hazards would be minimized." DSEIS, p. 15. Another method of monitoring is needed whether the dredger are going one or 11 miles beyond the precautionary area, is clearly available, and has been approved for use on the East Coast. CBE refers to and adopts the Oceanic Society's comments.

GI-51

Dr. Segar also comments upon the surveillance issue. He describes the use of shipriders as well as the use of the new technology. (The DSEIS admits that there are other methods for surveillance and that the radar system may not work at all if there is bad weather). Dr. Segar concludes that the "reasonable accountability" argument is "unsupportable."

No surveillance system is perfect. There have recently been claims that the Coast Guard is not even doing proper surveillance in the Bay where it does have radar and personal observation. See Appendix K, pp. 1-2. But clearly there is a feasible system which has been approved on the East Coast by the very agencies involved here and accepted by *Congress*. It is untenable to argue that what is feasible and required by law on the East Coast would be contrary to regulations on the West Coast. GI-51

The safety issue is particularly questionable. As the Oceanic Society explains, the radar system was created for the precautionary zone entering San Francisco Bay. Neither the Coast Guard nor the Corps or any other authority for safety reasons bars shipping beyond this range. The Corps, apparently other than for reasons of banning the consideration of disposal beyond the outer continental shelf, never considers this issue as a significant problem. Otherwise, it would not approve on principle [illegible] any projects that would increase the number of ships using San Francisco Bay from beyond 24 nm, which would doom this project and any activity related to growth of the use of the Bay's ports. The Corps clearly has not considered the safety issue significant, except apparently as an excuse to avoid examining an appropriate ocean site. GI-52

The NMFS in its comments similarly found the DSEIS's discussion of safety [illegible]:

> We question the decision to eliminate a [illegible] site from consideration if it is beyond the U.S. Coast Guard's Vessel Tracking [illegible]. In the course of everyday fishing [illegible] inbound and outbound vessels [illegible] beyond that radar safety [illegible]. It is not clear in the DSEIS why the [illegible] identifying a [illegible] Appendix B, p. 1.

The monitoring discussion avoids the key question: is it feasible? Whether monitoring is *more or less difficult* is not the issue under the ocean dumping regulations. Clearly the regulations anticipate disposal in deeper waters. In fact, Congress approved funding for the ODSS in order to facilitate proper ocean dumping, indicating the applicable legislative intent in interpreting the regulations. See Appendix F, p. 9. The fact that monitoring may be more difficult is not an excuse for failing to analyze appropriate sites beyond the outer continental shelf. More difficult monitoring of an area with less potential for environmental damage clearly is the preferred choice under the regulations over a site more easily monitored but with greater liklihood of damage to aquatic resources. GI-53

C. The Selection of A Site Beyond the Outer Continental Shelf Will Avoid Significant Adverse Environmental Impacts.

Both the Oceanic Society and the NMFS *emphasize* the importance of the fisheries in the coastal waters. Of particular importance is the Dungeness Crab which is in serious decline. CBE has been informed by the Fish and Game Department that the preferred site is in a spawning area of Dungeness Crab. GI-54

It is CBE's understanding that Fish and Game believes that alternative B-1 has the fewest impacts of those sites within the radar range because it is not a spawning area for crab, as is the preferred site. The DSEIS describes how both the preferred site and B1 are in areas of commerical fishing for numerous species. DSEIS, p. 15.

[illegible] the tidal range issue, Site B-2 is not [illegible] additional obstacles. CBE believes a site [illegible] may be the appropriate [illegible] GI-54

[illegible] comments of the [illegible] society, the [illegible] threats to the fisheries [illegible] fisheries [illegible] as well as the [illegible] help! GI-55

[illegible] may [illegible] GI-56

[illegible] GI-57

fees for such trips described in NOAA Technical *Memorandum* August 1987, "Results of Bay Area Sportfish Economic Study" by Thomson and Huppert. They concluded that $110,812,500 were spent on this marine angling activity and all is threatened by plans for the Oakland dredging and other disposal in the Bay and near-shore area. See Appendix T.

United Anglers also has reviewed the Meyer Resources *study on the* decline of fisheries in the Bay estuary. Dept. Fish and Game, Anadromous Fisheries Branch, Admin. Repr. No. 85-03. They concluded that declines in fisheries in the last 20 years resulted in a total loss of $2,312,714,260 with an average yearly [illegible] of $115,[illegible],713. See Appendix U.

As described by numerous fishermen, there is a serious [illegible] threat from the entire preferred alternative and it should be [illegible]. See discussion on turbidity at Alcatraz, supra. Not only actual fish losses, but also the impact of the loss of [illegible] upon tourism, marinas, and restaurants should be evaluated. The destruction of San Francisco's [illegible] crab [illegible], for instance, will have impacts far beyond the cost of the [illegible] for the [illegible] at Fisherman's Wharf.

None of these economic costs have been evaluated by the [illegible]. The violation of the NEPA requirement [illegible] economic and social effects, (40 CFR Sections 1502.14, [illegible]) [illegible] and in this case so important as to require [illegible] of the DEIS for full public comment. GI-57 [illegible] Society, United Anglers, and [illegible] RWQCB all have [illegible] comments, that CBE believes ought to be [illegible] entirely. Because of the huge opposition to the preferred alternative by a number of experts, CBE believes [illegible] must respond to each of these concerns under [illegible] must evaluate a reasonably forseeable scenario when [illegible] substantial uncertainty and it is not feasible to [illegible] the draft with new data. Simply claiming an issue is [illegible] the Corps has an opinion on it when there is a [illegible] controversy and credible opinions on both [illegible] insufficient as a matter of law. GI-58

CBE particularly refers to the following issues:

1. The [illegible] of contamination of the Farallones Island Sanctuary as [illegible] by the Oceanic Society--Site 1-M's center is 2.2 nautical miles (4.1 km) from the Sanctuary. The radius of the dumping area is 0.7 nautical miles (1.3 km). Thus the edge of the dumping area is only 1.5 nautical miles (2.8 km) from the Sanctuary. DSEIS, p. 30. The DSEIS incorrectly concludes the distance is 1.7 nautical miles. There is a threat that needs further consideration. GI-59

2. The failure to provide adequate testing of sediments for ocean disposal, as discussed by the RWQCB and the BCDC in its letter of October 19, 1987, including testing of Alcatraz sediments and that of Oakland sediments for ocean disposal purposes. The DSEIS states that additional studies are being performed but they were not provided with the draft. DSEIS, p. A-3. Under NEPA regulations a new draft should be circulated to allow public comment on this significant information. GI-60

3. The failure to properly coordinate with the US Fish and Wildlife Service, especially in rejecting the request for a full evaluation of a deepwater ocean site. GI-61

4. The failure to consider upland disposal or marsh building, as discussed by the Oceanic Society. The DSEIS dismisses upland disposal because no site has sufficient capacity to receive "all" of the dredged material from the Oakland Harbor project. DSEIS, p. 7. In fact, there are many sites under review by the Corps which may be available for some of the capacity, thereby mitigating the effects of all 7 million cubic yards being dumped at Alcatraz or in the Ocean. See Appendix O. It may also be possible to cap hazardous waste sites with the less seriously contaminated sediments. These alternatives should be considered. GI-62

5. The failure to analyze the effects of the dredging technique proposed and possible alternatives. The DSEIS states that most of the sediments from Alcatraz will be excavated by a clamshell dredge. According to BCDC's staff report, the clamshell causes more turbidity than other methods. The preferred alternative also accepts slurrying of all sediments at Alcatraz without any discussion of the impacts upon turbidity problems in the Bay. GI-63

6. The Corps documents fail to discuss the economic effects of redredging. According to BCDC's report, less than 30% of sediments disposed at Alcatraz go out the Golden Gate Bridge. The rest recirculates and must be redredged. The Port of San Francisco in prior correspondence has expressed concern about this redredging. See Appendix P. The economic and environmental costs from this redredging should be analyzed. GI-64

CBE also is concerned about the segmentation of this project from the Pier 26 project, which in a previous notice was described by the Corps as having as its purpose to be consistent with the Oakland channel deepening project. CBE also notes that there are other activities as discussed in the BCDC letter of October 19, 1987 to the Corps that are not discussed. See Appendix Q. Nor are reasonably anticipated future projects like the Navy homeporting dredging discussed. See Appendix R. It is improper to segment a project or ignore the cumulative effects of reasonably anticipated future projects. GI-65

IV. CONCLUSION

The Corps seems to be rushing the environmental review of this project at the expense of the environment and the [illegible] of this project. Fisheries are in danger and so is the future of this project if the applicant is mislead into supporting an alternative that is not permitted by law. GI-66

The proper review of this project is crucial, as soon there will be a selection of a permanent ocean site by the Environmental Protection Agency. If an inappropriate interim site is chosen, it might preclude a better permanent site as the equities favoring a historically used and degraded site will increase as opposed to a new site, no matter how preferable it might have been if no site had previously been used. GI-67

CBE strongly urges the Corps to withdraw its draft as inadequate under NEPA regulations. Instead, it urges the Corps to pursue a direct ocean disposal plan as suggested by the RWQCB and to work with EPA, USFWS, CDFG, and the NMFS to find an acceptable site beyond the outer continental shelf. GI-68

Respectfully submitted,

Alan Ramo
Legal Director

CBE APPENDICES ARE AVAILABLE FROM THE CORPS OF ENGINEERS, SAN FRANCISCO DISTRICT UPON REQUEST

File Name: [illegible]

[illegible]

Agency Group Individual: [illegible]
Date of Letter: [illegible]

GI-1 The Alcatraz site [illegible] material released there [illegible] the Bay via the [illegible] regime. With proper management [illegible] asset to the health of the Bay [illegible]

GI-2 The [illegible] Protection Agency [illegible] disposal site.

GI-3 See [illegible] Interior, Office of [illegible] 1987 and the response [illegible] letter, November [illegible]

The Corps of Engineers [illegible] dredged material [illegible] a dredged material disposal [illegible] resources off the [illegible] area of significant [illegible] from undue human disturbance, with [illegible] Gulf of the Farallones [illegible] received the comments [illegible] fishing interests and [illegible] disposing material [illegible] be considered. However, the [illegible] dredged material [illegible] fishery resources.

GI-4 It is stated that [illegible] that both [illegible] increasing benefit [illegible]

In response to the [illegible] formulated a project that [illegible] disposal of [illegible] change in the [illegible] been [illegible] Alcatraz disposal [illegible] condition [illegible] chemical processes supporting the growth and quantity [illegible] society have become more prolific, they have [illegible] significant synthetic by-products requiring waste management [illegible] 1987). In general, much of the wastes generated by [illegible] communities, such as the greater Bay Area and [illegible] discharged into the aquatic environment to [illegible] Wastes that are not acceptable for discharge [illegible] environment are concentrated and isolated on land [illegible] incineration. It is within this naturally [illegible] waste-impacted system that Bay dredging and disposal [illegible] placed. Based on documented studies, turbidity [illegible] from dredging and disposal operations are not [illegible] impacts have been described as being of short duration [illegible] to the dredging and disposal sites (Stern and [illegible]

The chronic and cumulative toxic problems in the Bay are [illegible] complex issue. Quantification of the stresses experienced [illegible] biotic environment from both natural processes, and [illegible] associated with the man-made environment is presently [illegible] scientific understanding. For this reason, the issues [illegible] the cumulative and toxic problems in the Bay will [illegible] considerable attention for as long as municipal, [illegible] agricultural, and non-point source discharges are allowed [illegible] contaminants into Bay waters. The redistribution of [illegible] sediments by disposal operations is an important concern [illegible] that from occurring, dredged material [illegible] tested [illegible] whether or not it is suitable for open water discharge prior [illegible] operation.

GI-6 The Corps of Engineers has considered the [illegible] and the preferences expressed by, the referenced Federal [illegible] Agencies and diverse environmental and fishing interests [illegible] the preferred alternative in the Final SEIS.

The governmental policies as described by the commenter [illegible] the position statements of the California Department of Fish and Game, National Marine Fisheries Service (See response to comment [illegible] letter dated November 9, 1987), and the U. S. Fish and Wildlife Service (See response to comments of letter dated November [illegible] (2) the "Water Quality Control Plan", San Francisco Bay Basin (2), [illegible] San Francisco Bay Region, Regional Water Quality Control Board (RWQCB); and (3) the San Francisco Bay Plan of the San Francisco Bay Conservation and Development Commission (BCDC). These institutional policies as they relate to dredged material disposal within the Bay and, in general, in the aquatic environment recognize that maritime needs are significant. Navigation is a beneficial use of the Water Quality Control Plan; Port development and small craft recreation are encouraged and promoted in the San Francisco Bay Plan; the reference attached as Appendix D from the Department of Fish and Game clearly states that regional ports and navigational channels must be dredged to compete in the world marketplace.

The responsible agencies have expressed, in part, [illegible] preferences related to alternatives that may be available, feasible, and practicable. The U. S. Fish and Wildlife Service has stated, as

Turbidity and suspended sediment loading are natural phenomena of the estuary. Within this natural system of high sediment loading, the disposal activities are added. The turbidity and suspended sediment added to the water column from disposal activities are considered small both in duration and in cumulative effects.

V. Sediment transport is discussed in Section 3.3.3 of the Final SEIS.

VI. There is an adequate base of available information to make reasoned determinations regarding the effects of dredged material disposal at the Alcatraz and ocean sites. This does not imply that no additional information is needed to provide a better understanding of outstanding concerns as were raised related to the Bay ecosystem as a whole. Efforts to obtain up-to-date information and understand specific complex interactions of human activities and natural processes of the Bay are now underway (e.g., recently completed state Bay-Delta hearings and related EPA's San Francisco Estuary Project).

GI-9 See response to GI-5 and GI-8.

GI-10 See response to F-18, Environmental Protection Agency, December 7, 1987. The claim contained in the comment that the bioassays were "unnecessarily limited" indicates a mistaken view of the purpose of the test requirements. These tests are indicators of potential for ecological effect. The tests do not reflect the actual response of marine organisms in the field. The misinterpretation of data as indicated in the comment implies a narrow view of the purpose of analyzing the ecological tests. For further discussion please see response to comment GI-8 (III).

GI-11 I. See responses to comments F-3 and F-9, Department of Commerce, NOAA National Marine Fisheries Service letter, October 28, 1987.

II. The Corps of Engineers disagrees with the need to prepare a new Draft SEIS. The purpose of the Draft SEIS is to receive comments in preparation of a final document. Further clarification of major areas has been provided and elaboration of key issues has also been included in the Final SEIS.

GI-12 The policy that is referred to by the commenter is described in the "Water Quality Control Plan", San Francisco Bay Basin (II) under toxicity in the section on Water Quality Objectives. The policy relates to concentrations of toxic substances in the receiving waters. Such objectives are reasonable and can be controlled to reduce toxic inputs to Bay waters as demonstrated by the referenced example of the Chevron refinery. Such objectives have not been directly applied to estuarine sediments which also receive contaminants.

The implementation policy related to dredged material disposal recognizes the complexities associated with contaminated sediments and that an in-depth examination of at least two years duration is needed. In the meantime, interim requirements have been identified

(1) Analyses of sediments for specified contaminants including

PCB's and pesticides

(2) Bioassays as specified by the Board, and

(3) Identification of costs of ocean and upland disposal compared

to proposed disposal options.

The above data have been obtained by the Corps of Engineers and the Port of Oakland.

GI-13 See response to comment GI-5. Inspection of the quoted source also recognizes the inconclusiveness of available information and recommends further investigation to resolve the problem. A complete inventory of contaminant sources cannot identify the complexities and the magnitude of the contamination problem. For example, even existing municipal and industrial effluent, which are point-source controlled, are indicated as requiring an analysis of cumulative effects. Another major contributor of contaminants includes urban runoff which is uncontrolled but is only now being examined by RWQCB. Contaminants associated with dredged materials are less available to the ecosystem than are those contributed by urban runoff (Gunther et al., 1987; USACE, 1975, DEIS, Appendix H). The amount of material placed into suspension by disposal compared to the overall Bay-wide sedimentation process is small. The extent of toxic effects from disposal is a small portion of the total problem.

GI-14 Comment noted. Contaminants found in San Francisco Bay waters are potentially accessible to marine organisms. The degree of accessibility will vary depending upon the particular contaminant and its available chemical form, the individual organism, and the environmental conditions (i.e., water temperature, salinity, pH, etc.). Contaminant distribution and effects, therefore, cannot be attributable to a single factor. Any attempt to specify in simple terms the cause of contaminant degradation of the Bay will fail because it must include complex interactions beyond source to include: (1) water diversions (e.g., the loss of freshwater flushing action to the Bay during runoff months and diminished freshwater flows during the summer months); (2) meteorological conditions (e.g., major shifts of rainfall and/or periodicity of abnormal rainfall, and wind-wave generated mixing of surface waters); and (3) ecological adaptations in response to physical/chemical/biological conditions wrought by human activities and natural estuarine processes.

GI-15 The commentator is reminded that this project was also congressionally authorized. Furthermore, the Corps has complied with the policies of the Clean Water Act as it relates to disposal of dredge material by complying with Federal criteria for determining the acceptability of the material for disposal in the Bay or Ocean. In Bay disposal also requires water quality certification from the Regional Water Quality Control Board.

GI-16 See response to GI-6.

GI-17 Cumulative impacts have been considered (see SEIS, Section 4.5). Cumulative increases in turbidity within the natural system have been described as insignificant because it is an established fact that San Francisco Bay is a naturally turbid estuary with an enormous suspended sediment load in its waters. Contamination of marine sediments in San Francisco Bay is of concern. Largely through the efforts of RWQCB and EPA pursuant to the Clean Water Act, Bay water quality has greatly improved over the conditions existing during the years prior to the 1970's. However, there are growing concerns related to sediment contamination. It is inescapable that where there is a preponderance of human activities, contamination will occur. The sequence of identifying the magnitude of cumulative contamination, its risks and controlling it, as much as possible, is a part of the management strategy devised by the referenced laws to better effect improved water quality.

GI-18 The statements by the California Department of Fish and Game representatives, contained in two cited appendices, express concerns related to several aspects of possible lethal and sublethal effects of dredged material disposal. Both statements, however, recognize the complexities of marine sediment contamination and the benefits of maritime needs for dredging. See responses to comments GI-19 through GI-23 for additional discussion of specific expressed concerns.

GI-19 The statement is that deposition of spoil can have adverse impacts. However, disposal of dredged material at the Alcatraz site will not have a measurable effect on habitat, wetlands or wildlife resources as discussed in the SEIS, Section 4.

GI-20 I. This is another statement of what can occur; not what does occur at Alcatraz. Fish mortalities can be measured when performing laboratory tests with dredged material. Fish kills can be observed in the field during disposal operations or potential mortality can be predicted where either limited habitat exists in the disposal area or there are species known to be sensitive to physical effects. Direct translation of laboratory tests to actual field conditions is not appropriate (see response to comments GI-8(III), GI-10 and GI-24). No fish kills have been observed at the Alcatraz disposal site during previous disposal activities. Although angling in the vicinity of the site is known to occur, limited habitat in the vicinity of the Alcatraz site has not been a problem through its use. The tidal influences at the site and the available area do not restrict circulation or exchange of water.

II. Disposal of contaminated sediments to the aquatic environment can contribute to [illegible] consumption. The degree to which this effect may occur and be attributed to dredged material must be placed into perspective. [illegible] are more readily available to marine organisms from the aqueous medium than from similar constituents associated with sediment particles. Potential for dredged material to release pollutants to the water column in significant amounts has been shown to be small based on the historic data base of "shake and settle" tests (elutriate test) required for regulatory approval and as contained in national statutory water quality regulations.

GI-21 Please refer to Section 3.3.4, of the Final SEIS.

GI-22 Effluent discharges and uncontrolled contaminant inputs distribute contaminants into the water column and are subsequently removed by particulates, principally sediments. These suspended sediments with their associated contaminants in the Bay's active sediment regime will then spread within the system naturally. They deposit throughout the Bay system, some in navigation channels. This material must be removed by periodic dredging. However, no material is dredged until it has been tested and its potential for significant adverse effects determined.

GI-23 Individual bottom and swimming organisms and individual contaminant forms will reflect varying capabilities of scavenging and stripping (Hirsch, et al; 1978). In addition, soluble contaminants are accessible to marine organisms directly from the aquatic environment through respiratory or external body surfaces (Wright, 1978). The varying extent of uptake by organisms and availability of contaminants must be considered when assessing potential for impacts. It is also stated in the referenced Appendix B that "The first step to protect fish and wildlife resources is to insure that discharges to the Bay system are adequately treated to prevent the addition of bioaccumulative substances". This is the reason that testing is conducted on material prior to its excavation to determine the potential for bioaccumulation.

GI-24 As discussed earlier in GI-8(III), bulk chemical sediment analyses are not good indicators of potential for environmental effects. Secondly, the report referred to, and attached as Appendix E to this commenting letter, presents an overly simple view of marine sediment contamination and uses unverified numerical criteria as a measure of "sediment toxicity" in San Francisco Bay.

GI-25 See response to comments GI-23 and GI-24.

GI-26 Comment noted.

GI-27 These issues are addressed in Appendix A.

GI-28 Scientists of the Aquatic Habitat Institute (AHI [illegible] et al, 1987) [illegible] agree with the assessment that dredged [illegible] major source of contaminants to the Bay Delta system. [illegible] AHI and the [illegible] the contribution [illegible] [illegible] and waste [illegible] Appendix A [illegible]

GI-29 The statement appears to be conjecture based on data not available to the Corps. The Corps would appreciate an opportunity to review the referenced data.

GI-30 See SEIS, section 3.3.3, for a presentation of sediment transport in San Francisco Bay. Bio-availability of toxicants attached to lithogenous Bay sediments is presented in Brannon et al. (1975), Bricker (1974), and Lee and Plumb (1978), and others previously cited.

GI-31 Appendix A discusses the testing that was performed on material from Oakland Harbor. The unrestricted disposal and dispersal of the material in the Bay (with the exception of material from Schnitzer Steel and Alameda Gateway) will not result in unacceptable toxicity or bioaccumulation.

GI-32 Appendix A has been modified to include a discussion of this topic. In making these estimates of the percentage of contaminants that are bioavailable, Dr. Segar has assumed that only the lattice-bound fraction is non-bioavailable. As discussed in Appendix A, a much larger fraction of these contaminants may be unavailable for uptake by organisms.

GI-33 See SEIS, sections 3.3.3, 3.3.4, [illegible] and [illegible]

GI-34 The Corps has reviewed all available data and has conducted its own studies. To this point, no significant adverse effects have been identified.

GI-35 See response to comments GI-23, GI-[illegible] and [illegible]

GI-36 The portion of the dredged material discharged at the site but not retained in the vicinity of it, is likely to be widely distributed within the entire Bay and the ocean [illegible] of the Tiburon Center for Environmental Studies [illegible] distribution of sediments from the disposal site in comment [illegible] above. Any specific location in the Bay apt to [illegible] sediments at a significant rate, is likely to have [illegible] equilibrium long before the present and would not [illegible] accumulate sediments. Additionally, the scientists [illegible] Habitat Institute do not agree that dredged material [illegible] source of contaminants in the Bay (Gunther et al. [illegible]) they overstate the contribution of dredged material [illegible] loading by omitting from their calculations the material [illegible] naturally by wind generated waves and strong [illegible] currents, and by counting the total amount of [illegible] discharged at disposal sites instead of the percent of [illegible] material dispersed from the sites.

GI-37 [illegible] addressed in Section [illegible] of the [illegible] addressed in [illegible]

[illegible]

environment (the NED plan) unless the Secretary of a Department or head of an independent agency grants an exception to [illegible] plan recommended in the GDM is the National Economic [illegible] (NED) plan. The basic objective of the proposed [illegible] to reduce the cost to the Nation of cargo movements [illegible] of Oakland, thus reducing the cost of goods [illegible] increasing the competitiveness of exports. [illegible] which would result from alterations to the plan [illegible] GDM would result in increased costs not only to the [illegible] but to the nation as a whole [illegible] consumers of products shipped [illegible]

GI-47 It has been determined that [illegible] material disposal site beyond the edge of the [illegible] not feasible. Please see Section 2.4 [illegible] Appendix F of the Final EIS [illegible] within the limits of the [illegible] National Marine [illegible] "only site that has been [illegible]" [illegible] of the Final EIS.

GI-48 The study [illegible] prepared by [illegible] was [illegible] Final EIS has been corrected [illegible] [illegible] Appendix [illegible]

GI-49 The Final EIS has been corrected to reflect [illegible] the [illegible] Section 2.4.4 [illegible]

GI-50 Refer to [illegible] of the Final EIS [illegible] monitoring program [illegible] other issues with respect [illegible] appendix to the Final EIS [illegible] Appendix [illegible]

GI-51 The [illegible] separately [illegible] appropriate [illegible] of the [illegible] GI-49 above.

GI-52 [illegible] Appendix [illegible]

GI-53 [illegible]

GI-54 [illegible] 2.4.4 and [illegible]

GI-55 The [illegible] and [illegible] transportation [illegible]

GI-56 [illegible] environmental [illegible]

Alcatraz site, though a known pelagic fishing [illegible] frequently during the year for the majority [illegible] fish resources are not directly [illegible] Alcatraz site be [illegible] disposal related turbidity [illegible] nature [illegible] distribution and abundance [illegible] influenced by changes in salinity related to [illegible] by [illegible] and [illegible] note that the Bay experienced extreme [illegible] salinity [illegible]

The subtidal [illegible] frequently [illegible] species [illegible] fishery [illegible] turbidity [illegible]

(2) [illegible] fish resources from [illegible] the disposal site [illegible] sediment [illegible] condition where fish are not able to escape [illegible] suspended sediment [illegible] which the Alcatraz site has been used for [illegible] disposal [illegible] With the exception [illegible] the [illegible] site [illegible] disposal site. It is expected that [illegible] from the area. The presence of [illegible] with dredged material may attract [illegible] their [illegible] water column.

[illegible] sediments [illegible] the Bay [illegible] the Bay ecosystem [illegible] and [illegible] [illegible]

GI-63 Various dredging methods are discussed in Section 4.2.1, of the Final SEIS. Impacts of dredged material disposal as they relate to turbidity are discussed in Section 4.3, of the Final SEIS.

GI-64 The portion of dredged material returning to navigation channels and requiring dredging is insignificant in light of the sediment regime of San Francisco Bay. See Final SEIS, Section 3.1.1

GI-65 The Corps of Engineers is undertaking a Dredge Material Disposal Management Plan (DMP) which is investigating the impacts, especially on Alcatraz, of all existing and proposed dredging in the Bay external to the scope of the Oakland Harbor project. Cumulative impacts are discussed in the Final SEIS in Section 4.5

GI-66 Comment noted. The selected alternative has been reviewed in context with the appropriate laws and regulations.

GI-67 Comment noted.

GI-68 Comment noted. An ocean disposal site beyond the outer continental shelf is not considered feasible (see SEIS, Appendix F).

MOSS LANDING
Commercial Fishermen's Association

P.O. BOX 44
Moss Landing, California 95039

November 6, 1987

Colonel Galen H. Yanagihara
U.S. Department of the Army
Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Dear Colonel Yanagihara:

In response to the Draft Supplement 1 to the Environmental Impact Statement to the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements, we are adamantly opposed to the proposed dredging and refilling of the Alcatraz disposal site due to potential impacts on marine life and potential adverse impacts on the general ecology of the area. Similar concerns cause us to oppose all the proposed ocean disposal sites. In addition, none of the alternative disposal sites meet the criteria of 40 CFR 228.5.

As commercial fishermen who are deeply dependent on the resources of the Gulf of the Farrolones and the San Francisco Bay and Delta we recommend that no disposal of dredge spoils be allowed inside the 1000 fathom curve. We believe that this will allow compliance with 40 CFR 228.5. GI-1 Finally, we believe that deleting any disposal sites which are outside the U.S.C.G. vessel monitoring radar net is a short sighted approach which results in immediate economic benefit but which will be deleterious in the long run. GI-2 Any ocean dumping site will set a precedent for dredge spoils disposal and thus it is very important to keep these sites out of important fisheries areas.

Sincerely,

Don Fairchild

Don Fairchild
President, Moss Landing Commercial Fishermen's Association

cc: R. Tasto, CDFG-Menlo Park
J. Bybee, NMFS-Santa Rosa
Hon. Sam Farr
Hon. Leon Panetta
Hon. Henry Mello
PCFFA

File Name: CFA11-6-87 Comment Categories: 3

RESPONSE TO COMMENTS

Agency/Group/Individual: COMMERCIAL FISHERMEN'S ASSOCIATION, MOSS LANDING, CA.

Date of Letter: November 6, 1987

GI-1. Comment noted. See response to comment F-29, Environmental Protection Agency letter, December 7, 1987.

GI-2. Comment noted. See response to comment GI-3, Citizens for a Better Environment letter, November 20, 1987.

Golden Gate Audubon Society

A Chapter of the National Audubon Society
Serving San Francisco and Parts of Alameda and Contra Costa Counties

November 18, 1987

Colonel Galen H. Yanagihara, District Engineer
US Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Dear Colonel Yanagihara:

The Golden Gate Audubon Society must regretfully oppose the dredging and disposal site elements of the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements. We do this because of the very real impacts these procedures will have on fisheries and wildlife of the Bay and the Farallones National Marine Sanctuary.

GI-1

We understand that much of the sediment in the proposed dredge sites is heavily contaminated with petroleum products, heavy metals, and possibly other toxic substances. Citizens For A Better Environment have listed this area as one of the Bay's "toxic hot spots". Your sediment testing and bioassay (that is from the [illegible]) has shown that there is a contaminant load in the sediments that is fatal to the test organisms. The fact that fewer than 50% died does not indicate a healthy environment.

GI-2

Our concern is that this contaminated sediment will be either distributed throughout the Bay as a result of using the Alcatraz dump site (it is known that much of dredge spoils deposited there find there way back into the Bay) and because the [illegible] method of dredging creates a fine spoil that is easily spread.

GI-3

We are also concerned that the deposition of these spoils only [illegible] nautical miles from the Farallones National Marine Sanctuary could have serious impacts. The incident of the Puerto Rico and its oil has clearly shown us that predicting the flow of ocean currents is still not a science. There is no guarantee that these spoils will not enter the Sanctuary and contaminate the many species that live or

GI-4

feed in these waters. In this regard, we question why the ocean disposal site is being located so close to shore, so completely on the Continental shelf, when the [illegible] Act states that such dumping should take place [illegible] Continental Shelf. We understand that on the East Coast dumping takes place over 100 miles from the Coast of New York. Surely, if it can be done there it can also be done here. Its simply unconscionable to have the dump site [illegible] so close to such an important marine natural resource [illegible] a National Marine Sanctuary.

GI-5

One last issue is turbidity. The Bay is already [illegible] with sediment load. This huge amount of [illegible] increase this problem with a [illegible] impact on [illegible] organisms such as phytoplankton that are dependent [illegible]. It is known that our Bay has a much lower level of primary productivity than other similar estuaries. [illegible] could be a serious contributor to this unfortunate [illegible].

GI-6

In closing, we urge you to find an alternative [illegible] dredging and spoil disposal plans [illegible] Notice. Thank you.

Sincerely yours,

[illegible]

[illegible]

File Name: GGAS11-18-87 Comment Category [illegible]
2, 3, 4

RESPONSE TO COMMENTS

Agency/Group/Individual: GOLDEN GATE AU[illegible]
BERKELEY, CA

Date of Letter: November 1[illegible], 1987

GI-1. Refer to response to comment [illegible] November 24, 1987.

GI-2 Appendix A contains an expanded discussion of [illegible] and the basis of the Corps of Engineers' determination [illegible] of material from Oakland Harbor will not result [illegible] toxicity or bioaccumulation. However, [illegible] results [illegible] indicate that sediment from [illegible] and [illegible] shipyard) may contain elevated concentrations of [illegible] (See Appendix A).

GI-3 The fate of dredged material discharged at [illegible] is addressed in Section [illegible] of the Final [illegible] slurry method of dredging [illegible]

GI-4 The proposed dredged material [illegible] sufficiently removed from the [illegible] of the [illegible] Sanctuary that the effects of dredged [illegible] ambient levels or [illegible]

GI-5 The Ocean Dumping Act [illegible] place beyond the [illegible] feasibility of [illegible] Appendix [illegible]. The [illegible] and from [illegible] is for sewage sludge.

GI-6 [illegible] the Final [illegible]

GOLDEN GATE FISHERMEN'S ASSOCIATION

Representing Commercial Passenger Fishing
and Marine Recreational Anglers

OFFICERS

Roger Thomas
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Larry Teixeira

San Francisco
Craig Hanson
Sam ...
Bill Mattlin

Santa Cruz
Jack A. Foran

GI 1

Thank you,

Jim Robertson
Secretary

AD-A191 294 OAKLAND HARBOR DEEP-DRAFT NAVIGATION IMPROVEMENTS DESIGN MEMORANDUM NUMBE..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT MAR 88 10/11

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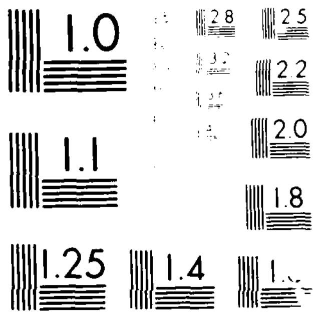
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DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

October 20, 1987

Environmental Branch

NOTICE OF PUBLIC MEETING

OAKLAND OUTER AND INNER HARBORS
DEEP-DRAFT NAVIGATION IMPROVEMENTS
ALAMEDA COUNTY, CALIFORNIA
AND
INTENT TO USE AN OCEAN DISPOSAL SITE

The U. S. Army Corps of Engineers, San Francisco District has distributed the Draft Design Memorandum Number 1 and Draft Supplement 1 to the Environmental Impact Statement (SEIS) for Oakland Outer and Inner Harbors, Deep-Draft Navigation Improvements, Alameda County, California. A Notice of Availability of the Draft SEIS was circulated by letter dated September 23, 1987.

Attached with this Notice is a statement of the U. S. Army Corps of Engineers, San Francisco District intent to use an ocean disposal site for the disposal of material dredged from the Alcatraz disposal site, San Francisco Bay as part of the Deep-Draft Navigation Improvements for Oakland Outer and Inner Harbors, Alameda County, California (Enclosure).

It has been determined that a public meeting to address concerns related to the Draft SEIS for the Oakland Harbor project and the intent to use an ocean disposal site for dredged material will be held. The public meeting has been scheduled as follows:

PUBLIC MEETING

DATE: Thursday, November 5, 1987 -- 7:30 P.M.

PLACE: U. S. Army Corps of Engineers, Bay Model

LOCATION: 2100 Bridgeway
Sausalito, California 94965-1753

Information related to either the Draft SEIS or the Intent to Use the Ocean Disposal Site may be obtained by contacting Mr. Brian Walls (415) 974-0444 of the Corps of Engineers.

Galen H. Yanagihara
Galen H. Yanagihara
Colonel, Corps of Engineers
District Engineer

Enclosure

File Name: CGFA11-9-87 Comment Categories: 3

RESPONSE TO COMMENTS

Agency/Group/Individual: GOLDEN GATE FISHERMEN'S ASSOCIATION
Date of Letter: November 9, 1987

GI-1 The concerns of the commenter are appreciated. The benefits to be derived from the authorized project are not only attributable to the Port of Oakland. The federal dollars invested in the project will benefit the general public. Dredged material disposal in the aquatic environment sometimes results in impacts to marine resources. In the case of this project, the material from Oakland Harbor (with the exception of sediments from near Schnitzer Steel and Alameda Gateway) has been tested and found to be acceptable for open water disposal. This does not mean that there will be no negative effects. However, these effects are expected to be of relatively small magnitude within an active estuarine environment. Fish resources are highly variable by nature in both population and distribution and, in San Francisco Bay, are affected by other activities of much greater significance (i.e. water diversions from the Delta, etc.).

Golden Gate Ports Association

2201 West Washington, P.O. 2089, Stockton, California 95201 • (209) 946-0246

December 8, 1987

Colonel Galen H. Yanagihara
District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Re: Oakland Outer and Inner Harbors
Deep-Draft Navigation Improvements

Dear Sir:

The golden Gate Ports Association represents the public ports of Oakland, Redwood City, Richmond, Sacramento, San Francisco, and Stockton; it is a cooperating entity that promotes the entire region through jointly sponsored activities.

A recent study prepared for the Association shows that 59 million revenue tons of waterborne cargo pass through this region in a year; these cargoes generate $3 billion in sales transactions and $1.7 billion in the regional gross product. The maritime industry contributes 45,000 jobs toward regional employment plus another 32,000 jobs attributable to support of the maritime trade. Fifteen thousand of the maritime jobs are generated by the cargoes handled in containers. Therefore it is important to the region that adequate channel depths be maintained to handle those vessels of the world fleet that are being developed for Pacific trade.

GI-1

The proposals for improvements at the Port of Oakland suggested in the referenced document therefore are a significant and necessary addition to the Association's regional assets.

At your recent hearing on this project there were many comments on the proposals for dredging and dredged material disposal. It is the Association's position that the greatest expertise in these matters resides in the Corps of Engineers. This expertise is based on many years of experience across the country by elements of the Corps and on the concentrated studies of the past ten years on the environmental aspects of dredging operations. Although it may not be apparent that the alternatives considered, nor that the one selected in the report, will represent the best choice when construction begins, it is clear that the Corps will chose the optimum course of action considering environmental and economical factors.

GI-2

Oakland • Redwood City • Richmond • Sacramento • San Francisco • Stockton

Colonel Galen H. Yanagihara
December 8, 1987
Page 2

The Association therefore urges the San Francisco District to move forward with this project in order to complete the early phases to meet the time schedules required by the shipping lines and the Port of Oakland.

The Association is prepared to assist in any way to promote the projects of its member ports in order to enhance their capabilities to continue to provide an important component of regional economic well-being.

If additional information is required, please contact me.

Sincerely,

GOLDEN GATE PORTS ASSOCIATION

Frank C. Boerger

Frank C. Boerger,
Consultant

HELLER, EHRMAN, WHITE & McAULIFFE
ATTORNEYS

333 BUSH STREET SAN FRANCISCO, CALIFORNIA 94104 2878

November 20, 1987

Galen M. Yanagihara, District Engineer
U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, California 94105-1905

Draft Supplement 1 to the Environmental Impact Statement for *the Oakland Outer and Inner Harbors* Deep Draft Navigation Improvements

Dear Colonel Yanagihara:

On behalf of Citizens for a Better Environment, our client, we hereby challenge the legal adequacy and substantive merit of the proposal to dump seven million cubic yards of contaminated dredge spoils into San Francisco Bay.

Both Congress and common sense compel the conclusion that one should not clean out the Augean Stables by dumping the waste into the palace swimming pool. Rather, specific statutory mandates and the National Environmental Policy Act ("NEPA") require profound consideration of a disposal site off the Outer Continental Shelf.

These comments on the Draft Supplement 1 to the Environmental Impact Statement for the Oakland Outer and Inner Harbors Deep Draft Navigation Improvements, dated September, 1987

("Draft SEIS") supplement separate comments submitted directly by Citizens for a Better Environment ("CBE").[1] We submit these separate comments to expand on some of CBE's comments from a legal perspective. For brevity, our comments refer to and incorporate by reference comments submitted on the Draft SEIS by CBE and others.

The Port of Oakland, abetted by the U.S. Army Corps of Engineers ("the Corps"), plans to dredge seven million cubic yards of sediment from Oakland Harbor and to dump these dredge spoils in the middle of the Bay, near Alcatraz Island. <u>These spoils are contaminated by toxic wastes previously disposed in or near the Bay</u>. GI-1 Much or most of these spoils, which will be dumped in slurry form at both ebb and flood tides, will be dispersed and redeposited in the Bay, adding to future dredging requirements. <u>Most importantly, toxic sediments that now lie relatively undisturbed at the bottom of the Bay will be put into suspension and distributed throughout the Bay</u>. GI-2

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1 The deadline for submission of comments on the Draft SEIS was extended at the November 5, 1987 public hearing from November 9 to November 20, 1987.

We expect that separate comments will be submitted later on behalf of CBE on the draft Environmental Impact Report ("EIR") prepared for the same project pursuant to the California Environmental Quality Act (Pub. Res. Code §§ 21000-21177).

There is substantial evidence that the additional turbidity and toxic loading that will result from the planned disposal at Alcatraz will have significant adverse effects on the already-stressed Bay ecosystem. The National Marine Fisheries Service has already reported toxic burdens in the food chain of San Francisco Bay that are capable of reducing the resource to stunted, sterile, and dying fish. See CBE's separate comments (Nov. 20, 1987), p. 6. The substantial basis for concern over the severely stressed health of the Bay results from findings such as the discovery that Bay mussels have the highest concentrations of mercury, cadmium, copper and silver of any bay mussels in California. CBE Comments, Appendix A, "Pollutants in the Bay-Delta Estuary," p. 3. **GI-3** **GI-4**

Even apart from the legal issues discussed below, the selected alternative offends common sense. Certainly no other governmental entity in this decade has gambled so much in reliance on the long discredited view that "the solution to pollution is dilution." The sole justification for such fouling of our collective nest is that it is cheaper to do so. But the Port of Oakland should not gain by imposing large economic and environmental losses on other Bay users, including recreational and commercial fishing people. This result would violate common notions both of fairness and of ecological good housekeeping. **GI-5**

We outline below some of the legal problems with the Draft SEIS and its selected alternative.[2] In particular, we focus on (1) the NEPA violation inherent in not evaluating a deep ocean disposal site, (2) the numerous inadequacies in the Draft SEIS' evaluation of the impacts from dumping at the Alcatraz site, and (3) the violation of applicable ocean dumping criteria inherent in the selection of the shallow ocean disposal site. We encourage the Corps to redo its analysis and to select an appropriate deep ocean site for disposal of Oakland Harbor dredge spoils. **GI-6** **GI-7** **GI-8**

I. The Draft SEIS Fails to Consider A Deep-Ocean Alternative

Probably the clearest flaw in the Draft SEIS is the failure to "[r]igorously explore and objectively evaluate all reasonable alternatives," as required by 40 C.F.R. § 1502.14(a). Evaluating a reasonable range of alternatives "is the heart of the environmental impact statement," since doing so provides the basis for choice among options by the decisionmaker and the public. See 40 C.F.R. § 1502.14(b).

The Corps has unreasonably excluded from consideration the alternative of dumping dredge spoils at any site beyond the outer continental shelf ("OCS"). Evaluation of one or more ocean disposal sites with depths of over 100 fathoms or more (considered **GI-9**

2 The separate comments of CBE raise a number of important legal issues not addressed here.

to be beyond the OCS; also referred to here as "deep ocean sites") is required by the Marine Protection, Research, and Sanctuaries Act of 1972 ("MPRSA"). As discussed below, evaluation of deep ocean sites has been demanded repeatedly by state and federal agencies responsible for wildlife; was recommended by the Corps' own contractor; and should not be prematurely cut off by the Corps' result oriented rationalization based on the reach of the U.S. Coast Guard's marine radar system. Therefore, the Draft SEIS must be revised and recirculated with a full analysis of one or more disposal sites beyond the OCS.

A deep ocean site is a "reasonable alternative" that must be evaluated, and failure to consider one or more deep ocean sites is clearly unreasonable. The Corps seems to recognize that an ocean disposal site must be located beyond the edge of the OCS "wherever feasible," pursuant to Section 103 of MPRSA and regulations promulgated thereunder (see discussion at III, below). Draft SEIS pp. 12, 16. In addition, the Corps was urged well before the preparation of the Draft SEIS to consider a deep ocean site by the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the National Marine Fisheries Service, as these agencies fulfilled their consultation responsibilities under NEPA, the Fish and Wildlife Coordination Act, and other authorities. Draft SEIS, Appendix B. In light of the statutory mandate of MPRSA and comments by responsible GI-9

agencies, a deep ocean site clearly is a fundamentally important alternative that must be fully evaluated in a Draft SEIS.

The Corps' rationale for excluding deep ocean alternatives is so unsupported as to seem pretextual. The Corps notes that the vessel traffic service radar net operated by the U.S. Coast Guard enables reasonable surveillance of vessels up to 24 nautical miles from Pt. Bonita, and states that corroboration of dumping only at the designated site "would be most easily accomplished" by using the radar net. Draft SEIS p. 21. The Corps states elsewhere that "any sites beyond the radar coverage has [sic] been considered infeasible." Draft SEIS p. 16. However, the Corps' own contractor concluded in its final report that: GI-9

> Although . . . vessel surveillance will be more difficult outside the USCG's radar range, there are no unmitigated restrictions upon the ZSF [Zone of Siting Feasibility] due to operational factors.

Tetra Tech, Inc., Zone of Siting Feasibility Analysis, San Francisco Dredged Material Ocean Disposal Site Evaluation Final Report (July 20, 1987) p. 2 4. The contractor also noted that "other methods of barge location (and perhaps vessel draft monitoring) . . . are now in operation in New York [illegible] and associated disposal sites." Id. (Citations omitted) [illegible] separate comments include corroboration of the latter [illegible], the Oceanic Society, and by Dr. Douglas Segar. Similarly, the recent comments by the Southwest Region of the National Marine Fisheries Service ("NMFS") state "[w]e question the decision to eliminate a deepwater site from consideration if it is beyond the U.S. Coast Guard's Vessel Tracking System," noting that fishing and shipping vessel activity beyond that radar system is routine. Letter from E. C. Fullerton, Regional Director, to Colonel Galen H. Yanagihara, District Engineer (Oct. 28, 1987), p. 3.

GI-9

Unless and until the Corps can demonstrate that disposal beyond the radar net is infeasible, disposal at a deep ocean site is an important, obvious, and reasonable alternative, which therefore deserves full ventilation in a Draft SEIS. It is possible, though it seems unlikely, that the Corps ultimately could justify a decision to exclude deep ocean sites, after a full evaluation of deep ocean and other alternatives was subjected to public comment through the NEPA process. But to hide deep ocean alternatives from public examination, as the Corps has done, is unjustifiable. A new Draft SEIS must be prepared that includes one or more deep ocean disposal sites among the evaluated alternatives.

II The Draft SEIS Fails to Adequately Discuss the Impacts of Predredging and Disposal at Alcatraz

The Draft SEIS seriously understates the potential adverse impacts of the proposed predredging and disposal at Alcatraz. Comments submitted by CBE and others explain why major

adverse impacts are expected or possible, and why the Draft SEIS should have provided more information on and analysis of these possibilities. Our discussion below re-presents some of those arguments in a format designed to emphasize how the Corps' analysis fails to comply with applicable NEPA requirements. In particular, we discuss the failure of the EIS (1) to adequately evaluate certain direct impacts of the disposal at Alcatraz, namely the toxicity of the disposed material and the increase in turbidity; (2) to adequately consider *the significance of the additional toxic* loading and turbidity in light of other pollution inputs to the Bay; (3) to adequately consider economic and social impacts that may result; and (4) to properly evaluate the above and related issues in light of incomplete information.

GI-10

A. Flawed Evaluation of Toxicity and Increased Turbidity

CBE's separate comments include correspondence from The Oceanic Society and from Dr. Douglas A. Segar that criticize the design and interpretation of various tests performed by the Corps on sediment samples taken from Oakland Harbor. These tests included analysis for certain constituent concentrations, elutriate testing, and bioaccumulation and bioassay experiments using a few test species. The above comments, which we adopt and incorporate by reference, note that the evidence presented in the SEIS (1) indicates that the Oakland Harbor sediments have elevated

GI-11

concentrations of toxic constituents, but (2) fails to support the Corps' stated conclusions that no unacceptable adverse impacts due to toxicity or bioaccumulation *would occur to benthic organisms or* in the water column from dumping these sediments near Alcatraz.[3] Similarly, comments by CBE and numerous others challenge the Corps' assertions that the increase in turbidity will be limited and not have significant adverse effects. See discussion at II. B., below. GI-11

The Corps has a duty to respond in detail to these substantial and credible comments. See 40 C.F.R. § 1503.4; 33 C.F.R. § 230.19(c). It seems unavoidable that a legally sufficient response to such comments would necessarily include such extensive additional information or analysis[4] that another supplemental EIS would be required, to permit full public review of such important additional material. GI-12

B. *Inadequate Consideration of Cumulative Impacts*

Applicable NEPA regulations require that the description of the effects of a proposed action and alternatives include consideration of cumulative impacts. 40 C.F.R. §§ 1502.16, 1508.8. "Cumulative impact" is defined as the environmental impact resulting from "the incremental impact of the action when added to GI-13

3 See Draft SEIS, pp. 64-69.

4 See the discussion at II.B., below, regarding the type of analysis required when actual data is lacking regarding a reasonably foreseeable adverse impact.

other past, present, and reasonably foreseeable future actions . . . ." 40 C.F.R. § 1508.7. The "synergistic impact of the project should be taken into account" in light of impacts from other projects. Oregon Natural Resources Council v. Marsh, 820 F.2d 1051, 1060 (9th Cir. 1987) (holding inadequate the EIS *evaluation of increased* turbidity expected from construction of a dam, due to failure of the EIS to consider turbidity effects of other dams).

GI-13

The Corps' inadequate evaluation of potential impacts from increased turbidity and toxic loading can be viewed in part as a failure to adequately consider cumulative impacts. The Draft SEIS *considers to a* limited extent the cumulative impact in light of other disposal activities at the Alcatraz site, noting that up to ten million cubic yards ("c.y.") of material could be discharged at "a Bay disposal site" per year in the next five years. Draft SEIS, p. 46. However, the Corps' conclusion that the resulting addition of approximately seven million c.y. of suspended solids per year to the Bay "is of minor significance" (Id.) is based on an *overly simplistic analysis*. The Corps reasons that because seven million c.y. is only four percent of the quantity of sediment estimated to be resuspended by waves and current each year, this additional load will not have *significant effects*. (Id.). As discussed in comments by CBE and others, this simplistic analysis fails to take into account (1) the recent declines in Bay fisheries, (2) the possibility that turbidity already may be a biologically limiting factor, (3) the fact that the additional four percent suspended solids may be distributed very differently from the naturally occurring resuspension, which is primarily in shallow areas, (4) the other human stresses ~~on the Bay~~ ecosystem, and (5) the possibility (resulting from the above factors) that the increase in suspended solids will have a direct and perhaps even a disproportionately large adverse effect on fisheries and other aspects of the Bay ecosystem. GI-13

The Corps' evaluation of the toxicity of the Oakland Harbor sediments is similarly flawed. For example, the Corps discounts the results of elutriate testing by relying on dilution of contaminants that will be released from the particles. Draft SEIS, p. 64. Whether or not this is a proper way to evaluate compliance with water quality standards, the Corps' analysis gives no recognition of the toxic stresses already placed on the Bay by a variety of causes. The Corps in its evaluation "must consider the area as it finds it" (Oregon Natural Resources Council v. Marsh, supra, at 1000), not assume a pristine environment that may be more resilient than an already stressed ecosystem. GI-14

To correct these flaws, the Corps should prepare a new draft SEIS that adequately considers other impacts on the Bay when GI-15

evaluating the possible effects of the proposed dumping at Alcatraz.

C. Inadequate Consideration of Economic and Social Impacts

The effects of a proposed action and alternatives that an environmental impact statement ("EIS") must discuss include economic and social effects. 40 C.F.R. §§ 1502.16, 1508.8. The Draft SEIS discussion of economic and social impacts is seriously inadequate. The discussion of present conditions states only that commercial and recreational fishing in the Bay is "highly variable," due to natural and man-related activities. Draft SEIS, p. 75. With regard to the potential impact on sport and commercial fishing of dredging and disposal at Alcatraz, the Draft SEIS states only that "[f]ishing at the vicinity of the site would be limited *during the period of dredging and disposal.*" Draft SEIS, p. 76. As discussed below, this terse presentation is inadequate to ventilate the major adverse economic and social impacts threatened by the Corps' selected alternative. GI-16

Numerous written comments provided to date on the Draft SEIS and the testimony presented at the November 5, 1987 public hearing has evidenced unusually prolonged high turbidity conditions in the Bay in the last two fishing seasons, with a corresponding decrease in fish harvest. The Director of the NMFS, Southeast GI-17

Region, has advised that "the manner in which dredged material is disposed in the Bay is highly suspect as a contributing *element*" to this *fishery decline*. Letter from E. C. Fullerton, Regional Director, to Colonel Galen H. Yanagihara (Oct. 27, 1987), p. 1. GI-17

The testimony and written comments of fishermen and fishermen's groups such as the United Anglers of California state that they have directly observed major, immediate impacts of dredge disposal on turbidity and on fishing. Comments submitted by the above parties, CBE, and others indicate the *major economic* impact that the recent *fishery declines* have had, and their potential future impacts. Given this substantial evidence,[5] the final EIS[6] would be clearly inadequate if it did not squarely and fully address the different economic impacts of the alternatives evaluated on recreational and commercial fishing. Such evaluation at a minimum should include quantitative economic estimates, to show the potential adverse economic impact of such disposal at Alcatraz on sport and commercial fishing in the Bay. Obviously, a reasoned decision must consider these costs, not only the cost savings to GI-18

5. As stated in 40 C.F.R. § 1502.15, "the data and analysis in an EIS should be commensurate with the importance of the impact." The impacts on fishing interests are extremely important, involving not only major ecological and recreational effects, but also potentially disastrous economic impacts on a large commercial sector. Potential impacts of such magnitude deserve very close attention in an EIS.

6. We state elsewhere that a new draft SEIS must be prepared for public review in light of major flaws and omissions. If a new draft SEIS is prepared, the expanded socio-economic analysis called for here of course should be included.

the Port of Oakland from disposal at Alcatraz. Such estimates of course should consider the information that is being provided in comments by CBE, fishing groups, and others.

D. Failure to Evaluate Certain Impacts in Light of Incomplete or Unavailable Information

The Corps is not free to ignore the real possibility that the proposed disposal at Alcatraz will have a major adverse impact on the Bay, simply because some uncertainty exists about certain issues (such as the fate of sediment disposed there, the bioavailability *and toxicity of such* sediment, and the resulting effect on Bay fisheries and other resources). As required by 40 C.F.R. Section 1502.22, the Corps must consider not only effects that current knowledge can predict without reasonable doubt, but also must evaluate significant adverse effects that are "reasonably foreseeable." "Reasonably foreseeable" impacts include: GI-19

> . . . *impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.*

40 C.F.R. § 1502.22(b).

A major decline in the Bay fishery and related adverse effects is a possible result of the Corps' selected alternative that is at least "reasonably foreseeable". This [illegible] adverse impact is reasonably foreseeable based on information provided in the Draft SEIS and in comments and testimony presented to date by CBE, responsible government agencies, and other parties, including: (1) the concentrations of contaminants measured in Oakland Harbor sediment samples and the possibly higher contamination in areas not sampled; (2) the toxicity of sampled sediments as shown by bioassay and bioaccumulation experiments, and the possible inadequacies in the sensitivity and interpretation of these experiments; (3) the evidence that a large portion of dredge spoils dumped at Alcatraz will be redistributed through a large portion of the Bay; (4) the evidence that dredge spoils dumped at Alcatraz increase turbidity over an area and a time span much larger than asserted by the Corps; (5) the evidence that this resulting increase in turbidity causes an immediate and substantial decrease in the Bay fishery; and (6) the possible impact of this additional toxic loading and turbidity, given factors such as the stress already placed on the Bay ecosystem by other human and natural causes and additional impacts to be expected from future projects and events. Therefore the requirements of 40 C.F.R. Section 1502.22 clearly are triggered with regard to these reasonably foreseeable adverse impacts. GI-20 GI-21 GI-22 GI-23 GI-24 GI-25

Once Section 1502.22 is triggered, the Corps must obtain the missing information and include it in the EIS if such information is "essential to a reasoned choice among alternatives" and if "the overall costs of obtaining it are not exorbitant." 40 GI-25

C.F.R. § 1502.22(a). Given the evidence presented, there could be no "reasoned choice" of the Alcatraz predredging and disposal option without enough additional study to ascertain the likelihood of the drastic impacts predicted by Bay fishermen and raised as a real possibility by numerous credible scientific and government sources. See comments submitted by CBE and other comments cited therein. The Corps therefore must either obtain such additional information or make a finding that the costs of doing so would be "exorbitant." 40 C.F.R. § 1502.22(a). GI-25

If the Corps determines that information gaps cannot be filled, it must evaluate the reasonably foreseeable impacts as described in 40 C.F.R. § 1502.22(b). Among other requirements, the Corps must summarize relevant "existing credible scientific evidence" and must evaluate the reasonably foreseeable impacts in question "based on theoretical approaches or research methods generally accepted in the scientific community." Id. Such analysis is required to the extent that it is supported by "credible scientific evidence," "not based on pure conjecture," and "within the rule of reason." Id. GI-26

In this case, the comments already provided by scientific, government, and other sources provide ample "credible scientific evidence" to support analysis of the possibility that the selected alternative will have a major negative effect [illegible] portions of the Bay ecosystem. Given the evidence already submitted and other investigations underway, such analysis would not have to be based on pure conjecture. The seriousness and likelihood of the threatened impacts and the feasibility of performing a responsible analysis suggests that doing so is entirely within the "rule of reason." Substantial additional analysis therefore must be provided by the Corps. GI-27

As with several other omissions in the Draft SEIS, this omission is so fundamental that it should be corrected not merely in the final EIS but in a new draft SEIS, to be recirculated for public review and comment. GI-28

III. The Proposed Ocean Site Violates Applicable Ocean Dumping Criteria

The Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. § 1401 et seq.; "MPRSA,") requires all persons proposing to dump material into the territorial ocean waters of the United States to first obtain a permit for such dumping from the Environmental Protection Agency ("EPA"). MPRSA additionally gives limited, but independent, authority to the Corps to grant permits for ocean dumping of "dredged material." 14 U.S.C. § 1413(a). GI-29

MPRSA establishes eleven environmental criteria that both the EPA and the Corps must consider prior to granting an ocean

dumping permit. 14 U.S.C. § 1412(a)(B)-(I) & § 1413(b). Regarding the environmental criteria that the Corps must apply prior to permitting the ocean dumping of dredged materials, the Corps has stated:

> Section [1413(b)], while encouraging use of EPA-designated sites where feasible, does provide for site designation by the [Corps]. However, the evaluation factors that must be considered in the evaluation process that lead to site designation would be the same in either case. (Emphasis added).

"General Approach to Designated Studies for Ocean Dredged Material Disposal Sites" jointly prepared by the EPA and the Corps in May 1984, p. 5.

One environmental criterion that must be considered prior to the Corps selecting a site for ocean dumping of dredged materials is 14 U.S.C. § 1412(a)(I), which requires the utilization, "wherever feasible," of locations beyond the OCS. This Federal statute establishes a legal presumption that ocean dumping sites located beyond the OCS are preferred over shallow ocean dumping. The MPRSA requires the Corps to site dumping beyond the OCS wherever feasible and to demonstrate that no deep ocean site is infeasible before selecting a shallow ocean site. GI-29

The Corps has treated the deep ocean dumping policy of MPRSA in cavalier fashion. As discussed in Section I above, the GI-30

Corps' apparent determination that any site beyond the marine radar net is infeasible (Draft SEIS, p. 16) is unsupported by the record and fails to overcome the statutory preference established by MPRSA for dumping beyond the OCS. To comply with MPRSA, the Corps must reconsider the evidence on infeasibility and must select an ocean site beyond the OCS if any such site is feasible. **GI-30**

* * * * *

In conclusion, on behalf of CBE we urge the Corps to reconsider its position and to propose an appropriate deep ocean site for disposal of all dredge spoils from the Oakland Inner and Outer Harbors to the extent that upland disposal is infeasible. If you would like to discuss these issues further, please contact Paul Shorb or Ken Finney of our firm, who played a large part in preparing these comments.

Sincerely yours,

Peter H. Weiner

Peter H. Weiner

File Name: HEWM11-20-87 Comment Categories: 2,3,4,5,9,11

RESPONSE TO COMMENTS

Agency/Group/Individual: HELLER, EHRMAN, WHITE AND MCAULLIFE
Date of Letter: November 20, 1987

GI-1 Refer to response to Comments GI-6 and GI-20, Oceanic Society letter, November 24, 1978.

GI-2 The analysis of the bioassay results indicate that the sediments are not toxic and that unrestricted disposal and dispersal of material from Oakland Harbor (except for materials near Schnitzer Steel and Alameda Gateway) will not result in any unacceptable adverse impacts in the Bay or in the ocean. Appendix A of the SEIS has been modified to include a discussion of this concern.

GI-3 Effects of disposal of dredged material at the Alcatraz site are addressed in the Final SEIS, Sections 4.2 and 4.3. The "stressed Bay ecosystem" is addressed in response to GI-5, Citizens for a Better Environment letter, November 20, 1987.

GI-4 Comment noted. Refer to GI-3 above.

GI-5 The cost sharing for this project is as directed by the Water Resources Development Act of 1986 and requires that the local Sponsor pay approximately 25% of the total project cost with the Federal Government paying the remaining 75%. The majority of the cost of the project is, therefore, a requirement of the taxpayer, not the Port of Oakland. The economics of a project play a large part in the selection of the proposed alternative. See response to comment GI-46 of the Citizens for a Better Environment (CBE) letter.

GI-6 See response to comment GI-9, below.

GI-7 See responses to comments GI-10 through GI-28, below.

GI-8 See responses to comments GI-29 and GI-30, below.

GI-9 An evaluation was made to determine the area in which it would be economically and operationally feasible to dispose of dredged material. The procedure followed national guidelines established by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (USACE/EPA, 1984; SAIC, 1986). The resulting Zone of Siting Feasibility (ZSF) analysis concluded that the ZSF extended to 44 km (24 nmi) from Pt. Bonita. It is reasonable to rigorously explore and objectively evaluate disposal at sites within the ZSF and to exclude sites that have been determined to be outside of the ZSF and therefore infeasible or impracticable to use. Because a "deep ocean site" can not be found in the ZSF and is therefore not considered as a feasible or reasonable alternative, the requirements of the National Environmental Policy Act (NEPA) and the Marine Protection, Research, and Sanctuaries Act (MPRSA) are satisfied. The Tetra Tech document is incorrectly cited as a final report. The Final Zone of Siting Feasibility Analysis is appended to the Final SEIS. Refer to Appendix F for discussion of surveillance of disposal activities, monitoring of dredged material disposal sites, and oversight of vessel traffic in the Gulf of the Farallones.

GI-10 Response to part (1) is included in responses to comments GI-11 through GI-12, response to part (2) is provided in responses to comments GI-13 to GI-15, response to part (3) is furnished in responses to comments GI-16 through GI-18, and response to part (4) is given in responses to comments GI-19 to GI-27, to follow.

GI-11 Appendix A has been modified to include a more extensive evaluation of the sediment test results. It also includes a discussion of the Corps of Engineers conclusion that no unacceptable toxicity or bioaccumulation would occur from disposal of material from Oakland Harbor (except material from near Schnitzer Steel and Alameda Gateway) at Alcatraz. The mere presence of contaminants in sediment does not mean that a significant effect will occur in the field because the constituents may not be bioavailable. Refer to response to comments GI-6 and GI-20, Oceanic Society letter, November 24, 1987. Appendix A has been modified to include a more extensive discussion of the test results.

GI-12 Comment noted. However the Corps does not believe another supplemental EIS is required.

GI-13 Cumulative impacts are presented in Section 4.5.1, of the Final SEIS. The questions as to synergistic impacts are valid; however, it is extremely difficult, if not impossible, to separate these impacts into quantifiable causative factors against which disposal's additive portion may be measured.

GI-14 The Corps does not agree with the conclusion that the evaluation of the test results is flawed. Refer to response to comment GI-11 in this letter.

GI-15 The Corps believes that the draft SEIS was adequate.

GI-16 Economic and social impacts are discussed in SEIS, Section 4.4.

GI-17 Hopper dredges, which have been in use since the 1930's, operate with hydraulic pumps that excavate material by suction and dispose of it in a slurried form. Clamshell operations dig material from the bottom. In areas where stiff clays are removed by clamshell dredges, large clumps of consolidated sediments, resistant to dispersion and erosion, would be disposed at the site. The slurry requirement was implemented to improve the movement of material from the site, either by dispersion or erosion by natural currents, since consolidated dredged sediments tend to accumulate. The Alcatraz site has been used since 1894, and regional fish populations and catch have varied greatly, which is their nature. In the past, resource agencies have identified other significant factors that affect fish populations, including loss of upstream spawning and nursery habitat, massive freshwater diversions, agricultural runoff, and the discharge of industrial effluent. Also see responses to comments F-3 and F-9, Department of Commerce, NOAA, National Marine Fisheries Service, October 28, 1978.

GI-18 Refer to SEIS, Section 4.4.2.

GI-19 See response to comment GI-57, Citizens for a Better Environment letter, November 20, 1987.

GI-20 Additional samples were collected and tested from Oakland Harbor. The results have been presented in the SEIS, Section 3.2.1 and Appendix A.

GI-21 Appendix A has been modified to include a detailed clarification of the testing and interpretation as required by statute and in accordance with joint EPA/COE guidance (EPA/USACE, 1977).

GI-22 Distribution of sediments discharged at the Alcatraz site is discussed in Section 3.3.3, of the Final SEIS.

GI-23 Turbidity in the region around the disposal site and throughout the Bay is presented in Sections 3.3.4 and 4.2.1, of the Final SEIS.

GI-24 There is no scientific evidence to substantiate the charge that the increase in turbidity due to disposal of dredged material "causes an immediate and substantial decrease in the Bay fishery." The cumulative impacts of disposal activity are addressed in Section 4.5.1, of the Final SEIS.

GI-25 The referenced data has been considered in the Final SEIS as indicated in the responses to comments GI-20 through GI-24 above. The commenting information as referenced has also been considered in making "a reasoned choice among alternatives." In addition, as discussed previously in response to comment GI-13 above, the quantification of stresses caused by natural processes and man-induced activities is beyond present scientific determination. However, in the context of these other influencing factors of significantly greater magnitude, the contribution of impacts of dredged material disposal at the Alcatraz disposal site would be a small one. The assignment of environmental costs to this small effect cannot be accomplished without the assignment of environmental costs to numerous other factors that may be responsible to a far greater degree of affecting the Bay environment than dredged material disposal at the Alcatraz site. Therefore, the costs of resolution would be "exorbitant".

GI-26 Comment noted. See response to comment GI-27.

GI-27 The analysis required to the extent supported by "credible scientific evidence", "not based on pure conjecture", and "within the rule of reason" as indicated in the comment has been accomplished. The studies of disposal activities at the Alcatraz site and test data of the dredged sediments both at Oakland Harbor and at the Alcatraz site have been described. It is believed that dredged material is not a significant and major contributor of contaminants to the Bay ecosystem. The contaminants are already a part of the Bay ecosystem. The turbid nature of the Bay is also an established fact. The determinations made in the SEIS have been accomplished within the "rule of reason."

GI-28 See response to comment GI-12.

GI-29 See response to GI-9 above. The selected ocean disposal site is, nationwide, one of the deepest and farthest from shore of disposal sites for dredged material. The broad, flat plain of the Continental Shelf extends seaward for approximately 34 miles. Along this part of the Pacific Coast deep-water sites off the shelf are not feasible for dredge material disposal and thus were not evaluated.

GI-30 The Corps of Engineers has followed the guidance provided by the "General Approach to Designation Studies for Ocean Dredged Material Disposal Sites" (USACE/EPA, 1984) and has complied with the general and specific criteria in 40 CFR 228.5 and 40 CFR 228.6 in selecting the preferred ocean site. Utilization of a site "OCS" has been determined to be infeasible.

Marin Audubon Society   *Box 599*   *Mill Valley, California 94942-0599*

November 19, 1987

Col. Galen Yanagihara
District Engineer
Army Corps of Engineers
211 Main Street
San Francisco, CA 94105

RE: OAKLAND OUTER AND INNER HARBORS DEEP-DRAFT NAVIGATION IMPROVEMENTS

ATT: ENVIRONMENTAL BRANCH

Dear Col. Yanagihara:

This project proposes to dredge 2.7 million cu. yds. of material from the Alcatraz disposal site, to dispose of this material at an ocean disposal site approximately 16 nautical miles southwest of the Golden Gate Bridge, to dredge 7 million cu. yds. of material from the Oakland Inner and Out Harbors and dispose this material at Alcatraz.

It is actually unclear whether pre-dredging the Alcatraz site will be adequate to accommodate all of the dredge material from the Oakland Harbors, plus other industrial and port dredging needs and the myriad of other small dredge projects that are being applied for these days. GI-1

We understand the Ocean Dumping Act specifies that, wherever feasible, the selection of ocean disposal sites should be beyond the edge of the continental shelf, which is commonly delineated at the 100 fathom line. We believe that location of the ocean disposal site closer than 100 fathoms and only 1.7 nm from the National Marine Sanctuary, as is proposed, endangers the Sanctuary and various fisheries. At the time of the Puerto Rican disaster, we recall that oil, unexpectedly, was disbursed by the currents to the north, encircled the Farallone Islands and came ashore in Bodega Bay and Harbor. Such movement of dredge spoils could result in destruction of benthic organisms and a concentration of pollutants thus significantly impacting this major pelagic bird breeding colony. GI-2

Further, we understand there is question among the scientific community about the adequacy of the bioassay tests. The tests indicate that the Oakland Harbor sediments carry a contaminant load that presents a danger to marine species. This supports GI-3

A Chapter of National Audubon Society

location of the ocean disposal site beyond the continental shelf, not dumping at Alcatraz where the contaminants could be disbursed around the Bay, as well as the need for further testing to determine the need for an upland disposal site for the most contaminated dredge material. GI-4

The Ocean Dumping Surveillance System used in the east coast could and should be adapted for use in the San Francisco Bay area which would eliminate the monitoring problem justification for disposal site located just 24 nm from the Golden Gate Bridge. While it appears that cost was a major determining factor in identifying the lesser depth disposal site, protection of the environmental resources of both the Bay and ocean should be the primary concern. GI-5

This massive project is just shuffling sediments around the marine environment. San Francisco Bay is already under great stress from toxics, turbidity, reduction in fresh-water flows and other causes. The Corps needs to consider the cumulative impacts of all dredging projects on the Bay ecosystem, migratory species, fisheries, recreational, and other values of the Bay. In the broader view, we believe it is time that the Corps begins to deny applications for dredging projects that involve new dredging, i.e. issue permits only for projects involving maintenance dredging. GI-6

Specifically regarding this project, we recommend:

1) that the Alcatraz disposal site not be used for disposal of spoils from the Oakland Harbors

2) that an ocean dumping site beyond the 100 fathom, continental shelf limit, be identified and used.

Thank you for considering our comments.

Sincerely,

Barbara Salzman, Chair
Conservation Committee

cc: Congresswoman Barbara Boxer
Environmental Protection Agency

File Name: MAS11-19-87 Comments Categories: 2,5,7

RESPONSE TO COMMENTS

Agency/Group/Individual: MARIN AUDUBON SOCIETY

Date of Letter: November 19, 1987

GI-1 The Alcatraz alternative was designed so that there would be no bathymetric change at the Alcatraz site.

GI-2 The analogy of the movement of an oil spill with dredged material is irrelevant. Dredged material would be excavated by clamshell and transported to an ocean disposal site well outside the boundary of the Sanctuary. As described in the FSEIS, the material will fall through the water column. There will be deposition on the seafloor at the site and a small amount of material will disperse. The Sanctuary is not expected to be impacted by the disposal of dredged material.

GI-3 Results of bioassay and bioaccumulation testing performed on material from Oakland Harbor indicate that no unacceptable toxicity or bioaccumulation would occur as a result of disposal of material from Oakland Harbor at Alcatraz or in the ocean. However, additional testing was performed on sediment from Oakland Inner Harbor adjacent to Schnitzer Steel and Alameda Gateway. This dredged material appears to have elevated concentrations of several constituents. Appendix A has been expanded to include a more complete discussion of all of the test results.

GI-4 Refer to response to comment S-4, California Department of Fish and Game letter, November 2, 1987.

GI-5 Refer to Appendix F of the SEIS.

GS-6 Comment noted. Cumulative effects are more thoroughly discussed in the final SEIS, Section 4.5.

SAN FRANCISCO BAY CHAPTER
OCEANIC SOCIETY
BLDG. E FORT MASON   SAN FRANCISCO CA 94123   PHONE (415) 441-5970

November 19, 1987

District Engineer
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dear Sir:

The Oceanic Society, San Francisco Bay Chapter, has reviewed the Draft Oakland Outer and Inner Harbors Deep-Draft Navigation *Improvements Draft Design Memorandum Number 1 and SEIS* and appreciates the opportunity to comment.

The San Francisco Bay Chapter is a nonprofit organization with over 2300 members. The organization is dedicated to the protection and wise management of San Francisco Bay and the adjoining coastal resources.

Our comments are directed primarily to three subject areas: 1) the rationale for pre-dredging at the Alcatraz site; 2) the adequacy of the bioassay tests; 3) the selection of an ocean disposal site.

I) The Alcatraz Site

A) Rationale for Pre-Dredging

The Corps proposes to pre-dredge to an offshore location the sediments already in the Alcatraz disposal site to make room for material from the Oakland harbors. This plan would involve needless resuspension of sediments at the site in the course of redredging sediments already deposited and by now in a stable form on the bay bottom, thus increasing the attendant impacts on the sediment and toxic load of the surrounding waters.

Moreover, it is not clear that pre-dredging the Alcatraz site would be adequate to handle the improvements in Oakland ports, GI-1 improvements at other port facilities, and routine maintenance. The sediments being dredged from the ports are clay-like, cohesive and prone to compaction and mounding; the Alcatraz site has already mounded far more than was anticipated. The Corps needs to present more persuasive empirical data to show that it is not now making the same overly-optimistic assumption that was made in the past and that there will not be further mounding. GI-2 Even so, it is anticipated that the Alcatraz site will have to be dredged again and yet again. It makes sense with respect to both dollar and environmental cost to abandon this alternative and take dredged material directly to an ocean site. GI-3

We are especially concerned by the SEIS' neglect of those disposal options which involve combinations of disposal techniques, in favor of studying plans that are, for example, all direct ocean disposal, or all pre-dredging. Perhaps the Corps could consider more creative approaches which would provide more leeway in terms of environmental and dollar costs.

For example, the SEIS rejects the use of landfill disposal because there are no sites in the area capable of accepting all the dredged materials. But might landfill disposal of a significant fraction of it be possible, and perhaps lower costs of direct ocean disposal of the remainder? The SEIS does not address this point. If landfill were an option, would it be feasible to transport some of the slurried sediments to it by pipeline? GI-4

B) The Consequences of Slurry Disposal in the Bay

We are concerned about the Corps' plan to dispose of large amounts of sediments at Alcatraz and that these are to be dumped in slurry form in order to increase their dilution and dispersal into the surrounding waters. GI-5 The SEIS states that because the total amount of Oakland sediments to be dumped as slurry would be the equivalent of less than 4% of the total suspended sediment load of the bay, this is an insignificant addition.

There already is increased turbidity in the Bay from various sources. While small, the slurried sediments add to this turbidity. Detailed studies have been made of sediment dispersion plumes after dumping at Alcatraz, and of the rate at which local turbidity returned to background levels. But this data says nothing about how those background levels are affected over the long term, or indeed how damaging those "background levels" may already be to the local biota. GI-6 Additionally, the Oakland sediments would be far greater in quantity than those studied.

Fishermen in the Bay have raised the question of the effects of increased turbidity on the decline in fishing. While a cause and effect relationship has not been established, neither has a relationship been ruled out. We believe there should be further study to eliminate the possibility that dredge disposal in the Bay is contributing to the fishermen's allegations. GI-7

II) The Adequacy of the Bioassays

We question the adequacy of the SEIS treatment of the potentially toxic sediments of the Oakland harbor. The sediment chemistry data, which is presented to show the concentration of metals, petroleum products and synthetic organic chemicals includes no reference values. Data should be presented from reference ocean sediments and from reference Bay sediments, near the Alcatraz site. GI-8

The reported bioassays are questionably designed and interpreted. The use of a 50% survival rate to demonstrate unacceptable limits is an arbitrary figure that must be used carefully, weighing the importance of the parameters tested. A useful approach might be to first investigate statistical differences (as was done) and then consider the resulting set of data. The 50% standard might be appropriate for some organisms, but not others. For example, if a fishery near the disposal site is of particular importance, then a negative effect on a similar organism or its larvae, might require a less extreme mortality to fall into the category of unacceptable degradation. GI-9

Some of the tests used this more considered approach. For the solid phase bioassay with the polychaete worm, sediment from every sample location within the Oakland harbors resulted in a significant difference in survival from the control. Although not 50% of the worms died, there was a significant difference from the control; this difference, we gather, led the testers to use another creature, an amphipod, to further investigate the biological effects of the Oakland sediments. It turned out that this choice of organism was poor (because the animal lives in different sized sediment), yet no other animal was used and no more bioassays were performed. This should be done. GI-10

The initial solid phase bioassays with Oakland sediments use three animals: the worm that was mentioned above, as well as a fish and a small clam. The fish and the polychaete worm are acceptable test animals, but the clam is less so. Clams may remain in their shells (which will be relatively impermeable to diffusion of contaminants from surrounding sediments) for long periods of time without feeding, and functioning under very low oxygen conditions. Although we are not told how clam mortality was measured, we assume that gaping shells due to the relaxation of the adductor muscle could be an indicator of stress, if not mortality. On the other hand, stress can result in tightly closed shells, to exclude ambient conditions. These clams might be judged to have survived the experiment, but in a sense had not been exposed to the experimental conditions of Oakland harbor sediment. GI-11

The solid phase bioassays with Alcatraz sediments only use a fish and a clam. These tests should be supplemented with at least the polychaete worm used in the Oakland bioassays. GI-12

The problem of using an animal with a hard shell also applies to the bioaccumulation work with both Alcatraz and Oakland sediments. The clam may have fed infrequently during the length of the test, and thus had little opportunity to take in contaminants; another soft bodied organism would have been more appropriate. GI-13

The suspended particulate bioassays using Oakland sediments resulted in significant mortalities to two of the test organisms, the sanddab and the mussel larvae. Again, the tests did not result in a 50% mortality. These sediments, however, are proposed for Bay disposal, where both finfish and shell fish larvae occur. This is certainly adequate reason to feel there might be an unacceptable effect on fishery resources, especially considering the use of the Bay by larvae of the Dungeness crab, and could preclude the Alcatraz disposal of 7 million cubic yards of Oakland sediments, some of which will be dispersed into the Bay. The results of the suspended particulate bioassays are also reason to ensure adequate mixing by dumping Oakland sediments in deep water. GI-14

No suspended particulate bioassays were run with Alcatraz sediments. These should be performed, since the SEIS proposes placing these sediments in areas where fisheries occur.

Except for the mussel larvae used in one set of bioassays, there is little other investigation of sublethal or population effects on larval or juvenile forms. These sublethal effects are now recognized as being of major importance; adults themselves may not die, but their reproductive potential may be reduced and the potentially more sensitive stages of eggs, pre-settlement larvae and juveniles may be affected. GI-15

In sum, the sediment testing and bioassay work indicate that the sediments do carry a contaminant load and that this load is of biological significance. This suggests that there is danger to fish and marine life if Oakland sediments are disposed of in the Bay. Further assays might be conducted to better define the level of this significance and to more carefully structure a management plan for ocean disposal. GI-16

III) The Ocean Disposal Site

A) Criteria for Selection of Interim vs. Permanent Site

The SEIS' discussion of possible sites for ocean disposal of dredged materials dismisses several siting options that we believe to be worth further scrutiny. The interim disposal site seems to have been selected primarily on the basis of economic factors. This is of particular concern because of the great likelihood that the "interim" site will be given preference in the selection of a permanent site.

B) Desirability of a Deeper Site

Our biggest concern regarding the ocean disposal site is the selection of sites off the continental shelf. A deepwater site seems to us the best solution to the disposal problem. In 40 CFR 228.5 (e) it is stated, "EPA will, wherever feasible, designate ocean dumping sites beyond the continental shelf"... It is critical to avoid any unnecessary harm to fisheries in the area where the SEIS' final candidates occur - notably salmon, rockfish, flatfish and Dungeness crab. GI-17

What specific criteria did the SEIS employ in judging this manifest goal unattainable, other than the 24nm radar surveillance limit? This is a crucial point because sites occur within the 16nm radius Zone of Siting Feasibility at depths of 500 fathoms or more. The rationale for this decision needs to be further documented. GI-18

It seems to us that the 24 nm limit is unnecessary. The USCG has been successfully monitoring dumping at a site 106 nm at sea off the New Jersey coast for three years, using the Ocean Dumping Surveillance System (ODSS), developed for this purpose. Has the Corps considered a similar system in this case? There is no indication in the SEIS that it has. If the use of ODSS has not been studied, why did the Corps decline to do so? GI-19

C) Proximity of the National Marine Sanctuary

We are concerned by the proposed ocean site's proximity to the National Marine Sanctuary - 1.7 miles. Has the Corps studied the possibility that fine material dispersed away from the dump site could move into the Sanctuary on northward current. GI-20 There is a possibility that sediment will not be uniformly diluted into the surrounding ocean; it is now recognized that such fine material may be focused in areas of high deposition. Such focusing of deposition in a small area as a result of current patterns and bottom topographic features, such as canyons, could have a negative impact on biota, since these sediments will have relatively high levels of heavy metals and petroleum hydrocarbon residues. Does the Corps have data that would clarify this point - such as data on nearby bottom topographic features and their importance to the fisheries? GI-21

D) Methods of Arriving at Cost Estimates

The Draft Design Memorandum is vague about the manner in which the dumping cost estimates for the deeper sites were reached. GI-22 As in the case of the SEIS' rejection of wetland creation and landfill disposal, we wonder about the thoroughness with which the Corps considered its options. In the case of the North Atlantic dump site referred to in the discussion of the ODSS, the switch from a site 12 nm at sea to one 106 nm at sea was accompanied by the introduction of much larger barges, making fewer trips. Has the Corps considered this option and included in its cost estimates the possibility of similarly adapting its disposal methods to the distance of the site, instead of the other way around? Are estimates based on the same barge sizes and dump schedules as are used in estimating the cost of dumping at Alcatraz? GI-23

D) Goals and Methodology of the Management Plan

Our final concern regards the proposed ocean site's management plan which does not clarify whether containment or dispersion and dilution of materials is required. GI-24 The Corps seems confident that the sediment at the offshore site will not impact the National Marine Sanctuary 1.7 miles away, given the cohesive nature of the sediments from Alcatraz. But because these materials would contain significant amounts of contaminants, it is important that the management plan state the appropriate strategy.

We commend the Corps for its efforts to listen to the various interested parties and for creating a steering committee to serve as a forum for discussion.

Thank you for the opportunity to submit our comments.

Sincerely,

Joan Patton

Joan Patton
Conservation Director

File Name: SOS11-19-87

Comments Categories: 4,9,4,5,2,3

RESPONSE TO COMMENTS

Agency/Group/Individual: SAN FRANCISCO BAY CHAPTER OCEANIC SOCIETY

Date of Letter: November 19,1987

GI-1 See response S-14, Bay Conservation and Development Commission letter, November 16, 1987.

GI-2 See response S-14, Bay Conservation and Development Commission letter, November 16, 1987.

GI-3 Comment noted.

GI-4 See SEIS, Sections 2.4.1 and 2.4.2.

GI-5 Refer to Section 3.3.3 of the Final SEIS

GI-6 See SEIS, Section 4.3.

GI-7 Comment noted. See SEIS, Section 4.6.

GI-8 Sediment core samples from the Alcatraz disposal were analyzed for oil and grease and petroleum hydrocarbons. These data are presented in the SEIS and in Appendix A. Decisions on suitability of material for open water disposal are not based on sediment chemistry. The bioassay and bioaccumulation testing of material from Oakland Harbor used material from the vicinity of the ocean site as a reference. Also see response GI-20, Oceanic Society letter, November 24, 1987.

GI-9 Refer to Appendix A of the SEIS.

GI-10 Refer to response to comment GI-14, Oceanic Society letter, November 24, 1987.

GI-11 Refer to response to comment GI-15, Oceanic Society letter, November 24, 1987.

GI-12 Refer to response to comment GI-16, Oceanic Society letter, November 24, 1987.

GI-13 Refer to response to comment GI-17, Oceanic Society letter, November 24, 1987.

GI-14 Refer to response to comment GI-18, Oceanic Society letter, November 24, 1987.

GI-15 Refer to response to comment GI-19, Oceanic Society letter, November 24, 1987.

GI-16 The results of sediment testing do not indicate that unacceptable toxicity and bioaccumulation would occur as a result of disposal of material from Oakland Harbor in the Bay or in the Ocean. However, results of additional testing conducted on material from Schnitzer Steel and Alameda Gateway (old Todd Shipyard) appears to contain elevated concentrations of some contaminants. Appendix A has been modified to contain a more complete discussion of these issues.

GI-17 Feasibility of designation and use of an ocean dredged material disposal site off the continental shelf in the Gulf of the Farallones is presented in the Final ZSF Analysis Report (Appendix F of the Final SEIS.)

GI-18 The ZSF established in the Draft ZSF Analysis Report did not consider safety or economic constraints. See the Final ZSF Analysis Report, Appendix F, appended to this SEIS.

GI-19 The Corps of Engineers is considering use of a similar system to insure adequate surveillance of dredge disposal operations without putting personnel aboard each vessel. Surveillance of disposal activities to insure disposal at the correct coordinates is very different from traffic control monitoring undertaken in the Gulf of the Farallones for safety purposes. Refer to the ZSF Analysis Report appended to the SEIS.

GI-20 Detailed numerical modeling of the ocean disposal sites has been undertaken. Dispersion and accompanying transport toward the Gulf of the Farallones National Marine Sanctuary is not indicated (Tetra Tech, December 1987).

GI-21 Sites 1M and B1 are located on broad, flat or very gently sloping areas of the shelf, devoid of distinct bathymetric features. Focusing of sediments in a small area outside of the site is considered very remote.

GI-22 Detailed cost estimates are presented in the Final ZSF Analysis Report appended to the SEIS.

GI-23 Corps of Engineers cost estimates are based on several sizes of barges up to the largest available. See response to previous comment.

GI-24 Sites 1M and B1 are nondispersive sites.

THE OCEANIC SOCIETY

EDUCATION • RESEARCH • CONSERVATION

EXECUTIVE OFFICES
1536 16th Street N.W.
Washington D.C. 20036
(202) 328-0098

November 24, 1987

Col. Galen H. Yanagihara
Department of the Army, Corps of Engineers
San Francisco District
211 Main Street
San Francisco, Ca. 94105-1905

Dear Col. Yanagihara:

At the suggestion of Patricia Duff of your office I am sending a copy of this letter to you (see attachment). The letter was sent to Alan Ramo of Citizens for a Better Environment (CBE) and is part of their submission on the Supplemental Environmental Impact Statement (SEIS) to the Memorandum on navigation improvements to the Oakland Inner and Outer Harbors. Miss Duff felt that the concerns expressed in the letter to CBE might be lost in the final compendium, therefore the separate copy and cover letter to you.

We appreciate having the opportunity to comment on the SEIS. If you have any question regarding the attached letter please feel free to call me at 202-328-0098.

Sincerely yours,

Mary C. Barber

Mary C. Barber, Ph.D.
Staff Scientist

cc: Patricia Duff

THE OCEANIC SOCIETY

EDUCATION • RESEARCH • CONSERVATION

EXECUTIVE OFFICES
1536 16th Street N.W.
Washington D.C. 20036
(202) 328-0098

November 18, 1987

Alan Ramo
Citizens For A Better Environment
942 Market Street
Suite 505
San Francisco, California 94102

RE: SEIS to Draft Oakland Inner and Outer Harbors Deep-Draft Navigation Improvements Memorandum

Dear Alan:

I've appreciated the opportunity to discuss the Corps of Engineers Supplemental Environmental Impact Statement (SEIS) with you. As I've mentioned the Oceanic Society's review of that document is an excellent, "real world" example of how we want our Marine Science Technical Assistance Project to benefit organizations like yours. With that objective in mind the concerns of the Oceanic Society regarding the SEIS to the Draft Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Memorandum follow.

The Oceanic Society strongly opposes the placement of any materials dredged from the Oakland Harbors into the San Francisco Bay. The proposal to pre-dredge the Alcatraz Disposal Site should be rejected for the reasons stated below. Further, consideration of alternative disposal sites should include both upland areas and the possibility of wetland creation and restoration. If an ocean site need be considered because of the unavailability of adequate alternative upland sites, the site designation process should proceed cautiously, allowing time for careful deliberation on the location that has the least environmental impact and best meets the requirements of the Marine Protection, Research and Sanctuaries Act of 1972 (33 USC 1401) (hereafter referred to as the Ocean Dumping Act).

Our comments are divided into three issue areas: (1) disposal within San Francisco Bay; (2) the need for an ocean site; and (3) the location of the ocean site.

A. Disposal in San Francisco Bay

1. Turbidity

The proposed plan to pre-dredge the Alcatraz Disposal Site for the purpose of disposing Oakland Harbor dredge spoil at that site is ill-conceived and environmentally unacceptable. The resuspension of material at the Alcatraz site and replacement with an additional 7 million cubic yards of slurried sediments will result in an increase in water turbidity. GI-1 The Fish and Wildlife Service of the US Department of Interior indicates in a letter of August 18, 1987 to the Corps of Engineers (Appendix B of the SEIS) its belief that a significant portion of these sediments will be retained in the Bay. GI-2 The waters of the San Francisco Bay are already stressed, especially considering sediment load and its effect on primary productivity or phytoplankton. Phytoplankton, which is the basis for the food web in the Bay, including fishery organisms, requires light as an energy source for growth. The amount of light penetrating the water column is significantly reduced under turbid conditions. The use of the Bay for disposal of millions of cubic yards of dredged spoil could provide the additional burden that pushes turbidity over the threshold resulting in seriously reduced primary production and reduced fishery production. GI-3

There is little question that significant damage may result from the slurry disposal of this extra volume of dredge material from Oakland into the Bay. Many feel (as reported in the media) that a turbidity threshold was crossed this fall resulting in a severe decline in the sport fisheries. GI-4 This concern is not merely academic. The Environmental Protection Agency in the Near Coastal Waters Strategic Planning Initiative (EPA, Office of Water, August 1986) identifies degradation of near shore coastal waters as a critical national problem. The Initiative states that the integrity of these coastal systems is stressed by cumulative impacts of a multitude of activities. Policy decisions for San Francisco Bay must be made in the light of ecosystems that (1) now are unable to support some fisheries and (2) have the potential of deteriorating even more dramatically under the addition of another environmental insult. GI-5

2. Contaminants

The negative effect of the sediment itself is compounded by the load of heavy metals and petroleum products found in the Oakland harbors. The Oakland sediments with their high contaminant load would be distributed throughout the Bay. The dispersal of these sediments will be magnified by the proposed use of the slurry method, chosen to slow the mounding of the Alcatraz site. The heavy metals will add to the cumulative load GI-6

of metals in the Bay with the potential of reducing the primary and secondary production (the growth of both plants and the animals that feed upon these plants which together form the bottom links of the food chain) and perhaps the commercially significant sport fisheries. GI-7 Petroleum hydrocarbons, also found in high concentrations in Oakland sediments, have been identified as playing a role in the decline of the striped bass fishery GI-8 (Jeanette Whipple. 1985. Striped Bass - Pollution and Declining Populations. Seminar on San Francisco Bay, Washington, D.C.). We still do not have a clear picture of the point where cumulative, sublethal effects might begin to severely reduce population size and growth potential. GI-9 For this reason, in-Bay disposal should be rejected.

Although the SEIS suggests that the sediments found in the Oakland harbors are biologically acceptable, the data presented and the tests conducted do not support this conclusion. GI-10 The SEIS admits that some of the concentrations of heavy metals are in the high range, but suggests that these concentrations will be diluted. Under the proposed plan, these contaminated sediments ultimately would be deposited in relatively shallow Bay waters where dilution will in effect be adding, perhaps significantly, to the Bay's cumulative contaminant load. GI-11

In addition, the sediment chemistry data, which is presented to show the concentration of metals, petroleum products and synthetic organic chemicals, include no background values. This information is necessary to make an adequate comparison and judgement on the effect of adding Oakland sediments to the Bay system. GI-12

3. Bioassays

The reported bioassays are questionably designed and interpreted as discussed below.

a. *Significance of 50% Mortality*

The use of a 50% death rate to demonstrate unacceptable limits is an arbitrary figure that must be used carefully, weighing the importance of the parameters tested. A useful stratagem would be to first investigate statistical differences (as was done) and then consider the resulting set of data. The 50% threshold might apply for some organisms, but not others. For example, a negative effect on larvae of a particularly important fishery species (or a similar species) near the dump site might warrant a less extreme mortality factor to demonstrate unacceptable degradation. GI-13

b. Solid Phase Bioassays

In one instance a more considered approach was applied. For the solid phase bioassay with the polychaete worm (Nephtys caecoides), sediment from every sample location within the Oakland harbors resulted in a significant difference in survival from the control. Although less than 50% of the worms died, there was a significant difference from the control. It appears this difference led the testers to use another creature, an amphipod (Rhepoxynius abronius), to further investigate the biological effects of the Oakland sediments. Although it was apparent that this choice of organism was poor (because the animal lives in different sized sediment), another animal or more bioassays were not performed. Additional research, with an appropriate organism, is necessary to provide sufficient bioassays. GI-14

The initial solid phase bioassays with Oakland sediments used three animals: the polychaete worm (mentioned above), a fish (Citharichthys stigmaeus), and a small clam (Macoma nasuta). The fish and polychaete worm are acceptable test animals, but clams generally are not used in bioassays. Clams may close their shells (which are relatively impermeable to diffusion of contaminants from surrounding sediments) for long periods of time; not feeding, and functioning under very low oxygen conditions. GI-15

For this reason it is hard to judge both the clam's condition and when death occurs. Although we are not told how clam mortality was measured, we assume that gaping shells due to the relaxation of the adductor muscle could be an indicator of stress, if not mortality. On the other hand stress can result in tightly closed shells, to exclude ambient conditions. Clams with tightly closed shells might survive exposure to contaminated sediments because of the protection afforded by their shells and not because the sediment is biologically acceptable.

The solid phase bioassays using Alcatraz sediments were performed only on the fish and clam. These tests should be supplemented with at least the polychaete worm used in the Oakland bioassays in order to compare the sediments to Oakland sediments and, later on, to judge the level of contamination for possible ocean disposal. GI-16

c. Bioaccumulation

The problem of using an animal with a hard shell also applies to the bioaccumulation work with both Alcatraz and Oakland sediments. The clam may have fed infrequently during the length of the test (only 4 days), and they have had little GI-17

opportunity to take in contaminants. Another soft bodied organism would have been more appropriate. GI-17

d. Suspended Sediment Bioassays

The suspended particulate bioassays using Oakland sediments resulted in significant mortalities to two of the test organisms, the fish and the mussel larvae. Although the tests resulted in mortalities of less than 50%, these sediments are proposed for Bay disposal, where commercially important sport finfish (such as striped bass) and shellfish (such as Dungeness crab and shrimp) larvae occur. *Slight increases in larval mortality will contribute to the decline of the fisheries; a 50% decline would be devastating.* On this basis we have reason to believe that there will be an unacceptable effect on *fishery resources*, precluding the Alcatraz disposal of 7 million cubic yards of Oakland sediments. GI-18

No suspended particulate bioassays were run with Alcatraz sediments. These should be performed, since the SEIS proposes placing these sediments in ocean areas where fishery species are known to occur.

e. Sublethal Effects

Except for the mussel larvae used *in one set of bioassays*, there was little other investigation of sublethal or population effects on larval or juvenile forms. These sublethal effects are now recognized as being of major environmental importance. Adults themselves may not die, but their reproductive potential may be reduced and the possibly more sensitive stages of eggs, pre-settlement larvae, and juveniles may be negatively impacted. GI-19

f. Comparison of Oakland and Alcatraz Sediments

Working with the incomplete information given in the SEIS it would appear that the Alcatraz site is less contaminated than the Oakland harbor sediments. The concentrations of copper, mercury and zinc are consistently higher (except in one sample location for mercury - Icel) in Oakland than at Alcatraz. No determination of oil and grease and petroleum hydrocarbons was made for Alcatraz, but the Oakland concentrations of these contaminants are quite high. These petroleum products have been identified as significant contributors to the decline of the striped bass fishery. Finally, although the bioassays are not really comparable as the entire suite was not run for Alcatraz, the small clam did bioaccumulate some contaminants from the Oakland sites and *not from* the Alcatraz site. GI-20 GI-21 GI-22

9. Conclusion

In sum, the sediment testing and bioassay work indicate that the sediments do carry a contaminant load and that this contaminant load is of biological significance. These results suggest that there is danger to fishery species if Oakland sediments are disposed in the Bay. Therefore, Oakland Harbor sediments should not be dumped in the Bay. GI-23

4. Repeat of Alcatraz Pre-Dredging

It is not clear that pre-dredging the Alcatraz site would be adequate to handle improvements in Oakland ports, improvements in other port facilities, and routine maintenance. GI-24 The Alcatraz site has already mounded more than was expected. The sediments being dredged from the ports are clay-like and thus cohesive and prone to compaction and mounding. The pre-dredging proposal sets a precedent for repeated future dredging at that site. It makes sense with respect to dollar cost, as well as environmental cost, to abandon this alternative. GI-25

B. Need for Ocean Site

Improvements to existing Oakland ports result in much larger volumes of sediment than routine maintenance. As was stated in the preceding section, these sediments should not be placed in the Bay. Alternatives to Bay disposal include marsh building, upland disposal sites, and the designation of an ocean disposal site. The SEIS pursues both Bay disposal and the ocean site alternative. Any designation of an ocean site, however, needs to be done with considerable care and attention to environmental effects. This care and attention is particularly important for the area adjacent to San Francisco Bay because of the important commercial fisheries (for example, the Dungeness crab) and the proximity of the Farallones National Marine Sanctuary. GI-26

The SEIS too quickly eliminates alternative disposal options; i.e., marsh building and upland sites. The marshes of San Francisco Bay have virtually disappeared and mitigation attempts to date have not been successful. The reason for the lack of success is unclear, but it most likely involves poor planning of the projects and little follow up. GI-27 There are some parts of the harbor that appear to have less of a heavy metal load than others. This relatively clean sediment might be considered for marsh development under mitigation, or State, local or private efforts if an appropriate opportunity presented itself. That possibility should be considered. GI-28

As some parts of the Oakland harbors may be clean enough to use for marsh creation, some areas might be so contaminated that upland disposal is the preferred alternative. GI-29 It is not necessary that an upland site be large enough to receive all dredge material from harbor improvement. It need only be large enough to receive that fraction of sediment that is particularly contaminated.

Taking all these concerns into account, consideration of a mixture of disposal options necessitates a more in depth sampling of harbor sediments. GI-30

C. Ocean Site Location

The preferred site of the Corps of Engineers (identified as 1-M in the SEIS) is not acceptable for the reasons that are listed below. GI-31 There is a site, B-2, that was not considered in the SEIS because it does not fall within the 24 nautical mile limit established by the Corps of Engineers (COE). The SEIS notes no factors of concern for B-2, GI-32 and a few miles to the southwest of the site is an area that has depths over 100 fathoms and is outside the submarine operating grounds (see Figure 2.2, SEIS-10). GI-33 The greater distance from shore and the Marine Sanctuary, as well as deeper water depths, suggest that this area is more suitable for dredge spoil disposal than the preferred site. GI-34 More information, however, is needed to determine the acceptability of a site near B-2.

1. Requirement to Designate Ocean Sites off the Shelf

The Ocean Dumping Act regulations (40 CFR 228.5) state that a criterion for the selection of ocean disposal sites is designation, wherever feasible, of locations beyond the edge of the continental shelf. GI-35 The 100 fathom line is a standard delineation of the continental shelf. This depth occurs in the initial Zone of Siting Feasibility (ZSF) set out by the COE. The deep sites of the ZSF were summarily excluded after a choice was made to consider only those within a 24 nautical mile (nm) distance from the mouth of the Bay, the effective range of the Coast Guard's marine radar net. GI-36

We strongly object to the dismissal of sites at the 100 fathom line or deeper. The law directs that this is the depth that must be considered, yet the Corps has ignored this requirement. GI-37 By establishing the ZSF at 38 nm, the Corps implies that transporting dredge spoils, at least to that distance, is economically feasible. GI-38 In some places within this larger zone, the water depth is greater than 500 fathoms. Without some real need - a need which is not substantiated in the GI-39

SEIS - the designation of a site at a lesser depth is in violation of the Ocean Dumping Act. GI-39

4. Fisheries

One rationale for the requirement to place sites beyond the continental shelf is the protection of coastal fisheries, which make up the bulk of the commercial and recreational harvest. As outlined in the SEIS, there are significant fisheries spread throughout the ZSF. Of particular interest to the site designation process is the Dungeness crab fishery, which is in a state of decline. Although crab larvae are found throughout the ZSF, harvesting occurs closer to shore, because of depth and sea conditions during the winter harvest. Considering only shallower sites conflicts with the enhancement of the fishery resource and causes possible navigation problems from barge interference with harvesting vessels. GI-40 GI-41

Disposal beyond 100 fathoms would move the barges beyond the area of harvest of Dungeness crab. In such a deep water setting, there would be less likelihood of resuspended sediments negatively impacting the Dungeness crab fishery and more mixing and dispersal of the contaminated sediments. GI-42

In selecting a deep ocean site, dilution of contaminants is sought, although care must be taken that dilution will be adequate and that the dumping activity is permitted only when alternatives are unavailable. Dilution in ocean waters is more acceptable in this case than disposal in Bay waters. In the Bay, dispersal and dilution would occur in a shallow water setting of much less volume that is already stressed with a high contaminant load. GI-43 GI-44

3. Barge Tracking

The SEIS indicates that the primary factor behind the COE recommendation to locate the dump site within 24 nm of the Golden Gate Bridge is to stay in the radar net of the Coast Guard, which has responsibility under the Ocean Dumping Act for surveillance of disposal vessels. This radar system tracks vessels, similar to the control tower in an airport. The system was developed to provide for safety in the congested traffic lanes coming into and out of San Francisco Bay, an area which often experiences conditions of poor visibility. GI-45

There are a number of alternatives to the radar net for ensuring disposal at the designated site. In particular, the COE should consider another monitoring method that is used by the Coast Guard in the northwest Atlantic that would address both safety concerns and monitoring responsibilities. This is the GI-46

Ocean Dumping Surveillance System (ODSS). The designated ocean disposal site off the coast of New Jersey is the 106 Mile Ocean Disposal Site, which is used for sewage sludge and industrial waste dumping. Recently all sludge dumpers that had been using a site 12 nm from the shore have been required to dump at the 106 Mile Site. As a result, bigger barges that take fewer trips have been built and a legislative directive was passed (a line item in the Coast Guard budget for the development of the system) requiring the Coast Guard to provide a surveillance system as near as possible to real time (that is, a system that will allow the position and state of the ship to be known at any given time). GI-46

The Coast Guard designed the ODSS and has had 3 prototype models in the field on vessels for the last three years. (The development of the ODSS is described in a paper by Russell A. Doughty and William K. May, 1986, An Ocean Dumping Surveillance System, Annual Symposium Wild Goose Association, which is enclosed.) Sixteen more units will be available for use at the 106 Mile Site in the early spring of 1988. The system transmits over VHF radio waves and provides real time information on identification of the vessel, position and draft depth (indicating the amount of the load still on board) out to a distance of 40 to 60 nm. Tracking the vessel for both navigational safety and compliance is accomplished. Beyond that distance the system operates as a "black box" (similar to the concept of the "black box" on aircraft), recording the information at preset time intervals. This information can then be accessed by the Coast Guard monitor when the vessel returns to radio range.

We know of no reason why the ODSS could not be adapted for the San Francisco area to allow for real time monitoring of barge traffic out to the edge of the continental shelf.

4. Distance From the Marine Sanctuary

The COE's preferred site is still quite close (1.7 nm) to the Farallones National Marine Sanctuary. Fine material that is dispersed away from the dump site could move into the sanctuary, especially during the season of upwelling (March through August) when surface waters move away from the coasts and bottom waters (along with fine sediments) rise to the surface. During the time of upwelling the current regime is poorly understood. Longshore currents move to and from the coast line. Given the uncertain nature of the current systems during upwelling, it is not acceptable to site a disposal location so close to the Marine Sanctuary. GI-47

It is now recognized that fine material may be focused in GI-48 areas of high deposition. Focusing is a deposition of sediment within a small geographic area as a result of predominate currents and bottom topographic features, i.e., a canyon in the sanctuary or south or northeast of the dump site. Such focusing might result in a concentration of pollutants and heavy metals which could have a negative effect on biota. Without a clearer understanding of current dynamics, focusing of contaminated sediments in the Marine Sanctuary cannot be ruled out. GI-48

5. Containment or Dispersal

Site designation must be considered in the broader context of the goal of the disposal activity; that is, are the sediments to be dispersed or contained. Until the management goal is clearly stated it is difficult to provide an appropriate site designation critique. GI-49 The COE is worried about sediment moving to the sanctuary, but it believes that in 100 feet of water this will not be a problem. This may be true given the cohesive nature of sediments both from the Oakland harbors and Alcatraz. GI-50 On the other hand, the test results indicate high concentrations of heavy metals and petroleum hydrocarbons in the sediments. These sediments will need to be diluted through dispersal. GI-51 If dispersal is the site management goal (which was the initial, albeit unsuccessful, plan at Alcatraz), then deeper water, especially for cohesive sediments, is indicated. GI-52

This goal must be clearly established in order to develop a proper and effective management and monitoring plan. Without such a clear goal, there is no guidance on where to concentrate monitoring activities; at the dump site or in the surrounding waters. This goal has not been clearly stated. GI-53

6. Characterization of Sediments

Before ocean dumping of dredged material can move forward, more comprehensive sediment chemistry and bioassay tests must be conducted. The results of the suspended particulate bioassays already conducted indicate that Oakland and Alcatraz sediments are contaminated. GI-54 For this reason any ocean site should be at least 100 fathoms deep to ensure adequate mixing and dispersal. GI-55 Further assays need to be conducted to better define the level and significance of this contamination in order to more carefully structure a management and monitoring plan for ocean disposal.

7. Monitoring Plan

The monitoring plan is not laid out in detail. In part, our concern here centers on the absence of any discussion of the methodology or philosophy underlying such a plan. We assume that the tiered approach as outlined in planning documents of both GI-56

the EPA and the COE will be the philosophical basis for any monitoring activity. Both fishery resources and possible focussing of fine sediments will need to be considered and addressed in the plan. GI-56

Also not mentioned in detail is the site management plan. Reference to such a plan is needed in the SEIS to indicate an awareness that timing of barge visits to the dumpsite must be controlled so that mixing and dilution occurs before the next barge load arrives. Here again a well described management goal - dispersal or containment - is a necessary first step. GI-57

Public participation is a critical element in both the monitoring and site management plan. It is extremely important to solicit public involvement; not so much for technical input, but rather to ensure that the public will have some stake in accepting the results. Often, monitoring results are not accepted because the public feels the initial plan was inadequate. The obvious way to avoid this problem is to have public involvement in the planning phase. GI-58

D. Summary/Conclusion

Bay Disposal - the Alcatraz site should not be pre-dredged and Oakland Harbor sediments should not be dumped in the Bay. GI-59 Bay water turbidity and contaminant load would be needlessly increased. The bioassays and sediment chemistry data, which are GI-60 both limited, indicate that negative biological effects will GI-61 occur. Both fishery species and their food sources could be affected. GI-62

Ocean Site - the COE needs to proceed very carefully to characterize and identify the best location off the continental shelf. GI-63 This will take time. Some fraction of the total sediments dredged from the Oakland harbors might go to marsh development GI-64 and some (especially those severely contaminated) might be placed at upland disposal sites. GI-65

Ocean Site Location - the site must be off the continental shelf. The law requires this, fishery resources and the Marine Sanctuary would be better protected, and the sediment contamination burden would be dispersed. An area near site B-2, for example, seems to be a better location than the alternatives presented. GI-66 The surveillance system used by the Coast Guard off the coast of New Jersey, or other tracking or compliance methods, can be used to monitor barge movement. GI-67 Both the monitoring and site management plans need to be defined in more detail, and directly related to the management goal. The tiered approach should be used in developing the plan and the public needs to be involved. GI-68

The Oceanic Society is glad to have the opportunity to convey to you our concerns related to the SEIS. Please give me a call if I can clarify these points further.

Sincerely yours,

Mary C Barber

Mary C. Barber, Ph.D.
Staff Scientist

cc: Joan Patton, Conservation Coordinator
San Francisco Bay Chapter of
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File Name: OS11-24-87 Comment Categories: 2,3,4,5

RESPONSE TO COMMENTS

Agency/Group/Individual: OCEANIC SOCIETY, WASHINGTON
Date of Letter: November 24, 1987

GI-1 Consideration has been given to turbidity and fisheries resources of San Francisco Bay and the potential for adverse effect as a result of pre-dredging and disposal of the 7 million cubic yards of material at the Alcatraz site. See SEIS, Section 4.3.2 for a discussion of biological impacts.

GI-2 It has been the position of the Corps of Engineers that, although over half of the dredge sediments discharged at the disposal site are retained within the Bay, these sediments are rapidly incorporated into the overall sediment regime. See SEIS, Section 3.3.3 for a review of sediment transport from Alcatraz disposal site.

GI-3 Turbidity increases at a disposal site occur at or near the bottom of the point of impact of the discharged material (USACE, 1977, DDS, Main Report: IV-10, Gunther et al., 1987). Elevated suspended solids concentrations occur for approximately 15 to 20 minutes at two or three orders of magnitude above ambient conditions (e.g., 20 mg/l at Alcatraz). These concentrations are associated with fluidized mud flowing away from the point of impact. Turbidity increases in the upper water column, on the other hand, are generally less than one order of magnitude and have durations lasting only a couple of minutes. Given these concentrations, the influence of a disposal operation or a series of disposal operations at Alcatraz on Central Bay turbidity is significantly less than a windy day in San Pablo or Suisun Bay. If, for example, 7 million cubic yards were discharged at Alcatraz annually, then approximately 70,000 to 700,000 cubic yards would be suspended in the upper water column during the year (USACE 1976, DDS, Appendix C: 83). Comparing this amount with the estimated 170 million cubic yards resuspended annually by wind (Krone, 1966) and transported by tidal flows to Central Bay indicates that the influence on the photic zone by disposal operations is negligible.

GI-4 All available turbidity data indicate levels of turbidity in San Francisco Bay in the fall of 1987 were no higher than other times of the year and no higher than in the same time period in some previous years. There was no direct correlation between disposal activity and turbidity levels in the Bay. (See response F-9, *Department of Commerce, NOAA, National Marine Fisheries letter, October 28, 1987.*) Sportfishing operations in the Bay in the fall of 1987 migrated to the more turbid waters of San Pablo Bay from the relatively clear waters of the central Bay and were reported in local papers as "catching the limit".

GI-5 Policy decisions for San Francisco Bay must include many factors beyond the two that are mentioned in the comment.

GI-6 As stated in Section 4.2.2 of the SEIS and in Appendix A to the SEIS, the mere presence of contaminants in the sediment does not mean that a biologically significant effect will occur as a results of disposal of this material. Only a very small fraction of the contaminants present may be available for uptake by an organism. For this reason, bioassay and bioaccumulation testing is conducted.

GI-7 Comment noted.

GI-8 Petroleum products could be one of many factors responsible for the decline of the striped bass. However it is very difficult, without additional data, to determine a direct cause and effect relationship between the striped bass fishery decline and a specific petroleum hydrocarbon level in Bay sediments. Furthermore release of petroleum from dredged material is insignificant compared to direct discharges, spills and urban runoff.

GI-9 Comment noted.

GI-10 Appendix A has been modified to address this concern.

GI-11 Appendix A has been modified to address this concern.

GI-12 Section 404 of the Clean Water Act requires that chemistry of sediments to be disposed in waters of the United States be compared to similar data from the disposal area. Bioassay and bioaccumulation testing were conducted to evaluate the potential environmental effects. Material from the ocean was used as reference material to which these tests were compared. In these tests, the use of reference material from offshore is considered to be a more conservative test because the material is assumed to contain lower concentrations of contaminants.

GI-13 Appendix A addresses this concern.

GI-14 The expressed concerns about the test species, *Rhepoxynius abronius*, are presented as revisions to Appendix A. Additional test species were not used because EPA regulations (40 CFR 227.27) implementing Section 103 of the MPRSA only require that three species be used in the solid phase. Testing was already performed on four species.

GI-15 The use of clams in bioassay tests is recommended in the joint (EPA/USACE/1977) Implementation Manual for Section 103 MPRSA. In fact, they are very common bioassay organisms. However, the Contractor who performed the bioassays, used juvenile clams for toxicity testing because they are more sensitive than larger ones. During these tests, the clams were observed feeding. They also observed the formation of fecal pellets which is another indication that the clams were feeding. Clam mortality was determined by observing gaping shells and no movement when the open shells were probed.

GI-16 Additional testing of Alcatraz sediment has been completed. The results are presented in the SEIS, Section 3.3.6 and in Appendix A.

GI-17 Clams are used in bioassay tests because they are excellent bioaccumulators. It is noted that the soft bodied animal, Nepthys caecoides, showed only minor bioaccumulation for one parameter, silver. However, the clam, which the commenter considers an inappropriate bioaccumulation organism, showed bioaccumulation of four constituents. Please noted that bioaccumulation testing was conducted for 20 days not four days. Appendix A has been modified to include this information.

GI-18 Appendix A has been modified to include an expanded discussion of the interpretation of the bioassay results. Suspended particulate phase bioassays for material from the Alcatraz disposal site are presented in the SEIS, Section 3.3.6 and in Appendix A.

GI-19 Research is currently being conducted by the Corps, EPA, and others in the scientific community to develop tests to assess sublethal effects. Tests using the bivalve larvae, which assesses abnormal development in response to dredged material disposal, and Rhepoxynius abronius, which assess abnormal emergence and reburial behavior in response to dredged material disposal, were performed on dredged material for Oakland Harbor and Alcatraz. These two recently developed tests have standardized procedures published as "American Society for Testing and Materials" methods. However, the test which uses Rhepoxynius abronius has not been shown to be suitable for sediments from San Francisco Bay. The results of tests which measure sublethal effects are extremely difficult to extrapolate to effects in the field. The Corps and EPA are also developing test procedures to assess reproductive effects due to exposure to contaminants in dredged material. However, most of these state of the art techniques need to be proven and then interpretation of results needs to be developed within a regulatory framework.

GI-20 The data show that Oakland Harbor sediments contain higher concentrations of several contaminants than Alcatraz. However, it should be noted that no statistical analyses were performed on the data and that the Oakland results are reported for individual sediment samples whereas the Alcatraz results are a mean of seven analyses. The appropriate tables in the SEIS and Appendix A have been modified to present a range of concentrations for parameters measured at Alcatraz. As mentioned in response to comment GI-6 of this letter, the mere presence of a contaminant in the sediment does not mean that an ecologically significant effect will occur in the field. There is no relationship between bulk sediment concentration and environmental effects (DiSalvo and Hirsh, 1978; Lee and Plumb, 1978; Brannon et al., 1978; Jones and Lee, 1978 and Brannon, 1978).

GI-21 Same response as to comments GI-6 and GI-8 of this letter.

GI-22 Although there was statistically significant bioaccumulation of several metals by the clam, the magnitude of these results indicate that unacceptable levels of bioaccumulation will not occur in the field. Appendix A has been modified to include a more detailed discussion of these results.

GI-23 Response to comment GI-6 of the letter addresses the concentration of contaminants in the *sediment*. Appendix A contains a modified discussion of the bioassay results. The Corps does not agree with the conclusion that the concentration of contaminants is biologically significant or that there would be a danger to fisheries if Oakland sediments, with the exception of material near Schnitzer Steel and Alameda Gateway, are disposed in the Bay.

GI-24 Predredging quantities determined for the Oakland Harbor deepening project are to mitigate bathymetric changes in the disposal area expected from the disposal of 7.0 million cubic yards of dredged material. Disposal of future maintenance materials will be managed as well as new work dredging to minimize mounding at Alcatraz.

GI-25 Opinion noted. For dollar costs of the various alternatives, see the GDM, Section 6. Environmental effects are discussed in Section 4 of the Final SEIS.

GI-26 *Comment noted.* The Corps of Engineers has been studying designation of an ocean dredged material disposal site, environmental effects of designation, and use of such a site in the Gulf of the Farallones for over five years. The results of these studies are found in Appendix F of the SEIS.

GI-27 The potential for marsh development and the availability of upland sites were examined in the individual Final EIS's for Oakland Outer and Oakland Inner Harbor. Appropriate areas for marsh development in the vicinity of Oakland Harbor, or in San Francisco Bay as a whole, require access to tidal waters, require suitable capacity and low elevations in topography. For the most part, such areas already have significant habitat values (i.e., mudflats, or areas behind dikes where potential restoration exists without the need for dredged material). In addition, risk of failure is high as noted in the comment. The availability of upland sites, located within reasonable distance of the project, was evaluated in the Oakland Inner Harbor, FEIS, and none were identified. With respect to trucking material inland, the logistics of preparing a holding area for rehandling prior to transport over land are economically infeasible. The exception would be for accommodation of relatively small amounts of material that may not be appropriate for disposal in the aquatic environment.

GI-28 Comment noted. However, to date no opportunities of the type described have been identified during the project development and review process.

GI-29 Aquatic disposal with underwater capping with "clean" material is planned for contaminated dredged material.

GI-30 The evaluation of harbor sediments is conducted in a "reason to believe" approach. Additional testing was conducted on material in the turning basin based on this approach.

GI-31 The Corps' evaluation of ocean disposal sites is contained in the SEIS, Section 2.4.5 and Appendix F.

GI-32 Besides being outside of the established Zone of Siting Feasibility (see Appendix F, Final SEIS), sampling at site B2 showed it is in a spawning area for Dungeness crabs and conflicts with oil and gas development. The omission of this data has been corrected in the Final SEIS.

GI-33 It is not valid to conclude that a site is more suitable for disposal of dredged material solely because it is deeper or farther from shore.

GI-34 It would not be operationally feasible to use a site in the area specified for the disposal of dredged material (see Appendix F of the Final SEIS). Also, there is no reason to believe that such a site would be more environmentally acceptable to use for disposal of dredged material just because the depth of water will cause greater dispersion.

GI-35 The Corps of Engineers and the U.S. Environmental Protection Agency have developed the Zone of Siting (ZSF) Feasibility Analysis to delineate the area in which it would be practicable to dispose of dredged material before randomly conducting costly and time consuming environmental studies of sites that may later be determined to be unusable due to economic or operational considerations. If a site off the continental shelf (OCS) lies within the ZSF it is considered for designation. If no OCS site is available within the ZSF, the requirement of 40 CFR 228.5(e) is satisfied with respect to the OCS requisite.

GI-36 A draft ZSF Analysis report was cited in the Draft SEIS. The Final ZSF Analysis is attached as Appendix F. The ZSF extends 24 nmi from Pt. Bonita.

GI-37 Comment noted. There are no 100 fathom areas in the ZSF (See SEIS, ZSF Appendix F).

GI-38 The established Zone of Siting Feasibility is 24 nmi from Pt. Bonita not 38 nmi (See response GI-36).

GI-39 As stated in GI-36, GI-37 and GI-38, the ZSF is limited to 24 nmi. That area does not include depths greater than 50 fathoms.

GI-40 Comment noted. Coastal fisheries, both in harvest and recreation, represent factors that must be considered. However, these are not the only factors that must be considered. Other factors included in the statutory guidance that must be considered are economics and operational feasibility.

GI-41 The sites within the ZSF are in waters with depths ranging from 16 (95 feet) to 46 fathoms (275 feet). The location of sites within the ZSF would allow for navigation safety. Fishing vessels operate outside of the radar range; the awkward and cumbersome towed-barge operation would present a greater hazard beyond radar range than within it.

GI-42 Comment noted. The dungeness crab harvest is one of many factors. Areas beyond the radar range were eliminated from detailed consideration as described previously. See response to comment GI-41 and the ZSF (SEIS, Appendix F).

GI-43 Deep water sites are considered dispersive sites and are preferred only when no non-dispersive sites are available.

GI-44 San Francisco Bay is subject to enormous tidal exchange at more than 20% of the total volume, and therefore significant mixing and dilution is accomplished. Admittedly, the volume of the Bay is less when compared to the volume of waters offshore, however, the potential for significant adverse effects associated with dredged material disposal in the Bay must be evaluated considering available mixing volumes. Given that the tidal exchange is large, dilution within the Bay may be acceptable. This is not a commitment to the view that dilution is an acceptable solution to new sources of pollution, but dispersive disposal alternatives must be considered as reasonable means to address low-level contamination already existing in the aquatic environment.

GI-45 The ZSF is based on safety and is not predicated on surveillance of disposal operations (see Appendix F).

GI-46 Surveillance of disposal operations to insure that the disposal of dredged material is confined to the correct site as well as insuring little or no leakage of dredged material occurs in route to the site will be undertaken with a system similar to the one specified in the comment.

GI-47 Detailed numerical modeling of the disposal sites has been undertaken. Dispersion and accompanying transport toward the Gulf of the Farallones National Marine Sanctuary is not indicated (Tetra Tech, 1987b).

GI-48 Comment noted. See response to comment GI-47. Because sediments from disposal will not move toward the marine sanctuary (Tetra Tech, 1987b), focusing of sediments within the sanctuary due to dredged material disposal at Site 1M is not likely to occur.

GI-49 Sites 1M and B1 are nondispersive sites. OCS sites are likely to be dispersive but may "focus" sediments as suggested in comment GI-48 or trap sediments in a density layer in the water column and transport the trapped sediment a long distance before deposition.

GI-50 Please refer to above response to comment GI-47.

GI-51 See GI-52.

GI-52 Dispersal is not the the site management goal of the ocean dredged material disposal site. Capping of contaminated materials is planned. Because Alcatraz has not been 100% dispersive, does not mean that it is an unsuccessful dispersive site. Refer to Section 3.3.3, of the SEIS.

GI-53 Comment noted. See response to comment GI-52.

GI-54 The Corps does not agree that more comprehensive sediment chemistry and bioassay tests need to be conducted for the entire Oakland project. However, the Corps reviewed the results of testing completed to date, and the concerns raised by different agencies and determined that additional testing was needed on sediment adjacent to Schnitzer Steel and Alameda Gateway (the former Moore Drydock and Todd Shipyard). The results of this testing are presented in the SEIS, Section 3.2.1 and in Appendix A. Appendix A contains a complete discussion of the bioassays and the rationale behind the Corps' determination that material from Oakland, except for material from Schnitzer Steel and Alameda Gateway, is suitable for unrestricted disposal at Alcatraz or in the ocean. Since suspended phase bioassay results for sediment from Alcatraz were not presented in the draft SEIS, it is unclear how the conclusion was reached that the results of this testing indicated that Alcatraz sediments are contaminated. However, these tests have now been completed and are presented in the SEIS, Section 3.3.6 and in Appendix A.

GI-55 Most sediments from San Francisco Bay contain elevated concentrations of contaminants (Long et al., 1987). The basic concern related to disposal of dredged material is to what extent are the sediments contaminated and whether they meet the criteria for ocean disposal. Depth is not the single factor that governs acceptability of ocean disposal of dredged material. Many other factors must be considered in identifying an appropriate ocean site. See 40 CFR 228.5 and 228.6 and Appendix F, SEIS.

GI-56 A monitoring program has been included in the SEIS, see Section 4.6.

GI-57 See response to comment GI-52. The schedule of barge trips will depend on the production rate of the dredges, the time it takes for hauling material to the site, and the number of barges in operation. Controlling the intervals of dumping is not needed as the time for barge trips offshore would provide adequate intervals for material settling. With exception of material near Schnitzer Steel and Alameda Gateway, the dredged material from Oakland has been identified as having no unacceptable effects requiring dilution. The dredging and disposal operation is expected to continue year round.

GI-58 Public and agency input to the monitoring and site management plan will be considered. EPA and the Corps of Engineers have monitoring and management responsibilities.

GI-59 Comment noted, however, the Corps does not concur.

GI-60 Comment noted, however, the Corps does not concur.

GI-61 The response to comment F-6 and therein referenced comments, EPA letter of December 7, 1987 discusses why additional sediment chemistry data are not necessary. The response to comment GI-54 of this letter discusses why additional bioassays, except for two areas within Oakland Harbor, are not necessary. Appendix A discusses the Corps' conclusion that unacceptable impacts to the marine environment will not occur due to disposal of material from Oakland (excepting material from Schnitzer Steel and Alameda Gateway, as previously mentioned) in the Bay or at the ocean disposal sites.

GI-62 Fish and other species and their food sources could be affected by disposal in the Bay and in the ocean. However, their effects would be small in magnitude and, for the most part, temporary. See Section 4.3.2 in the SEIS.

GI-63 Further study of an ocean dredged material disposal site off *the continental shelf* is unwarranted as it would lie outside of the Zone of Siting Feasibility. Hence, use of such a site for disposal of dredged sediments would not be practicable.

GI-64 Marsh development has been eliminated from detailed consideration. See response to comment GI-27 and SEIS (Section 2.4.2).

GI-65 Upland disposal for the project has also been eliminated except as necessary for material which is not acceptable for aquatic disposal under specific circumstances. See response to comment GI-27 and SEIS (Section 2.4.1).

GI-66 Refer to responses to above comments GI-32, GI-34 and GI-55.

GI-67 See response to comment GI-46.

GI-68 Comment noted. See response to comment GI-58.

PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS, INCORPORATED

Reply to:
☒ P.O. Box 1626
Sausalito, CA 94966
(415) 332-5080

☐ P.O. Box 1896
Sacramento, CA 95809
(916) 448-8805

18 November 1987

Col. Galen H. Yanagihara
District Engineer
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

RE: SEIS on the Oakland Outer and Inner Harbor
Navigation Improvements

Dear Col. Yanagihara:

The Pacific Coast Federation of Fishermen's Associations (PCFFA), representing 22 commercial fishermen's organizations in California and has the following comments on the above-entitled document.

First, the PCFFA does not oppose the dredging requested by the Port of Oakland. It does oppose, however, the dredging proposed for the Alcatraz Disposal Site and the disposal of spoils from this project at the Alcatraz Disposal Site. GI-1

Second, PCFFA has had an ongoing concern with the existing dumping of spoils at the Alcatraz Disposal Site. In 1986, PCFFA joined with other members of the San Francisco Bay Basin Plan Task Force and recommended to the Regional Water Quality Control Board the following:

Disposal of dredge spoils must be controlled.

FINDINGS: Inadequate monitoring of toxic pollutants and uncoordinated regulation by government agencies render regulation of dredging in the Bay unsatisfactory. In view of new evidence of toxic contamination due to dredge spoils disposal in the Bay and the lack of adequate transport of spoils in the Bay to the ocean, plans to expand the Alcatraz dump site have to be viewed with alarm.

RECOMMENDATIONS: The Basin Plan should:

- Establish criteria and a time schedule to prohibit the disposal of dredge spoils which have adverse impacts on water quality in the Bay.

STEWARDS OF THE FISHERIES

- Institute immediate monitoring and charaterization of toxic pollutants and toxicity in dredge spoils material.

- Require the Regional Board to review all U.S. Army Corps of Engineer permits, monitoring programs and test protocols relating to dredge spoils disposal.

Third, PCFFA has received numerous complaints from fishermen this year regarding the disposal of present dredge spoils at the Alcatraz Disposal Site and the impacts this dumping is, or may be having, on chinook salmon, Dungeness crab, herring and sole and flounder that utilize the Bay for spawning and nursery habitat. GI-2 As a result of these complaints and in reviewing reports on the amount of material existing presently at the Alcatraz Disposal Site, the problems with Bay circulation (i.e., reduction of fresh water inflows as a result of the state and federal water projects), and the probable toxicity of the dredge spoils, the PCFFA Board voted on 13 November to oppose any further dumping of dredge spoils at the Alcatraz Disposal Site or any other location in the Bay or nearshore (i.e., inside of 50 fathoms).

It is our recommendation therefore that the dredging of the Oakland Outer and Inner Harbor to improve navigation be permited provided:

- there be no dredging of the existing Alcatraz Disposal site; and

- all dredge spoils would be disposed of at site B2 listed in the SEIS.

The benefit of such a dredging scenario would be to protect the Bay habitat, fisheries and fishing grounds. The cost would be that involved with the additional travel to an offshore site; a cost that would be slight in comparison to the $66 million annual benefit that is expected to come to the local economy from the navigation improvements. GI-3

We wish to thank you for providing the additional time for the submission of comments on the SEIS. If you or your staff have any questions, please call. Your attention to this matter is appreciated.

Sincerely,

W.F. "Zeke" Grader, Jr.
Executive Director

WFG:lrb

cc: Bay Conservation & Development Commission
San Francisco Bay Regional Water Quality Control Board
Environmental Protection Agency, Region IX
California Department of Fish & Game
Pacific Fishery Management Council
National Marine Fisheries Service

File Name: PCFFA11-18-87 Comment Categories: 4,5,9

RESPONSE TO COMMENTS

Agency\Group\Individual: PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS

Date of letter: November 18, 1987

GI-1 Comment noted. See responses to comments F-3 and F-9, Department of Commerce, NOAA, National Marine Fisheries Service letter, October 28, 1987.

GI-2 Spawning and nursery habitat of the species referenced have not been significantly impacted by disposal of dredged material at the Alcatraz disposal site. Spawning and nursery habitat exists throughout the bay in shallow waters away from the Alcatraz site. The distance of shallow waters from the site is great enough to minimize effects of suspended sediment from disposal that it becomes indistinguishable from the natural suspended sediment loading of the system.

GI-3 Please refer to the Project Economic Section in the GDM (Section 6) for a cost comparison.

UNITED ANGLERS OF CALIFORNIA
2830 TENTH STREET
SUITE 4 / BERKELEY
CA 94710 / 415 845 3533

October 19, 1987

Colonel Galen Yanagihara
District Engineer
San Francisco District
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

RE: SFEIS on the Oakland Outer and Inner Harbor Navigation Improvements

Dear Colonel Yanagihara:

United Anglers of California is the state's largest fishery conservation organization. On behalf of our 20,000 members and 70 statewide affiliated organizations, we would like to express our concerns regarding the SFEIS, the EIS and the project as proposed.

Our review of the Oakland Outer and Inner Harbors Deep-Draft Navigation Improvements Draft Design Memorandum Number 1 and the Supplement to the Environmental Impact Statement for this project cause our organization to adamantly urge you to revise these documents and to change the selected project alternative.

Should you fail to do so, the results could be catastrophic to the San Francisco Bay, and the sport anglers and commercial fishermen who use the Bay's fisheries.

The document has not made a proper assessment of the environment impacts

which can be reasonably expected to result from the selected project alternatives. It has also overlooked and/or not properly taken into consideration those impacts to the Bay's aquatic environment which it has identified. GI-1

In failing to properly evaluate and address all environment impacts the document and especially the EIS/SFEIS will violate the following state and federal laws: GI-2

1. The National Environmental Protection Act and the California Environmental Protection Act.
2. The Clean Water Act, Section 404.
3. The Fish and Wildlife Coordination Act.
4. The Coastal Zone Management Act.
5. The Marine Protection, Research and Sanctuaries Act of 1972
6. McAteer Petris Act and the Bay Plan as established by the Bay Conservation and Development Commission.
7. The State Water Quality Control Policy for Enclosed Bays and Estuaries.

ENVIRONMENTAL ASSESSMENT:

Due to reasons not fully understood by our organization at this time, but obviously related to the costs associated with disposal of spoils, the environmental assessment failed to include the following critical information: GI-3

A. The full extent of the environmental impacts of dredge disposal at the Alcatraz site on the aquatic environment, fishery habitat, angling and commercial fishing habitat and the cumulative impacts of the current level of disposal when combined with impacts expected from the project as proposed.

B. The full extent of the economic impacts which can reasonably be expected to take place on the sport angling and commercial revenues generated by sport and commercial fishing industries.

The following information must be included in your environmental documentation and it should play a major role in the process of selecting which alternative will become the project alternative.

Over the past two to three years, anglers, partyboat operators and commercial fishermen who traditionally fish for a wide range of fish in the San Francisco and San Pablo Bays have suffered significant declines in harvest and revenues because of the extensive siltation of the Bay's waters. This siltation used to be associated only with natural occurring conditions. Over the past two years the siltation due to dredge spoil disposition has often made the water so turbid that the fishery and angling habit of the San Francisco and San Pablo Bays are no longer productive areas to fish during larger periods of time in the summer and fall months. GI-4

This turbid condition has been directly associated with dredge disposal activities at the Alcatraz site numerous times by partyboat operators and anglers fishing from private craft. Their on-the-water observations have in recent years and especially for the past two years verified that the dumping of spoils has turned the water to a turbid condition the color of mud over most of the main bay for prolonged periods of time. GI-5

In addition, this turbidity has continued for such a long duration that fishing effectiveness is reduced to the point of stopping angling in the open

waters of the Bay for weeks and or months at a time. The result is the loss of angling recreation and a significant decline in revenues generated by such activities.

The following sport fisheries have been affected: striped bass, salmon, halibut, shark, perch, flounder, croaker and sturgeon. These fisheries generate millions of dollars annually to local, regional, state and federal economics. The situation has become so serious in recent years that many partyboat businesses may be forced out of operation if the impacts related to spoil disposition is not corrected by the spring of 1988. This in turn will have major economic impacts and will return a severe loss in angling on the Bay.

We therefore urge that the EIS/SEIS and all related project documentation be revised to include: GI-6

1. A review of the impacts of the current method of dredge disposal on:
   (a) The use of Bay fishery habitat by the species previously listed as well as on the forage species used by these fisheries.
   (b) The impacts related to sport and commercial fishing activity in the Bay.

2. An assessment of the impacts on sport and commercial fishing in the bay which can be reasonably expected to occur from: (A) the current level of spoil disposal (B) the addition of 7 million cubic yards if the Alcatraz site is selected. (C) the cumulative impact of these activities. GI-7

3. An assessment of impacts if appropriate ocean site is selected. GI-8

4. The cumulative impacts of disposal if the project alternative selected GI-9

is the Alcatraz site and how this would change if an ocean site were selected and, an estimate of additional impacts of the projects planned for Hunter's Point, and Richmond.

5. The economic impacts to sport and commercial fishing in the Bay from the current amount of disposal of spoils in San Francisco and San Pablo Bays, and the anticipated impacts if the project as envisioned is implemented. GI-10

RELATED ISSUES:

A. DESIGN MEMORANDUM #1:

1. P.34, 5.3 In-Bay Disposal sites, 2nd paragraph: Because of excessive accumulation at this site and the need to slurry spoils to reduce the amount of accumulation, this site is no longer a good site. This should be noted in this section. GI-11

2. P. 36, 5.5 Formulation of Disposal Plans: This section does not note what is meant by "the double impact" of dredging and disposal to prepare the Alcatraz site for disposal of spoils from the Oakland Project. It also fails to note that the slurry method used may put an end to sport and commercial fishing activity in the main Bay. These omissions should be corrected. GI-12

3. P. 37, 5.6.1 Cost Estimates. This section fails to take into consideration the loss of revenues from sport and commercial fishing which would occur as a result of the maintenance dredging and the major effects that will occur if this project were selected. It should be revised. GI-13

4. P. 37, 5.6.2 Environment Impacts. This section and the table it refers to must be revised to address the impacts we have noted above. GI-14

B. DRAFT SUPPLEMENT I TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT:

1. P. iii, 3. Major Conclusion Findings. This entire section does not include an assessment of impacts to Bay fisheries, their habitat, angling and commercial use of the aquatic habitat, and the economic impacts to these business and sport angling recreation. It should be revised. GI-15

2. P. v, #4. Area of Controversy.

(a) The statement here is faulty in regard to the belief that sediment disposal is "not considered additive to the overall sediment dynamics of the Bay system." Because it represents a "redistribution" as you note it also represents adding a significant amount of sediments back into the system due to the activity of dredging and disposal. This should be noted. GI-16

(b) Resolution of Controversies, IV

(1) It is incorrect to deal with controversies by saying they have been resolved because the Corps has taken a position. Taking a position may or may not resolve a controversy depending on what position is taken. In this case the position taken does not resolve the controversy. GI-17

(2) While the system does carry a significant sediment load, we cannot find any information to support the Corps assertion that "turbidity resulting from disposal...is of short duration." Direct on-the-water observations offers just the opposite conclusion. This section must be revised accordingly. GI-18

(3) Second paragraph of b.: We wonder why water clarity is not GI-19

included in determining if water quality of the Bay is being degraded? Certainly turning Bay waters to the *color of mud* has impacted the use of the Bay for fishery activities and affected the water quality as far as fish and anglers are concerned. We also wonder why tests were not run to evaluate this impact as they were *for* other water quality parameters? These issues need to be addressed in this section.

P. vi, unresolved issues 5. The statement that "there are no unresolved issues is not valid as is the statement that (6a) "the authorized project is in full compliance with environmental laws and regulations." Appropriate revisions must be made which address the following issues. GI-20

(6b) NEPA and CEQA: the intent and purpose of NEPA and CEQA have not been met nor will they until the information we have asked for be provided and is provided. GI-21

(6c) *The* objective of the Clear Water Act, Sect. 404 has not been met because the preferred alternative does *not* "restore and maintain the chemical, physical and biological integrity" of the Bay. The project will in fact have the effect of degrading the chemical, physical, and biological integrity of the estuary. The impacts of the preferred alternative - by definition - cannot achieve the objective. GI-22

(6d) Just because *you attempt to address issues does not mean you resolve* them. This should be duly noted in this section. It must be noted that we do not feel the Corps has been sanctioned by our government to serve as a final arbitrator. The state and federal fish and wildlife agencies are the GI-23

"authoritative agencies" whose expertise cannot be nullified just because you endeavor to address issues.

The facts regarding these agencies position relative to using the Bay as a disposal grounds for dredge spoils are clear. The letter from the U.S. Fish and Wildlife *Service in appendix B* - Fish and Wildlife Coordination-is a prime example. The Service states:

...Our basic position has always been that first priority for disposal...should be upland areas followed by ocean disposal. Only if these alternatives are not feasible should open-water disposal in the Bay be considered, and then only on ebb tides."

The Corps has not demonstrated that ocean disposal is not feasible. You have only shown that it is more expensive to haul spoils to an appropriate ocean site. Since you have not included critical economic impacts of Bay sport and commercial fishing this evaluation must be revised accordingly. In addition, because you have not properly assessed the impacts on sport and commercial fishing and on recreational opportunity, you have not demonstrated that *the preferred* alternative is less expensive. Nor have you addressed the cumulative costs the proposed alternative may have on these activities, costs which could be significant! GI-24

(6h) The proposed alternative is not consistent with the San Francisco Bay Plan and McAteer Act. The Bay plan requires (see p. 33 of your design memorandum): "C. The designated disposal area will be selected with due consideration to being least harmful to the *ecology of the Bay*." Dumping spoils in the ocean would be far less destructive to the Bay and it should be GI-25 noted in this section!

(6i) The Marine Protection Research and Sanctuaries Act of 1972 requires that it is national policy to prevent or limit the dumping of material that would "adversely affect the human welfare or amenities, the marine environment, ecological systems or economic potentialities..." The selected alternative violates this policy because other alternatives exist which would not be nearly severe. **GI-26**

(6k) Your consideration of the selected project alternative is faulty for all the reason we have cited in this section. This means any consistency determination is invalid! **GI-27**

CONCLUSION:

We urge you in the strongest possible terms to take immediate action to properly revise EIS and SEIS and all related documentation. We believe that, when properly studied and analyzed, the impacts that have resulted from disposal of spoils in the Bay are of major importance to the quality of life for all those who enjoy and utilize the Bay-Delta estuary, and that destroying that which is left of sport and commercial fishing on the Bay is not in the best public interest. **GI-28**

Sincerely,

J. Beuttler

John Beuttler

Executive Director

File Name: UA10-19-87

Comment Categories: 2, 3, 4, 5, 7, 9, 11

RESPONSE TO COMMENTS

Agency/Group/Individual: UNITED ANGLERS OF CALIFORNIA
Date of Letter: October 19, 1987

GI-1 The Corps has obtained additional testing data and has performed additional interpretation of the biological implications of the results. See the SEIS, Section 4.3 and 4.4 as well as Appendix A.

GI-2 Comment noted.

GI-3 The extent of the environmental impacts that can be reasonably expected from dredged material disposal on the aquatic environment (See Section 4.2.2 of the SEIS), fishery habitat (See Section 4.3.2 of the SEIS), fishing (See Section 4.4.2 of the SEIS), and cumulative impacts (See Section 4.5) have been considered in the SEIS based on the best available data.

GI-4 The charge that dredged material disposal has made water "so turbid that the fishery and angling habitat of the San Francisco and San Pablo Bays are no longer productive areas to fish during larger periods of time in the summer and fall months" is totally without basis in fact. The parties making the charge have not contacted the Corps of Engineers to attempt to relate dredged material disposal quantities to alleged increases in turbidity. There is no such correlation. There has been no net increase in the quantity of dredged material discharged at the Alcatraz site over the last two years nor a significant increase in material dispersed and carried from the site. Besides, the fishing season with highest alleged turbidity, May through October 1986, corresponded with the lowest rate of disposal activity in several years. Additionally, substantial increases in water temperature, insolation, and salinity, wind generated waves resuspending material from shallow portions of the Bay, reduced freshwater inputs, migratory difficulties due to low flow, and coastwide phenomenon were ignored as potential causes for changes in the fishery. Typical seasonal distribution patterns were purposefully disregarded. California Department of Fish and Game has reported the striped bass sportfishery in central San Francisco Bay as normally being at a standstill from September through winter (Skinner, 1962). Still, the claims of the decline in the striped bass sportfishery in the Central Bay in September and October are fueling these charges. The available scientific evidence overwhelming suggests that the Bay is a naturally turbid environment and that the major sources of turbidity are naturally caused.

Purported declines in sportfisheries in the Central Bay were offset by increases in the more turbid waters of San Pablo and Suisun Bays. The fishermen should be the first to realize that Central Bay water is the least turbid water of San Francisco Bay and that if fish are migrating toward more turbid areas, that excess turbidity is not a driving cause. There is no correlation between the level activity of dredged material disposal and purported turbidity, nor any substantiated connection between the alleged high turbidity in San Francisco Bay and the ostensible decline or migration of some fisheries.

GI-5 Surface turbidity at the Alcatraz site due to disposal of dredged material is caused by very low concentrations of suspended solids. The elevated level is of extremely short duration and of limited areal extent (SAIC, 1987). Turbidity at the disposal site and in the Central Bay are overwhelmingly dominated by the back and forth, tidally propelled, movement of the sediment laden waters from the shallow areas of the Bay and Delta and the relatively clear ocean waters, through the Central Bay.

GI-6 See Section 4.3 in the SEIS.

GI-7 See Sections 4.4.2 and 4.5.1 in the SEIS.

GI-8 The environmental impacts of ocean disposal are addressed in Sections 4.2 and 4.3 the Final SEIS.

GI-9 Cumulative impacts are discussed in Section 4.5.1 of the Final SEIS.

GI-10 There are no documented or quantified attributable economic impacts to sport or commercial fishing in the Bay from the present amount of disposal of dredged material in San Francisco Bay and San Pablo Bay. See Section 4.4.2 in the SEIS.

GI-11 Comment noted. See response to comment F-9, Department of Commerce, NOAA, National Marine Fisheries Service letter, October 28, 1987.

GI-12 See response to comment GI-57, Citizens for a Better Environment letter, November 20, 1987.

GI-13 See response to comment GI-10 above and Section 4.4.2 in the SEIS.

GI-14 Revisions to the text and Table have been made.

GI-15 A summary discussion of fisheries has been added to the referenced section.

GI-16 The statement has been clarified in the Final SEIS.

GI-17 See response to comment F-16, Department of Commerce, NOAA National Marine Fisheries Service letter, October 28, 19[illegible]

GI-18 Please refer to section 4.2.1 of the Final SEIS and the response to comment GI-5, above.

GI-19 See SEIS, Section 3.3.4.

GI-20 Several major issues have been identified and are discussed in the Unresolved Issues section.

GI-21 The final SEIS attempts to address all issues raised. The Corps of Engineers believes it is in compliance with NEPA.

GI-22 The preferred alternative now is direct ocean disposal.

GI-23 Comment noted. The Corps of Engineers is mandated by Congress to carry out congressionally authorized projects, such as Oakland Harbor in the Water Resources Development Act of 1986. In so doing, the project will comply with the applicable environmental laws and regulations and will be properly coordinated with other agencies.

GI-24 See SEIS, Section 2.8.

GI-25 Comment noted.

GI-26 Comment noted.

GI-27 Comment noted.

GI-28 The views presented are appreciated. Conversely, the impacts that may result from no disposal of dredged material in the Bay are also "of importance to the quality of life for those who enjoy and utilize the Bay-Delta estuary" For example, sport and commercial fishing on the Bay would be adversely impacted if small craft berths were not efficiently dredged.

VENTANA
ALUMINUM MFG. CO. 1425 DONNER AVE • SAN FRANCISCO CALIF 94124 • PHONE 822 8170

12-11-87

U.S. Army Corps. of Engineers
211 Main Street
San Francisco, Ca. 94105-1905

Col. Galen Yanagihara,

I am writing this letter to protest the dumping of dredge spoils in San Francisco Bay. I do a lot of fishing in the bay and I feel this will deteriorate the spawning grounds and eventually wipe out the fishing. GI-1

The dump site should be moved out to sea. The loss of the fishery will prove to be more expensive than moving the dump site.

Get on the ball, stop destroying the bay!

Peter Rossi

P. Rossi
Ventana Aluminum

File Name: VAM11-12-87

Comments Categories: 4

RESPONSE TO COMMENTS

Group/Individuals: VENTANA ALUMINUM MFG. CO.
Date of Letter: December 11, 1987

GI-1 The Corps acknowledges that fish populations in the Bay have declined historically; however, the problem is related to many factors including fresh water diversion from the Delta, pollution from point source dischargers, urban runoff, etc. Dredge sediment discharged at the Alcatraz disposal site is tested for contamination prior to disposal and must meet requirements of the Regional Water Quality Control Board. Additionally, most of the sediment does not remain in suspension for more than a few minutes, nor does it travel far (distance) from the disposal area. Thus, "spawning grounds" are unlikely to be affected by dredge material disposal either by sediments covering egg laying areas or by the release of contaminants into the water column.

NOV 13, 1987

RONALD D. BURCH
1651 BEACH PARK BLVD.
FOSTER CITY, CA 94404

COLONEL GALEN YANAGIHARA
U S ARMY CORPS of ENGINEERS
211 MAIN ST
SAN FRANCISCO, CA 94105 1905

DEAR MR YANAGIHARA

PLEASE STOP THE DUMPING OF DREDGE SPOILS NEAR THE ALCATRAZ ISLAND. IT IS ~~SEVERLY~~ SEVERELY HAMPING THE ABILITY OF FISH AND OTHER AQUATIC LIFE TO REMAIN IN THE SAN FRANCISCO BAY.

GI-1

THE SPOILS CAN BE TAKEN DIRECTLY TO A MORE SUITABLE LOCATION IN THE OCEAN, AND NOT DUMPED IN THE BAY FIRST.

GI-2

CONSIDER THE CONSEQUENCES OF DREDGING ARE ENOUGH WITHOUT COMPOUNDING THE DAMAGE BY DUMPING THE SPOILS NEARBY

THANK YOU,
Ronald D Burch

File Name: BUR11-13-8[illegible] Comment Categories: 4

RESPONSE TO COMMENTS

Agency Group Individual: RONALD D. BURCH
Date of Letter: November 13,198[illegible]

GI-1 See response to comment GI-[illegible], Citizens for a Better Environment letter, November 20, 198[illegible].

GI-2 See response to comment E-2[illegible], Environmental Protection Agency letter, December [illegible], 198[illegible].

I recently read a[n] article that deeply disturbed me. The article [illegible] that the Army [illegible]

The article led me to believe that the Army Corps of Engineers [illegible] GI-1

[illegible] GI-2

File Name: CONI1-.1-87 Comments Categories: 4

RESPONSE TO COMMENTS

Agency/Group/Individual: CHRISTINE CONCEICAO
Date of Letter: November 23, 1987

GI-1 The shoreline areas surrounding San Francisco Bay are naturally shallow. To accommodate commercial and recreational vessels, the navigation channels and berthing areas of Bay Area ports must be dredged to adequate depth. This activity has been ongoing since the late 1800's with much of the dredged sediment being disposed in open water off Alcatraz Island. Following passage of the National Environmental Policy Act in 1969, the Corps conducted several studies to assess the impacts of dredging and disposal on the environment. Additionally, water quality tests are conducted on all dredged sediment to determine its suitability for disposal.

GI-2 Several alternatives have been considered and are discussed in the draft and final SEIS. In an ideal world no impacts to the environment would be encountered as a result of any project. Unfortunately, economic development has concomitant environmental trade-offs; however, one goal of project planning is to minimize the environmental impacts to the extent possible.

187 Alpine Terrace
San Francisco Ca 94117

November 19, 1987

TO: Col. Yanikahara
U.S. Army Corps. of Engineers
211 Main Street
San Francisco Ca 94105

Dear Sir,

I was in attendance at your public hearing on the General Design Memorandum and Supplement to the Environmental Impact Statement for Oakland Harbour Deepening held on November 5, 1987 at the Sausalito Bay Model. In accordance with your directions that evening I am now availing myself of the opportunity to provide you with my comments after having attended the public hearing and having reviewed the published material.

It is my understanding that the Water Resources Development Act of 1986 authorized dredging the estuary from a current depth of 35' MLLW to 42' MLLW. Plates 1-6 in your Design Memorandum document show in several places that the depth of the estuary has already been dredged to a depth of 42' or greater. Is this in conformance with the Act? Is this in error? Is the intent to dredge from current depths of 45' MLLW to 52' MLLW? GI-1 The Bay is already under considerable stress from existing dredging activity and the disposal from this additional dredging activity creates severe environmental problems for the marine environment. GI-2 The proposal for dumping the dredged material in your preferred oceanic dumping site on the boundaries of the Farrallones marine sanctuary is totally out of the question. GI-3 While it is understandable that the Bay is under sever pressure because of dredging and other types of polluting activity it is not advisable to use that as an excuse to begin polluting the remainder of the ocean. GI-4 I look forward to your next draft of the Design Memorandum and will be active in ensuring that the Corps takes into consideration the effect of this project on the environment and considers more than just the economic benefits to the Port of Oakland.

Your Sincerely,

G. Gasper (Mr)

cc: Sierra Club

File Name: GAS11-19-87 Comments Categories: 7,5,3

RESPONSE TO COMMENTS

Agency/Group/Individual: G. GASPER
Date of Letter: November 19, 1987

GI-1 Berths 20,21,22,23, and 24 in the Outer Harbor and berths 67 and 68 in the Inner Harbor are authorized by COE permit no. 14728E35 to a depth of - 42 feet. During recent maintenance dredging some areas of the Oakland Outer Harbor Channel were overdredged.

GI-2 The Bay, by its very nature, is subject to stress by physical processes. The dynamic nature of the estuarine system allows it to assimilate man-induced activities. The extent to which the system can accept such impact has been the subject of many studies and expert opinions. The severity of impacts on the marine environment related to dredged material disposal is tempered by the active Bay sedimentation/resuspension system. The extent of impacts from dredged material disposal at the Alcatraz Site has been found acceptable using available testing guidance. However, the aquatic Bay environment is also continually impacted by other influences of significantly greater magnitude, which may also contribute to the stressed environment. The disposal of material must be viewed within the context of natural processes and other man-induced activities.

GI-3 The ocean dredged material disposal sites are sufficiently removed from the Gulf of the Farallones National Marine Sanctuary that the effects of dredged material disposal will be below ambient levels or unmeasureable at the Sanctuary boundary.

GI-4 The San Francisco Bay and Delta estuary is a naturally turbid environment with high levels of suspended sediments prevalent most of the year. Aquatic life in the Bay and delta, like all life on the planet, is adapted to survive subject to the particular set of environmental conditions under which it normally lives. Stress to an ecosystem is caused by a marked deviation in one or more of the indigenous environmental factors to which the biota has become adapted. Dredged material disposal at the Alcatraz site does not cause a marked deviation
in any environmental parameter within the Bay. While the ocean ecosystem is more fragile, and the introduction of dredged sediments may represent change in environment, the vast assimilative capacity of the ocean is sufficient to accommodate dredged sediments from the estuary without causing significant change in environmental parameters.

WE WOULD APPRECIATE YOUR COMMENTS

PLEASE WRITE OR CALL

CAPT. SAM LACKEY
2118 GREAT HIGHWAY
SAN FRANCISCO, CALIF. 941[illegible]

(415) 974-0329 (Dennis Thiel)

Oakland Harbor Deepening
Public Meeting Nov. 5, 1987

(PLEASE PRINT)

YOUR NAME	SAM LACKEY
NO. & STREET	2418 GREAT HIGHWAY
CITY	SAN FRANCISCO
STATE	CALIFORNIA ZIP 94116
COUNTY	SAN FRANCISCO
ORGANIZATION IF ANY	Golden Gate Fishermans Assn.

Dear Sirs,

As a commercial fisherman and Party Boat Operator for over 40 years I have seen a steady decline of our fisheries. All of the decline in my opinion is due to man made problems, water diversions, bay fills, pollution and so forth. This year with the silting of the water the bay and Golden Gate the fisheries inside were completely wiped out.

GI-1

I have occassion to run at night. Always there was phosphorescence in the water due to microscopic life organisms. The Spark of Life the basic element in the marine food chain.

GI-1a

This year the Spark of Life is gone until you are eight miles outside of the gate. There has been no anchovies in the bay for the first time in my experience.

GI-1b

I am not opposed to Oakland dredging its harbor, but for all the income it is supposed to bring in they should spend more money and use a 4th generation disposal sight. Deep Ocean waters at 100 fathoms or more off of the continental shelf. The Alcatraz disposal sight should be closed once and for all.

GI-2

Thank you

Sam Lackey

Please fold this sheet and tape or staple the edge. -- NO POSTAGE REQUIRED --

File Name: LAC11-5-87 Comments Categories: 5,3

RESPONSE TO COMMENTS

Agency/Group/Individual: CAPTAIN SAM LACKEY
Date of Letter: November 5, 1987

GI-1a The success of fishing in central San Francisco Bay in 1986 and 1987 has been commented upon by numerous fishing interests as being poor compared to past years. However, Sport Fishing in San Pablo Bay, Suisun Bay and the Delta have been reported as being good to very good.

GI-2b The dearth of anchovies in San Francisco Bay this year appears to be part of a larger coastwide phenomenon and not related to disposal of dredged material, since anchovies were also reported absent from Santa Cruz and Bodega Bay. This phenomenon is indicative of the typical variation in fish population and distribution.

GI-2 Please refer to ZSF Analysis Report appended to the Final SEIS.

December 3, 1987

Col. Galen Yanagihara
U. S. Army Corps of Engineers
211 Main St.
San Francisco, CA 941[illegible]

Dear Sir:

I am writing to express my concern over the dumping of dredge spoils in San Francisco Bay. As a registered republican and local businessman, I hardly consider myself a left wing radical, but I was also born here and have watched the fisheries make a tremendous decline over my lifetime. The commercial and sport fishing industries are a viable part of the local economy. A cost saving in one sector (disposing of dredging) to the detriment of another sector (fisheries) does not seem to me to be a decision that benefits the economy and/or community at large. The Japanese have taught us a big lesson about producing inferior products to reduce cost. Let us learn that lesson and do the job right, it is cheaper in the long run and we all will be happy. Thank you.

GI-1

Yours truly,

Victor C. Norling

Victor C. Norling

VCN:aid

7 DEC 1989

WE WOULD APPRECIATE YOUR COMMENTS

PLEASE WRITE OR CALL

(415) 924-0379 (Dennis Thuet)

Oakland Harbor Deepening
Public Meeting Nov. 5, 1987

(PLEASE PRINT)

YOUR NAME Pat Osborne
NO & STREET 4 Amalfi Pl
CITY San Rafael
STATE Ca ZIP 94901
COUNTY Marin
ORGANIZATION IF ANY

My comments are concerning "Dumping The spoils at Alcatraz." Any new material dredging and any excessive amount of dredging must go out to the 2nd [illegible] spot.

The fishing industry has been hurt due to Alcatraz dumping — I am a sport fisher-person and [illegible] the Bay fishing is poor. GI-1

The dredging material [illegible] (Oakland is new material (not maintenance dredging) and it is [illegible]! The [illegible] [illegible] understand they need [illegible] in the [illegible] — [illegible] them [illegible] [illegible] know) This is best for everyones concerned!

Pat Osborne

PS: Excellent presentation & hearing — only a 3 min clock should be used. [illegible] for the [illegible] [illegible] [illegible]

Please fold this sheet and tape or staple the edge — NO POSTAGE REQUIRED

File Name: OSB11-5-87 Comments Categories: 5

RESPONSE TO COMMENTS

Agency/Group, Individual: PAT OSBORNE
Date of Letter: November 5, 1987

GI-1 Bay fishing varies. Fish populations are not constant from year to year. Numbers of fish are dependent on reproductive success. Fish distribution in the ocean and in the Bay can also be extremely different for a number of reasons. Some fish may respond to fresh water outflow which can change water salinity. Certain fish may also be sensitive to small temperature changes (e.g. striped bass) The feeding behavior of fish (e.g. herring) may be influenced indirectly by the location of its particular food supply. See response to GI-57, Citizens for a Better Environment letter, November 29, 1987.

E-155

NOV 18, 1987

[illegible] Galen Yanagihara
Army Corps of Engineers
2[illegible] Main St
San Francisco, CA 94105-1905

Re:

I would like to add my name to the list of Bay Area anglers vehemently opposed to the dumping of dredge spoils your organization is applying for at Alcatraz Island in San Francisco Bay. I pay an annual fishing license fee and a large amount of taxes and I resent the fact that your dumping is ruining my recreation time. GI-1

I am sure there are good reasons for the dredging to be done but I am equally sure there are better places for you to dump your garbage; places that would not cause the catastrophe that results from the central bay dumping. Our fisheries are already under severe pressure from a variety of problems (lack of fresh water in the bay, toxic chemicals being dumped by the refineries, etc.), please don't add further problems. Our government should NOT be in the business of ruining the bay. GI-2

Sincerely
Raymond Wanner
3231 Crane Ave
Castro Valley, CA 94546

cc: Senator Pete Wilson
Senator Alan Cranston
Congressman Pete Stark

File Name: WAN11-18 Comments Categories: 4

RESPONSE TO COMMENTS

Agency/Group/Individual: RAYMOND WANSER
Date of Letter: November 18, 1987

GI-1 Comment noted.

GI-2 The Alcatraz dredge material disposal site has been is use since 1894. Impacts to fisheries as a result of disposing material at the site have never been demonstrated. See response to comment GI-57, Citizens for a Better Environment letter, November 20, 1987.

NOVEMBER 18,1987

ONE OF NINE IDENTICAL LETTERS. THE REMAINING EIGHT FOLLOW.

COLONEL GALEN YANAGIHARA
U.S. ARMY CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO,CA 94105-1905

COLONEL GALEN,

I AM QUITE UPSET TO SEE THE ARMY CORPS OF ENGINEERS DUMPING MILLIONS OF YARDS OF DREDGE SPOILS AT ALCATRAZ. NOT ONLY IS SHOCKING TO HEAR ABOUT,IT IS INCONCIEVABLE THAT SOME ONE WOULD BE THAT IGNORANT AS TO DUMP IT WHERE IT WOULD EFFECT THE WHOLE BAY ECOLOGICAL SYSTEM. GI-1 I AM SURE THAT THE CORPS COULD FIND SOME PLACE THAT NEEDS LAND FILL AND COULD PROBABLY SELL THE SLUDGE TO THEM. GI-2 INSTEAD OF KILLING OUR SALMON,STRIPED BASS,STEELHEAD,SARDINE,HERRING,HALIBUT, AND ALL THE OTHER LIFE THAT GOES WITHIN THAT CYCLE. GI-3 IT WOULD BE BETTER TO RID OF THE SLEDGE ELSE WHERE.

I AM WRITING THIS LETTER IN PROTEST OF THE DUMPING.

I AM HOPING THAT SOMEONE CAN FIND A SOLUTION TO THIS PROBLEM.

IF OAKLAND WANTS IMPROVE THIER HARBOR,I SUGGEST THAT THEY FIND ANOTHER PLACE TO DUMP THIER SLUDGE. IS IT POSSIBLE THAT SOMEONE IS BLIND,AND CANNOT SEE WHAT EFFECT IT IS HAVING ON OUR FISHERIES ?

YOU WILL PROBABLY RECIEVE LOTS OF THESE LETTERS,AS I AM COPYING THIS AND LETTING OTHER PEOPLE SEND IT IN.

File Name: NINE11-18-87 Comments Categories: 4

RESPONSE TO COMMENTS

Agency/Group/Individual: *Nine Identical Letters*
Date of Letter: November 18, 1987

GI-1 Comments from the public are appreciated. San Francisco Bay is, by its own nature, a very active system. Tidal waters exchange and mix oceanic waters with Delta outflow. The dredged material that has been and is presently being disposed at the Alcatraz site is also by nature a part of a very large sedimentation system of the Bay. Before disposal at the Alcatraz site is permitted, the dredged material is evaluated. For the most part, the material has been found acceptable for aquatic disposal at the Alcatraz site. Although there are effects, the effects have not been found significantly adverse or unacceptable.

GI-2 The type of material referred to as "dredge spoils" implies "sludge-like" material. In fact, dredged materials are basically Bay sediments. These sediments are composed of fine-grained sand, silts and clay. Sludge on the other hand is composed of mainly organic and concentrated refractory matter.

GI-3 There is no substantial scientific evidence that supports the allegations that acceptable dredged material disposed at the Alcatraz site has been significantly detrimental to fish migrating through the Bay. Refer to response to comment GI-57, Citizens for a Better Environment letter, November 20, 1987.

HOFMANN & YAKUSHI PHYSICAL THERAPY INC
Federal ID No. 94 2284855
1001 SNEATH LANE SUITE 110
SAN BRUNO CA 94066
(415) 871 1590

Nov 27, 87

Col. Galen Yanagihara
U.S. Corps of Engineers
211 Main St.
S.F. 94105

Re: DUMPING DREDGE SPOIL INTO S.F. BAY.

I think that the preservation of the Bay far outweighs the cost of dumping out in the Ocean.

GI-1

The Bay is a fragile & priceless environment & its health is vital to our fishing - sport & commercial.

Please stop the DUMPING

[illegible]
[illegible]
FRANK YAKUSHI

File Name: YAFII-22 Comments Categories: I

RESPONSE TO COMMENTS

Agency Group Individual: HOFMANN & YAFFE PHYSICAL THERAPY, P.
Date of Letter: November 27, 198?

GI-1 Comment noted. The Final SEIS addresses environmental impacts and economic costs of the proposed disposal of dredged sediments in the Bay and in the ocean.

APPENDIX F

ZONE OF SITING FEASIBILITY

Zone of Siting Feasibility Analysis
for the
San Francisco/Gulf of the Farallones
Ocean Dredged Material Disposal Site

US Army Corps
of Engineers
San Francisco District

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ZONE OF SITING FEASIBILITY ANALYSIS FOR THE SAN FRANCISCO/GULF OF THE FARALLONES OCEAN DREDGED MATERIAL DISPOSAL SITE

February 1988

1.0 INTRODUCTION

1.1 PURPOSE

The San Francisco District of the U. S. Army Corps of Engineers is evaluating candidate ocean sites for disposal of dredged sediments from San Francisco Bay. The Corps of Engineers (COE), in consultation with the Environmental Protection Agency (EPA), has been investigating candidate ocean sites with the intent of the EPA designating a permanent ocean site for dredged material under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1977 and EPA's Ocean Dumping Regulations and Criteria (40 CFR 220-225, 227-229). No ocean sites are presently available for disposal of fine-grained material dredged from navigation projects within the Bay.

1.2 REPORT ORGANIZATION

This report documents the initial review process for identifying general areas within which unconfined, open water disposal of dredged material could take place. In Chapter 2, a general description of the area evaluated, the operational considerations, and the economic factors are presented in order. Afterwards, the presented factors are evaluated to delineate the ZSF. The evaluation is based on review of the available literature and information obtained through recent field investigations in the study area.

1.3 PROCEDURES FOR SITE DESIGNATION

General procedures and criteria for designating ocean disposal sites are specified in the Ocean Dumping Regulations (40 CFR 220 (July 1, 1986) et seq.) which implement Title I of the Marine Protection, Research, and Sanctuaries Act. The COE and the EPA have added to this general framework by developing the concept of the ZSF (COE/EPA 1984; Science Applications International Corporation 1986). The ZSF analysis defines the area within which disposal of dredged material would be feasible based on operational, economic, and regulatory criteria. Candidate disposal sites within this zone are then evaluated according to environmental criteria. The EPA has determined that an Environmental Impact Statement (EIS) or its functional equivalent will be issued by the EPA for each of its disposal site designations under Section 102 of the MPRSA (Memorandum of Understanding Between the Department of the Army and the Environmental Protection Agency 1987). The EIS prepared for this ocean disposal site designation will contain an evaluation of each of the candidate sites within the Zone of

Siting Feasibility, including the preferred site. The Environmental Impact Statement prepared for this designation will be issued by Region IX of EPA; COE will be a cooperating agency. The EIS will comply with all aspects of the National Environmental Policy Act (NEPA) (42 U.S.C. 4341 et seq.). The major steps necessary to designate an ocean disposal site as outlined in the Ocean Dumping Regulations and the COE and EPA policy are shown in Figure 1-1.

1.4 NEED FOR AN OCEAN DISPOSAL SITE

There is currently no ocean disposal site available near San Francisco Bay to receive fine-grained dredged material. An ocean disposal site which had been used previously for such material, the Farallon Islands site, was given interim designation by the EPA in 1977 (40 CFR 228.12(a)). Final designation of that site was not pursued because the site was located within the Gulf of the Farallones National Marine Sanctuary (Figure 1-2), established in 1982. According to regulations that designated the sanctuary, disposal of dredged material within the sanctuary boundaries is prohibited except as may be necessary for national defense or to respond to an emergency threatening life, property, or the environment (15 CFR 936.6). The only other dredged material disposal site offshore of San Francisco Bay is the Channel Bar site adjacent to the Main Ship Channel. This site is currently available for disposal of material "...which is composed primarily of sand having grain sizes compatible with naturally occurring sediments at the disposal site and containing approximately five percent of particles having grain sizes finer than that normally attributed to very fine sand (0.75 mm)" (40 CFR 228.12 (b)(22)).

Historically, a large portion of the sediments dredged from San Francisco Bay have been disposed of at a site located south of Alcatraz Island in San Francisco Bay (Figure 1-3). Approximately 3.8 million m^3 (5 million yd^3) of dredged sediments are disposed of at the Alcatraz site annually. This volume includes material from maintenance dredging of existing navigation projects by the San Francisco District of the COE, as well as material dredged by other government agencies and private parties under permits granted by the COE under Section 404 of the Clean Water Act.

The Alcatraz Site is currently shoaling. The average depth of the site is expected to decrease to about -13.7 m (-45 ft MLLW) by 1989 or 1990 if disposal of dredged material at the site continues at the present rate. Continued accumulation of dredged material at the site after this point will result in severe impacts to existing dredging and disposal operations. Hopper dredges would be unable to navigate in areas of the site less than -11.9 m (-39 ft) MLLW. Present COE policy is to continue disposal of sediments from most government and private dredging projects at the Alcatraz disposal site, providing the material is acceptable for aquatic disposal under Clean Water Act and local regulations. It is anticipated that periodic removal of a portion of the accumulated material at the Alcatraz site will be undertaken with disposal at the ocean site. Removal of 1.9 million m^3 (2.5 million yd^3) is proposed for 1988. Thereafter, annual removal is expected to be 1.1 million m^3

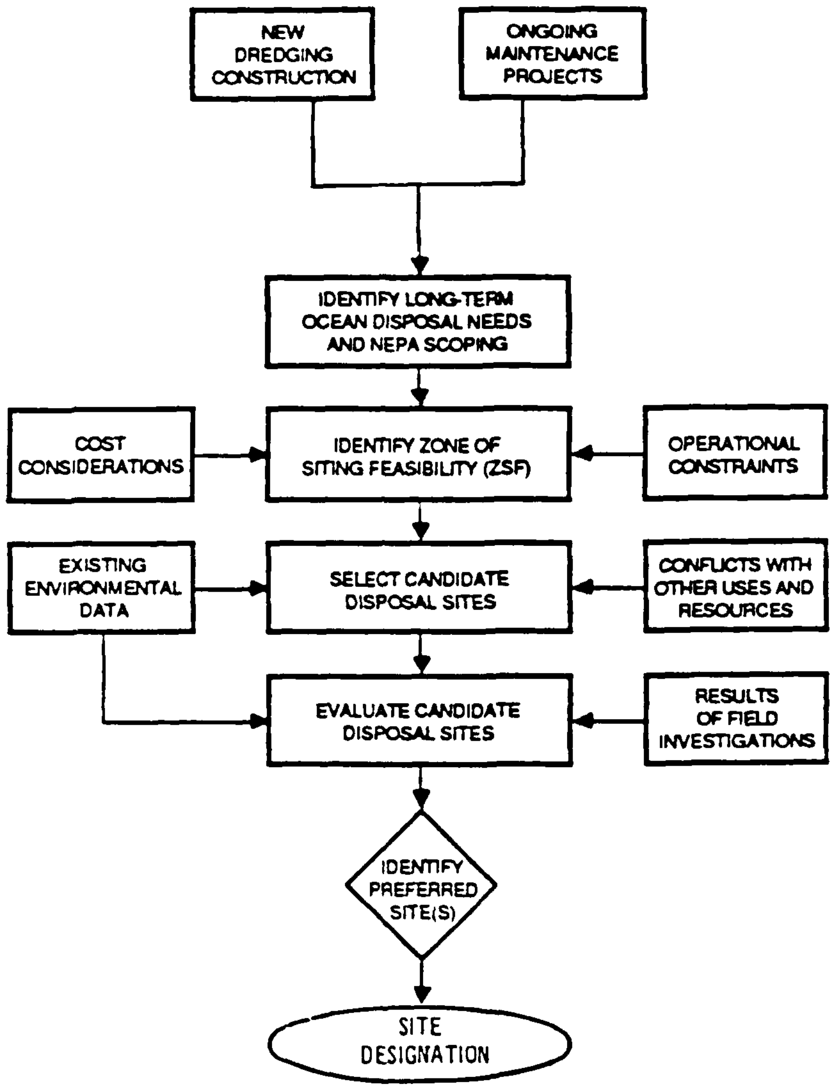

Figure 1-1. Ocean disposal site designation flow chart.

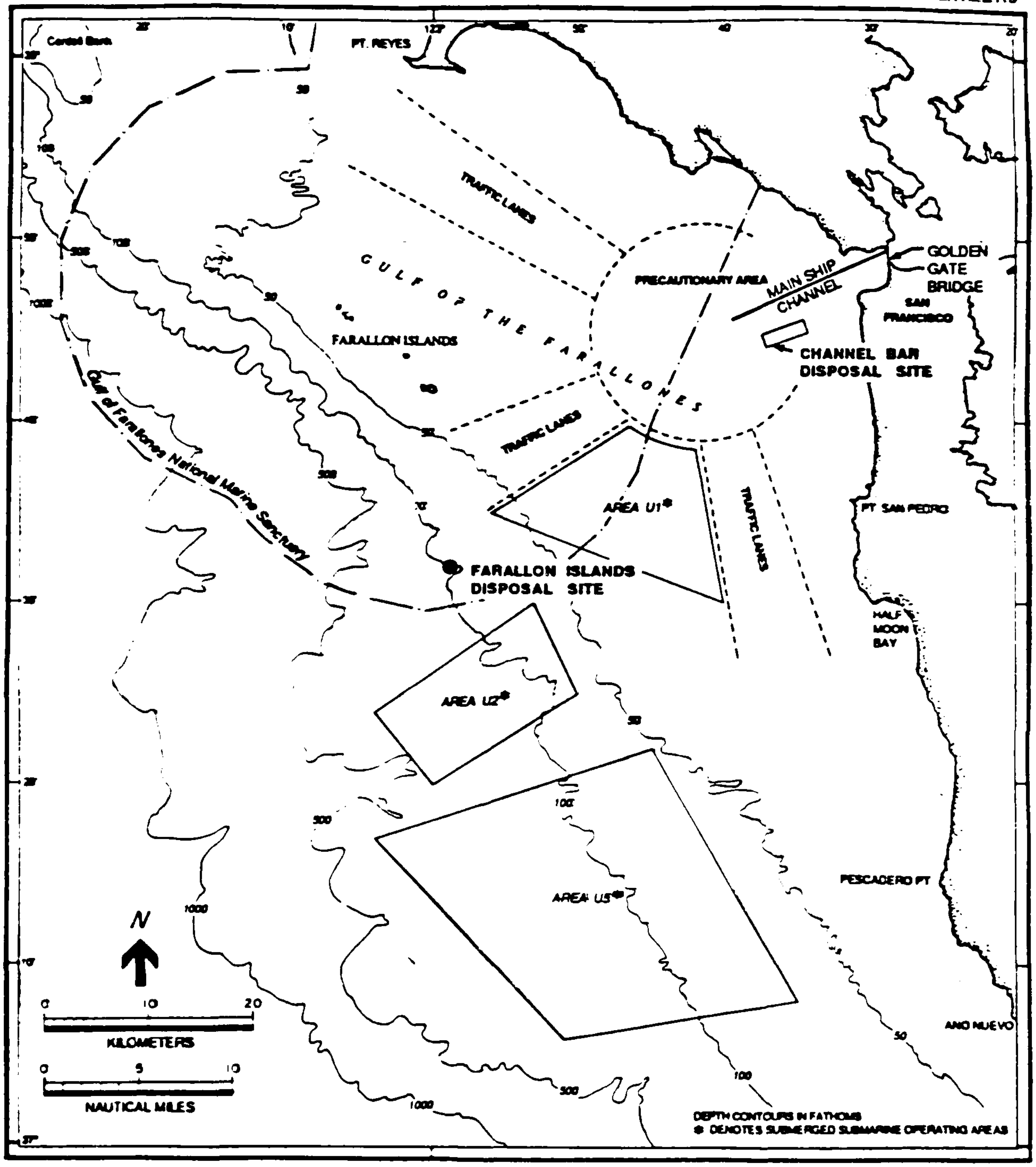

Figure 1-2. San Francisco dredged material disposal site study area.

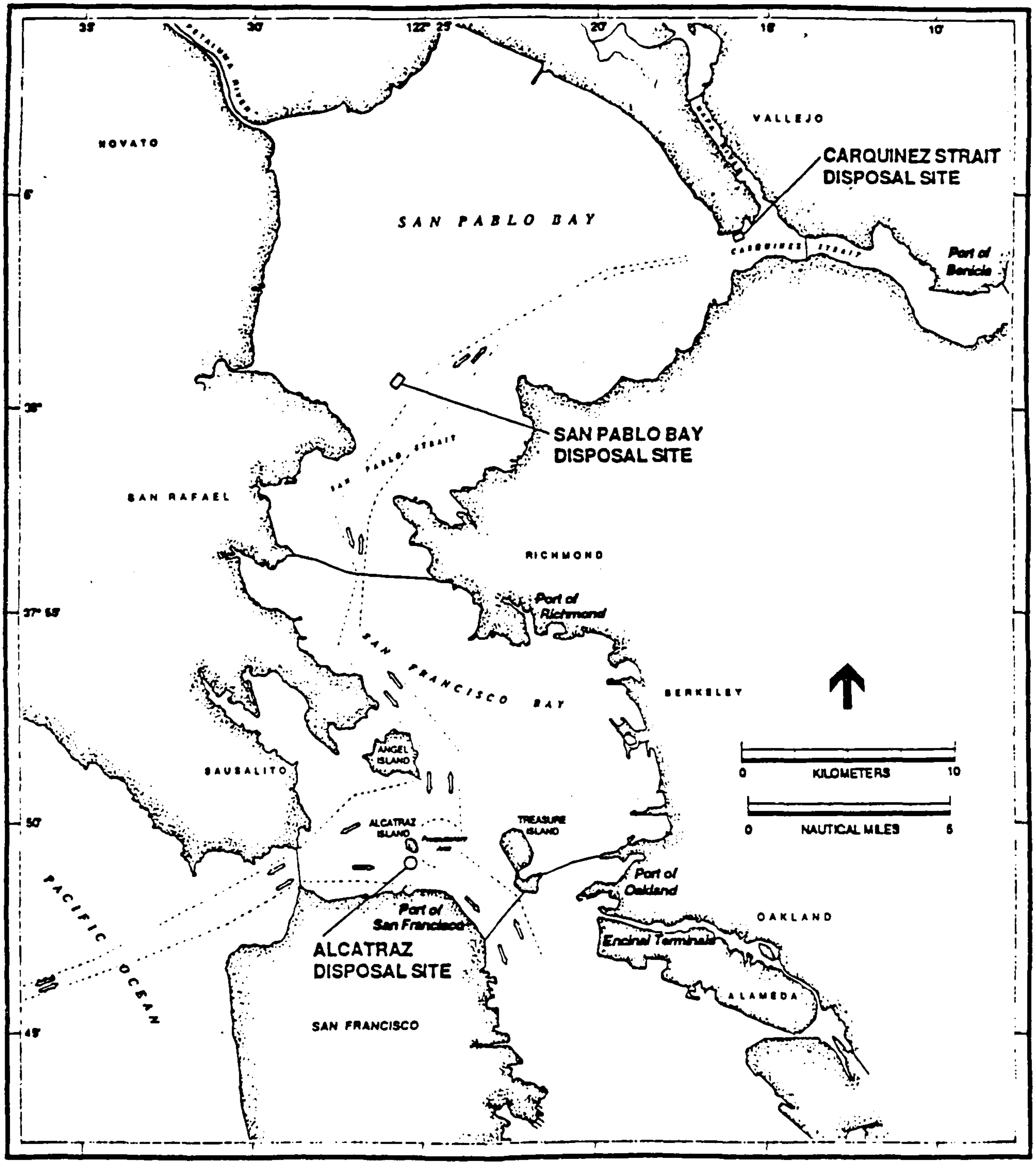

Figure 1-3 San Francisco Bay and Alcatraz Disposal Site.

(1.5 million yd^3) of sediment. This removal rate is considered adequate because approximately 70% of the material disposed of at the Alcatraz site is expected to be dispersed and carried from the site by tidal currents.

Disposal of sediments from several new COE navigation projects planned over the next ten years cannot be accommodated at the Alcatraz site. Because land disposal alternatives are limited, the COE is planning either ocean disposal or disposal at Alcatraz with rehandling of material to the ocean. Potential COE dredging projects from 1988 to 2007 that could include ocean disposal are listed in Table 1-1, along with the volume of material to be dredged and the proposed project start dates. For the purpose of this analysis, it is assumed that all projects will be constructed and that disposal will occur at the ocean disposal site. The volumes of material planned for ocean disposal are presented in Figure 1-4 for 1988 through 1997. After 1997, it is anticipated that the selected site will be used for the annual disposal of the 1.1 million m^3 (1.5 million yd^3) of sediment removed from the Alcatraz disposal site. These are the only known projects for which ocean disposal is planned or has been proposed at this time.

Quantities and project specific data from those listed projects will be used throughout this Zone of Siting Feasibility Analysis and in the subsequent Site Selection and Site Designation Reports. However, the ultimate goal is designation of an ocean site to receive dredged material from any proposed dredging project in San Francisco Bay where the proper permit has been obtained from the COE and the material has been determined to be suitable for discharge at the designated ocean site.

TABLE 1-1: PLANNED DREDGING PROJECTS WITH OCEAN DISPOSAL 1988-2007

Project	Volume of Sediments (million yd^3)	Start Date
Oakland Inner Harbor	4.2	May 1988
Oakland Cuter Harbor	3.1	May 1988
Richmond Harbor Phase I	1.4	Oct 1989
Richmond Harbor Phase II	3.6	unscheduled
J.F. Baldwin Ship Channel Phase III	12.6	unscheduled
Proposed Initial Dredging at Alcatraz	2.5	June 1988*
Total Annual Maintenance at Alcatraz (1989-2007)(based on 1988 start)	28.5	
TOTAL	55.9	

* Estimated scheduled start; presently, unscheduled

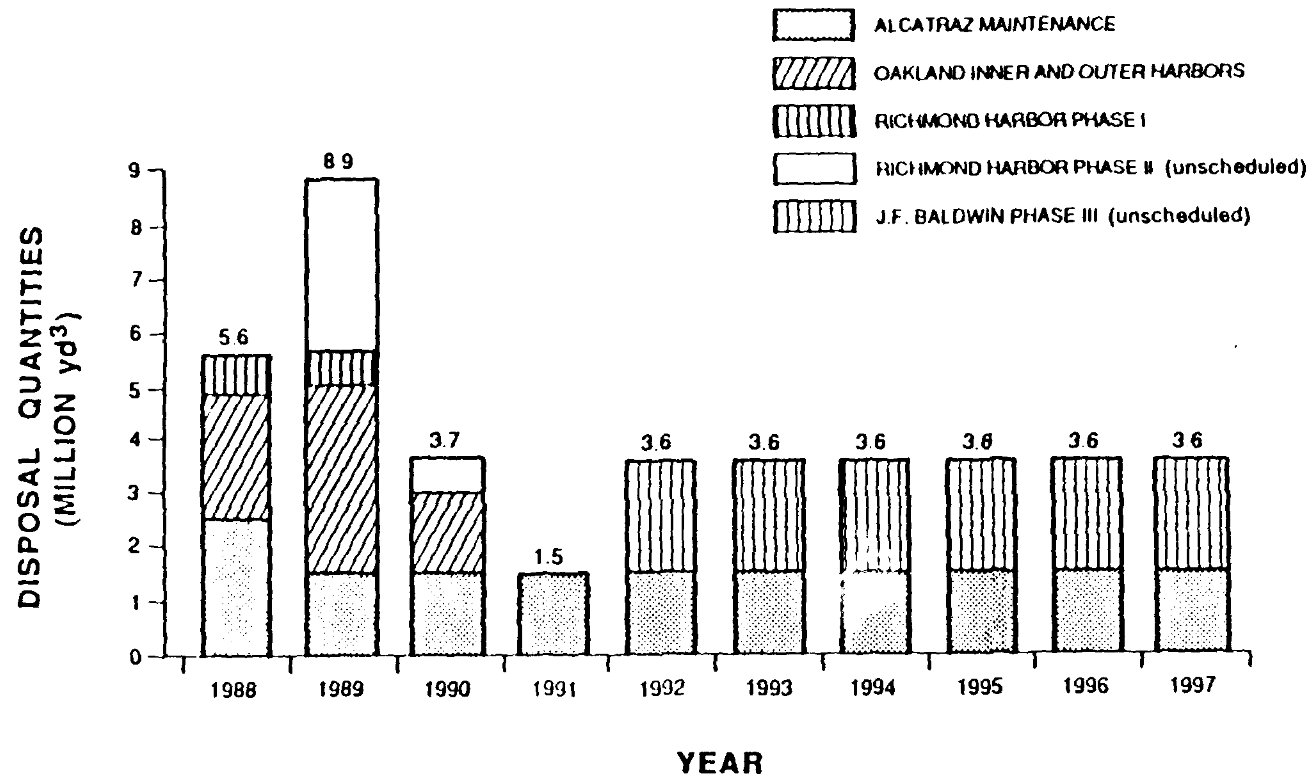

Figure 1-4. Volume of dredged material planned for ocean disposal (1988-1997).

2.0 ZONE OF SITING FEASIBILITY

2.1 INTRODUCTION

EPA's Ocean Dumping Site Designation Delegation Handbook for Dredged Material (SAIC 1986) provides the following guidance:

> "In this phase, the geographic area of consideration must first be defined. Reasonable distance of haul is a determining factor and will be affected by such considerations as available dredging equipment, energy use constraints, costs, and safety considerations. Then, within this 'Zone of Siting Feasibility' (ZSF), a preliminary analysis, based on available data, is applied to identify and map reach boundaries for critical resources as well as zones of incompatibility. Such critical areas and resources may include clustered areas of geographically limited fisheries and shell fisheries, navigation lanes, beaches, and marine sanctuaries."

2.2 ANALYSIS TO DETERMINE BOUNDARY LOCATION

2.2.1 APPROACH

For this analysis, the outer limits of the ZSF are determined by operational and economic constraints. Operational factors include equipment type and availability, sea condition limitations, marine traffic safety, disposal surveillance, and environmental monitoring of the disposal site. Economic factors are primarily controlled by the haul distance to the disposal site but can also be affected by equipment type and availability, weather or sea conditions, and fuel use.

2.2.2 OPERATIONAL CONSIDERATIONS

2.2.2.1 Equipment type and availability. Appropriate equipment type for each dredging job is determined by the density of the sediments to be dredged, the distance to the disposal site, and equipment maneuverability. Of the types of dredging work undertaken in the Bay, hydraulic pipeline, hopper, and clamshell dredging; only clamshell dredging in conjunction with barge transport appears practical. A pipeline extending several kilometers through the Golden Gate to the designated site is not feasible. As haul distances increase, hopper dredges spend a higher percent of time hauling and a smaller percent of time actually dredging, and become less efficient. For the ZSF analysis it is assumed that all dredging and subsequent transport to an ocean site will be by clamshell dredge and disposal barge and that a sufficient number of tugs and barges are available to satisfy dredging needs.

2.2.2.2 Sea condition limitations. The relative calm of San Francisco Bay contrasts sharply with the wave environment in the Gulf of the Farallones. Prevailing west-northwest to north-west winds drive waves onshore during the summer months. The strongest waves however, are generated by low pressure storms travelling west to east across the Pacific in winter months. In both instances, the main ship channel across the San Francisco Bar (Figure 2-1) is likely to be the most difficult to navigate during ocean disposal operations. The rapid rise of the sea floor at the bar increases wave height and the irregular bottom topography induces refraction. Beyond the bar, where the sea is less affected by bottom topography, conditions are not expected to vary significantly with distance from shore. Duration of exposure to the relatively hostile sea conditions of the Gulf of the Farallones will increase as haul distance increases.

The tug and ocean certified barge configuration deemed most appropriate for the projects requiring ocean disposal cannot operate safely when wave heights exceed 3.0 m (9.8 ft.) and wave periods are nine seconds or less. The occurrence of wave heights of 3.0 m (9.8 ft) with periods of nine seconds or less over the past five years at a station near the Farallon Islands is about 6.5%. Coincidence of these waves with seasonal Pacific storms and their immediate after-effect is high. The frequency of Pacific storms in the winter season and their rarity at other times of year will compel ocean disposal operators to schedule operations seasonally.

2.2.2.3 Navigation safety. The United States Coast Guard (USCG) has established marine traffic separation lanes and vessel movement reporting systems to aid in safe navigation of the waters of San Francisco Bay and more recently, the ocean immediately offshore from San Francisco Bay. The monitoring of a portion of the Gulf of the Farallones near the Golden Gate, was initiated after an incident between a commercial vessel and a smaller fishing boat that resulted in loss of life. For both the Bay and the ocean offshore from San Francisco Bay, inbound and outbound vessels are routed to separate unidirectional lanes similar to boulevards. Precautionary areas are established where traffic lanes intersect or vessels enter, leave, or cross the established lanes. The Offshore Vessel Movement Reporting System (OVMRS) is utilized by the USCG to monitor vessels transiting the ocean outside of San Francisco Bay by radar within about a 51.9 km (24 nmi) radius of Pt. Bonita in good weather and by radio within a 70.5 km (38 nmi) radius of Mt. Tamalpais (Figure 2-2). The voluntary radio information service provides advisory information on other vessel's identities and positions, weather, and routes. The radar net provides relative locations of vessels to one another and to the shore.

The tug and barge configuration most likely for ocean disposal of dredged material is one tug towing two 2294 m^3 (3000 yd^3) or two 3058 m^3 (4000 yd^3) barges. The barges would be towed in tandem with 91 to 183 m (300 to 600 ft) separating each vessel; the total length of the tow can approach 366 m (1200 ft). Disposal vessels are expected to travel at 9.3 km/h (5.0 kn) within the bay and 7.4 km/h (4.0 kn) in the ocean. The configuration and overall length of the tow require a large turning radius.

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS

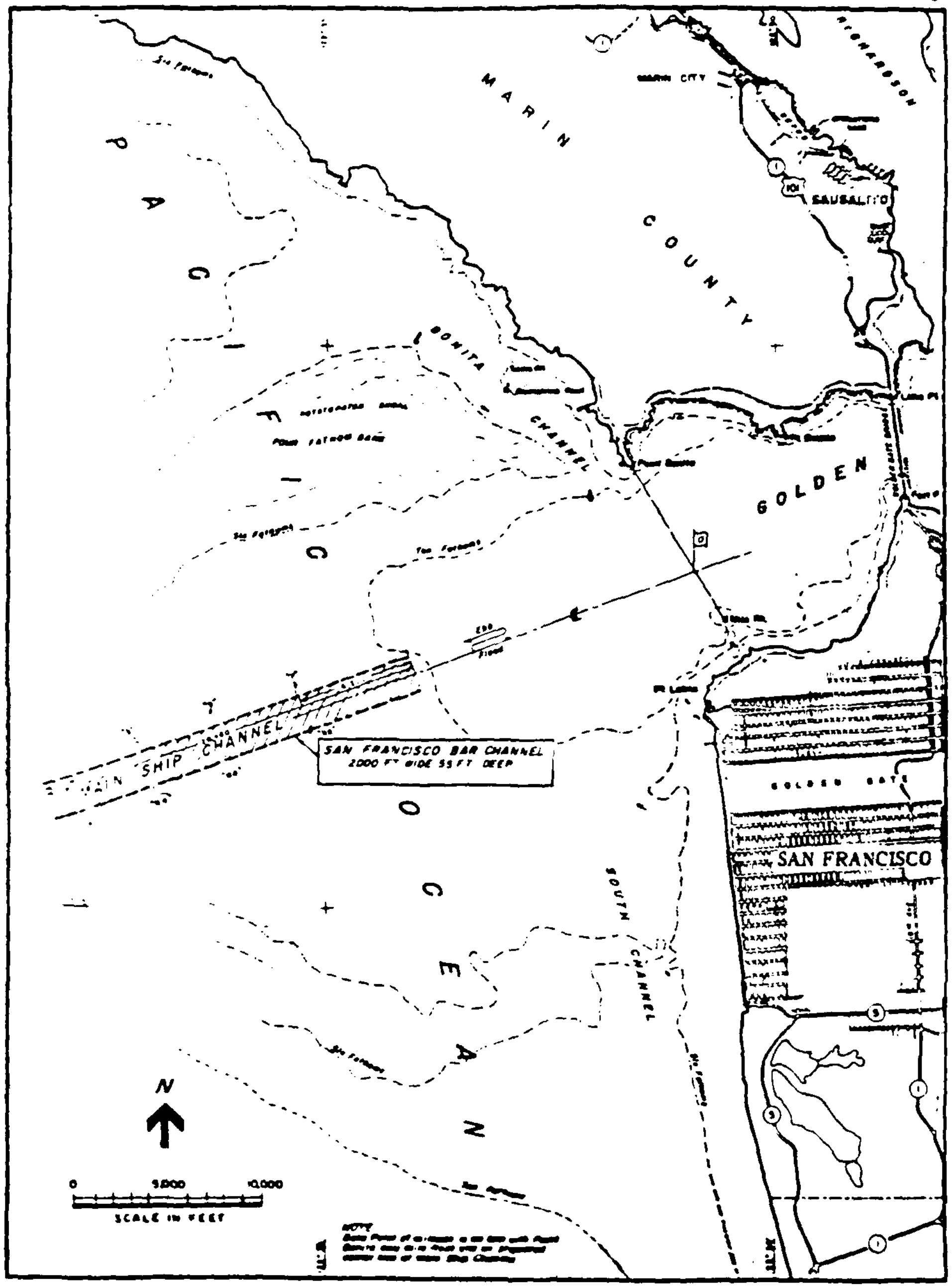

Figure 2-1. San Francisco Bay Channel

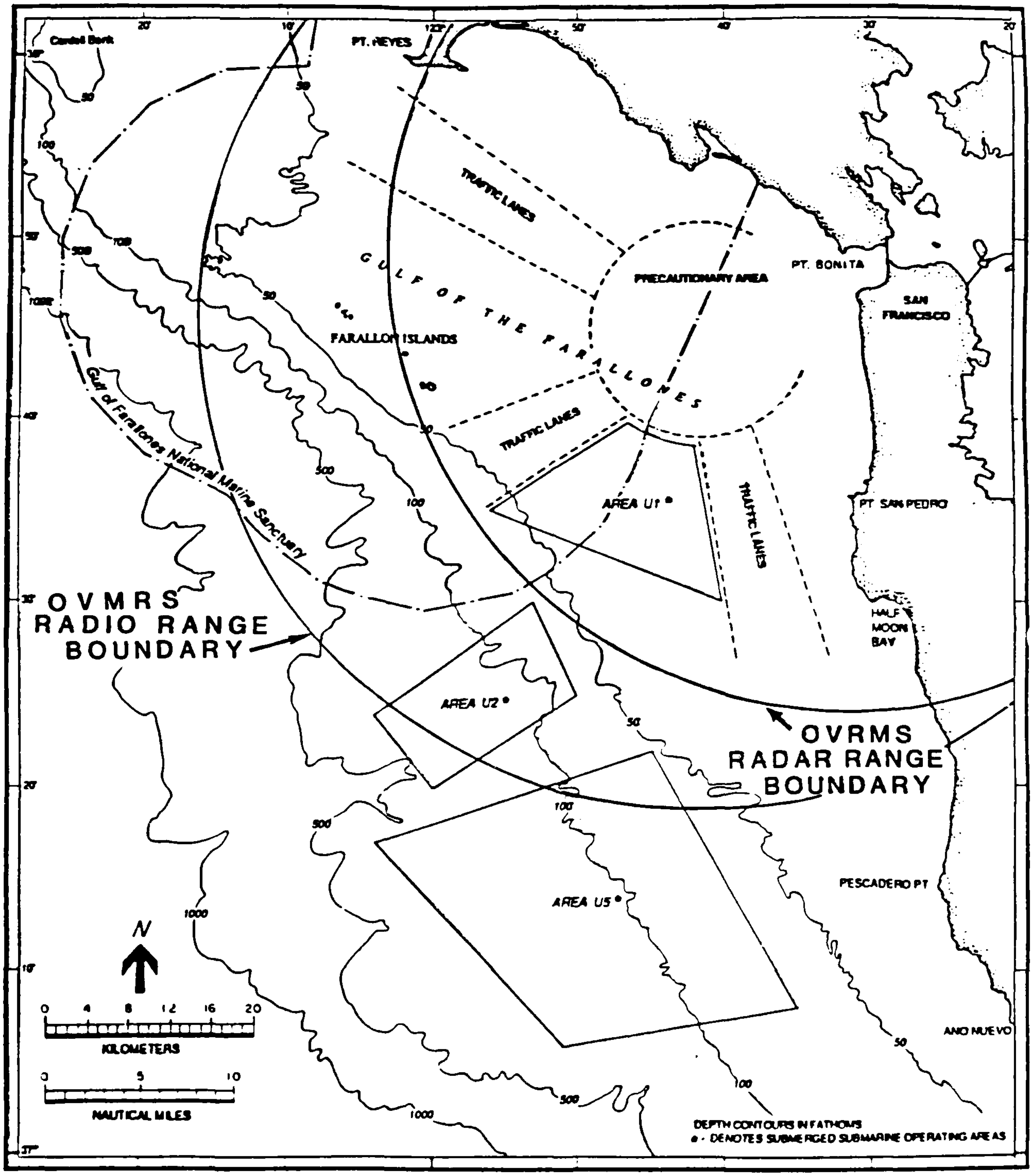

Figure 2-2. OVMRS Radar & Radio Range Limits

The slow moving and wide turning tugs with disposal barges in tow will encounter or be overtaken by numerous other vessels in ocean waters offshore from San Francisco Bay. Other vessels include commercial cargo and tanker vessels entering and leaving San Francisco Bay, ships and submarines of the U.S. Navy, a large commercial fishing fleet working the broad continental shelf, other tugs and barges, and numerous sport fishing and recreational craft. Often these encounters will occur at night or during periods of dense fog endemic to these waters. Repeated trips, at varying intervals, outside of the established traffic lanes will be required for disposal of dredged material at the designated site. Often the vessels encountered outside of the traffic lanes will be smaller fishing or recreational craft operating without on-board radar to detect the presence of other vessels. Designating a disposal site within the radar range enables the U.S. Coast Guard to monitor the relative position of disposal vessels with respect to other traffic during the entire trip to the disposal site and to report potential collisions or unsafe conditions to all parties via the established radio channels.

Many of the incidents involving towed barges recorded by the U.S. Coast Guard's Vessel Traffic Service (VTS) in San Francisco Bay involve broken lines and free drifting barges. Disposal operations confined to the OVMRS radar net would facilitate early detection of such occurrences in ocean waters and would expedite assistance from the Coast Guard.

2.2.2.4 Surveillance Constraints. Surveillance to insure disposal is occurring at the designated coordinates or to observe other aspects of disposal operations cannot be accomplished by the OVMRS alone. Strict observation of the radar image of the disposal vessel would only allow oversight of the route taken by the pilot; it would not record when or where the discharge of dredged material occurred. To insure proper disposal, instrumentation may be installed aboard each disposal vessel that records position and draft with respect to time. Such a system is now in operation in New York Harbor and associated offshore disposal sites (Tetra Tech 1986; U.S. Coast Guard 1986). Range of similar instrumentation is sufficient to cover at least a 185 km (100 nmi) radius. The exigencies of surveillance of disposal activity are not likely to restrain the size of the Zone of Siting Feasibility (ZSF).

2.2.2.5 Site Monitoring Operations. A program will be established by EPA and COE to monitor the environmental effects of disposal of dredged material at the designated ocean disposal site. Distinctly different approaches to monitoring may be required dependent on the depth of the water at the disposal site and the material to be disposed. For example, fine unconsolidated or moderately consolidated material from some locations in the Bay may disperse in either very deep or very shallow sites. Preliminary numerical modeling of fine, unconsolidated dredged material discharges indicate that a portion of the dredged material may entrain water during descent through the water column and can achieve neutral buoyancy in cooler, denser water found between 183 to 229 m (600 to 750 ft). This material can then be transported many kilometers from the site by the prevalent currents at the time of disposal. It also follows that the less dense, unconsolidated deposit that results from disposal of similar material in shallow water near shore, may be subject to extensive resuspension by storm and wave induced currents. Both the deep water and the shallow site may be dispersive for this type of material. Dense, more consolidated material from some proposed dredging projects within the Bay, is expected to fall almost vertically to the bottom after discharge at any disposal site, regardless of depth. The same material would be more resistant to resuspension in shallow water sites. Separate disposal sites for the two types of material are impractical because of increased monitoring costs and increased environmental impacts. Consequently, practicable physical monitoring of an ocean dredged material disposal site designated to receive dredged material from all projects in San Francisco Bay, may suggest siting within the 183 m (100 fathom) depth contour.

Methods of analysis exist that will address the fate of dispersed material. If EPA and COE accept similar analyses in a program to monitor deep water sites, the impediment to siting beyond the 183 m (100 fathom) contour will be removed. Of the ninety-six disposal sites offshore of the continental U.S., only two are at depths of 183 m (100 fathoms) or greater (see Appendix B). The monitoring programs are still being developed for the two deep water sites and are unavailable to assist in this analysis. Comprehensive monitoring of the disposal of a small amount of dredged material at the 183 m (100 fathom) contour in 1975 may suggest methods for monitoring some impacts of disposal in deeper water (COE, 1975).

Generally, the costs of monitoring will increase with distance from San Francisco Bay and increase more rapidly with increases in depth. However, monitoring cost are expected to remain a small portion of the total project costs. The ability to monitor all of the material and the accuracy of measurements will decrease with increased depths, but within the 183 m (100 fathom) and away from the surf zone near shore, monitoring will be more practicable. Monitoring of a disposal site restricted to dense, consolidated dredged material at a site substantially deeper than 183 m (100 fathoms) is also feasible. Additionally, the final site monitoring program is likely to be site specific and will not be determined until the site selection process has been completed.

2.2.3 ECONOMIC CONSIDERATIONS

2.2.3.1 Assumptions for Cost Analysis. The COE developed cost estimates for direct ocean disposal of the material from each of the listed projects. Assumptions made for the cost analysis are presented below. The costs were based on the calculated dredging costs per 0.76 m^3 (1.0 yd^3) of dredged material and transport costs per 185 m (0.1 nmi) of haul distance to the disposal site. The following assumptions were used to develop the estimates:

Type and volume of material to be dredged;

The estimated volume of material to be dredged in each anticipated project is given below: Oakland Inner Harbor, 3.2 million m^3 (4.2 million yd^3); Oakland Outer Harbor, 2.4 million m^3 (3.1 million yd^3); Richmond Harbor Phase I, 1.1 million m^3 (1.4 million yd^3); Richmond Harbor Phase II, 2.8 million m^3 (3.6 million yd^3); J.F. Baldwin Ship Channel Phase III, 9.6 million m^3 (12.6 million yd^3); Initial dredging of Alcatraz Site, 1.9 million m^3 (2.5 million yd^3); and total maintenance dredging of Alcatraz Site through year 2008, 21.8 million m^3 (28.5 million yd^3).

The in situ sediment density will range from 1.3 to 1.8 g/cc (81.2 to 112.4 lb/ft^3). Average in situ density will be 1.57 g/cc (98.0 lb/ft^3).

Particle size will range from clay to coarse sand, but most of the material will be clay with a median grain size of 0.004 mm (0.00016 in).

Specific gravity of the material is 2.7.

The average density of material in the disposal barge will be 1.57 g/cc (98.0 lb/ft^3).

Period of operation;

Dredging and disposal will occur an average of 25 days per month.

Hauling efficiency is reduced by 6% due to weather related conditions.

Dredging and disposal equipment;

The required equipment is available.

A clamshell dredge with barge transport and disposal is the most efficient method of operation.

Each tug will be used to tow one or two barges to the disposal site. Towing of more than two barges simultaneously would be unsafe.

Separate cost estimates were developed for three configurations: one tug with two barges, one tug with four barges, and two tugs with six barges. Each configuration was evaluated with 2294 m^3 (3000 yd^3) barges and again with 3058 m^3 (4000 yd^3) barges to yield six separate cost estimates.

Production rates;

Bucket size is determined by the density of the sediments to be dredged.

Dredging time is determined by incremental times for the following activities: loading bucket, lifting bucket from bottom to clearing bulkhead, swinging over barge, releasing material, swing back to cut area, repositioning bucket, and lowering bucket to the bottom.

Disposal time is determined by the time required to travel to and from the disposal site and the release period.

Equipment ownership and operating costs;

Equipment ownership costs are calculated based on the following factors: straight line depreciation, interest on capital investment, taxes, insurance and storage, and repairs.

Operating cost include the following elements: payroll, fuel, water and dockage, small tools, lubricants, and subsistence and quarters.

Navigation;

Disposal vessels will travel within the established shipping lanes within San Francisco Bay. Vessels will use the San Francisco Main Ship Channel (Figure 2-1) for 15.4 km (8.3 nmi) from the Golden Gate Bridge, before turning with traffic into the southbound traffic lane in the Gulf of the Farallones. Disposal vessels will leave the traffic lane and proceed directly to the disposal site when that can be accomplished safely and without traversing a U.S. Navy submarine operating area.

Disposal vessels will travel at 9.3 km/h (5.0 kn) within the Bay, and 7.4 km/h (4.0 kn) in the ocean.

Price Levels

All cost estimates are based on the value of 1987 dollars.

2.2.3.2 Results of Costs Analysis. The results of the cost estimates for each tug and barge configuration are shown for each project in Figures A1 - A5 in Appendix A. The dredging and disposal costs for each project and configuration are presented in Appendix A by Tables A1 - A5 for three distances from the Golden Gate Bridge: 0.2 km (0.1 nmi), the distance at which this initial cost starts to increase, and 64.8 km (35 nmi), the approximate distance to the edge of the continental shelf. The results of the cost estimates for the Oakland Inner Harbor project are given in Figure 2-3 and Table 2-1 as an example.

For each project, the construction costs per 0.8 m^3 (1.0 yd^3) of material for each of the one tug configurations are initially similar. The production rate is the key factor controlling the shape of the curve.

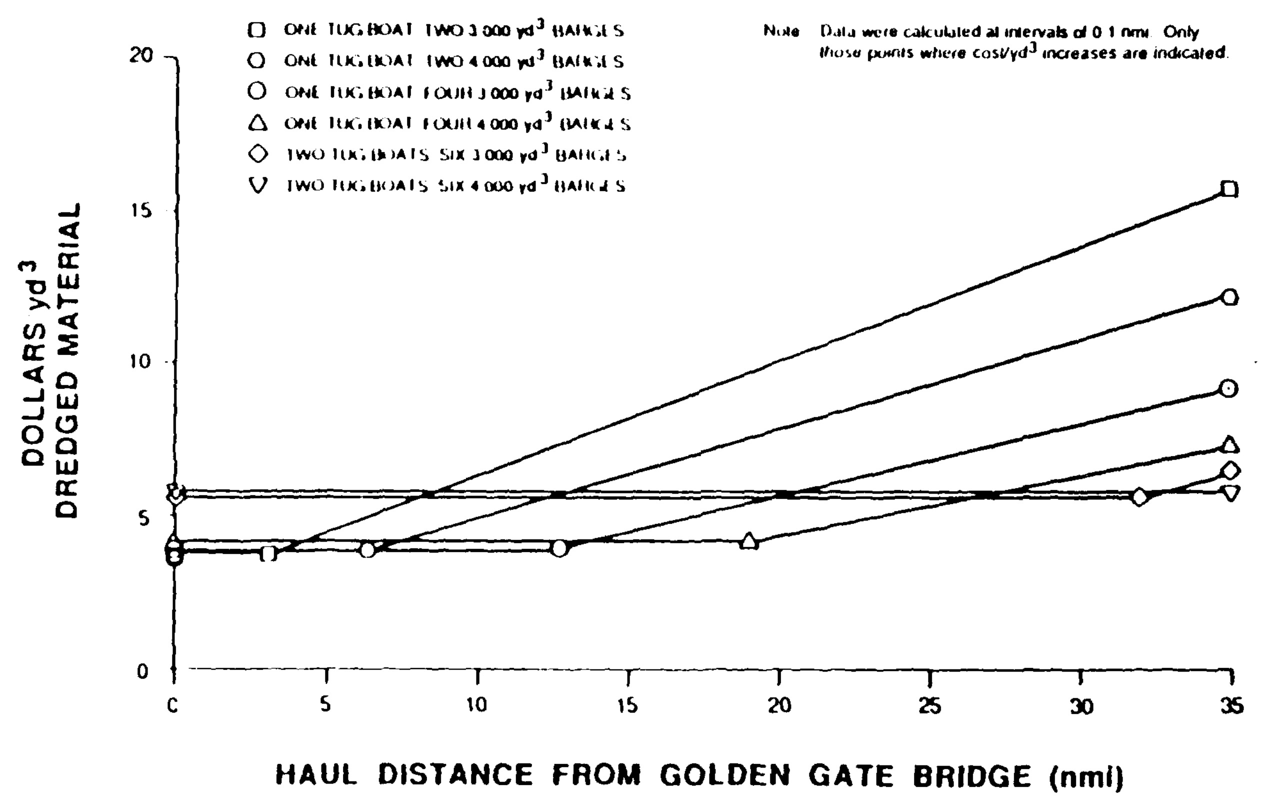

Figure 2-3 Oakland Inner Harbor dredging and disposal costs per yd^3 of dredged material as a function of haul distance to the disposal site

TABLE 2-1: OAKLAND INNER HARBOR DREDGING AND DISPOSAL COSTS PER YD^3 OF DREDGED MATERIAL AS A FUNCTION OF DISTANCE TO THE DISPOSAL SITE.

Tug-Barge Configuration	Distance From GGB/a/ (nmi)/b/	Cost per yd^3
One Tug, Two 3,000-yd^3 barges		
	0.1	$ 3.61
	3.2	$ 3.61
	35.0	$15.90
One Tug, Two 4,000-yd^3 barges		
	0.1	$ 3.70
	6.4	$ 3.70
	35.0	$12.15
One Tug, Four 3,000-yd^3 barges		
	0.1	$ 3.96
	12.8	$ 3.96
	35.0	$ 8.65
One Tug, Four 4,000-yd^3 barges		
	0.1	$ 4.13
	19.2	$ 4.13
	35.0	$ 6.74
Two Tugs, Six 3,000-yd^3 barges		
	0.1	$ 5.60
	31.9	$ 5.60
	35.0	$ 6.05
Two Tugs, Six 4,000-yd^3 barges		
	0.1	$ 5.84
	35.0	$ 5.84

/a/ Golden Gate Bridge
/b/ The second value in each series indicates the point at which cost per yd^3 begins to increase.

Differences in fuel consumption as a function of distance have only a minor effect upon construction costs. Consequently, the unit costs remain relatively constant until the haul distance reaches a point where the dredging equipment is forced to remain idle while the barge completes the roundtrip to the disposal site. The point at which the increase occurs depends upon the barge capacity. For the Oakland Inner Harbor project example shown in Figure 2-3, the initial unit cost for all the one-tug configurations are between \$3.61 and \$4.13. Of this lower group, the configuration involving one tug and four 3058 m^3 (4000 yd^3) barges remains fairly constant for the greatest distance, to 35.6 km (19.2 nmi) from the Golden Gate Bridge. The unit cost then increases steadily for this configuration as haul distance is increased.

For all projects, the unit costs for the configurations involving two tug boats and six barges are initially greater than for any of the single tug operations because of greater ownership and operating expenses. However, the unit costs remain constant for a greater distance because the dredge is not required to remain idle. The two-tug, six barge configurations are more efficient and less expensive than any of the one-tug configurations at sufficiently large haul distances. For the Oakland Inner Harbor project (Figure 2-3), the two-tug, six 2294 m^3 (3000 yd^3) barge configuration is the most economical at distances greater than 52.0 km (28.1 nmi) from the Golden Gate Bridge and remains so until haul distances reach 61.7 km (33.3 nmi) from the bridge. This configuration becomes the most efficient for the Oakland Outer Harbor dredging at 44.2 km (23.85 nmi), the Richmond Harbor projects at 29.6 km (16 nmi), and for maintenance of the Alcatraz disposal site at 34.9 km (18.85 nmi). Lowest unit costs for each project as a function of haul distance from the Golden Gate Bridge are shown in Table 2-2.

Estimated total dredging and disposal costs for each project are shown in Table 2-3 at increments of 9.3 km (5 nmi). Values were calculated by multiplying the total volume of dredged material for each project (Table 1-1) by the unit costs (Table 2-2).

2.2.4 INCOMPATIBLE USE AREAS

2.2.4.1 Gulf of the Farallones Marine Sanctuary. The Gulf of the Farallones National Marine Sanctuary was established in 1981. According to regulations that designated the sanctuary, dumping of dredged material within the sanctuary boundaries is prohibited except as may be necessary for national defense or to respond to an emergency threatening life, property, or the environment (15 CFR 936.6). Accordingly, all area within the boundaries of the sanctuary are eliminated from further siting consideration.

2.2.4.2 USCG Marine Traffic Lanes and Precautionary Areas. The United States Coast Guard (USCG) established the traffic separation scheme with transit lanes and precautionary areas to promote the safe flow of marine traffic to and from the ports in San Francisco Bay. The "General Approach to Site Designation Studies for Ocean Dredged Material Disposal Sites" (COE, 1984) lists navigation lanes as incompatible use areas. For this ZSF analysis, all navigation lanes and precautionary areas within the Gulf of the Farallones will be excluded from siting consideration.

TABLE 2-2: LOWEST COST PER YD^3 PER NAUTICAL MILE OF HAUL DISTANCE FROM THE GOLDEN GATE BRIDGE FOR EACH DREDGING PROJECT/a/

Distance to Disposal Site (nmi)	Oakland Inner Harbor	Oakland Outer Harbor	Richmond Harbor Phase I	Richmond Harbor Phase II	Alcatraz Initial Removal	Alcatraz Annual Maintenance
0.1	$4.13	$3.45	$2.93	$2.93	$2.45	$2.45
5	$4.13	$3.45	$2.93	$2.93	$2.45	$2.45
10	$4.13	$3.45	$3.01	$3.01	$2.45	$2.45
15	$4.13	$3.45	$3.81	$3.81	$2.71	$2.71
20	$4.26	$4.05	$4.17	$4.17	$3.33	$3.33
25	$5.09	$4.68	$4.90	$4.90	$3.90	$3.90
30	$5.60	$5.11	$5.63	$5.63	$4.63	$4.63
35	$6.05	$5.84	$6.34	$6.34	$5.35	$5.35
40	$6.50	$6.57	$7.05	$7.05	$6.07	$6.07

/a/ Costs were derived using the tug-barge configurations explained in the text.

TABLE 2-3: TOTAL PROJECT DREDGING AND DISPOSAL COSTS AS A FUNCTION OF HAUL DISTANCE FROM THE GOLDEN GATE BRIDGE/a/

Distance to Disposal Site (nmi)	Oakland Inner Harbor	Oakland Outer Harbor	Richmond Harbor Phase I	Richmond Harbor Phase II	Alcatraz Initial Removal	Alcatraz Annual Maintenance	Total
0.1	17.6	10.9	4.3	10.8	6.3	73.9	123.8
5	17.6	10.9	4.3	10.8	6.3	73.9	123.8
10	17.6	10.9	4.4	11.1	6.3	73.9	124.2
15	17.6	10.9	5.6	13.9	7.0	81.3	136.3
20	18.1	12.8	6.1	15.3	8.6	99.6	160.5
25	21.6	14.8	7.1	17.9	10.0	115.8	187.2
30	23.8	16.1	8.1	20.5	11.8	136.6	216.9
35	25.7	18.4	9.1	23.1	13.6	157.2	247.1
40	27.5	20.6	10.1	25.6	15.4	177.7	276.9

/a/ Project costs are in million dollars; project period is 1988-2007.

2.2.4.3 U. S. Navy Submarine Operating Areas. While details of submarine operations are classified, the U.S. Navy has confirmed that areas U1 through U5 shown on navigation charts and on Figure 2.2 are frequently used for post-overhaul seatrials. Submerged operations are not limited to those areas. Since sonar detection of non-propelled vessels such as towed barges is very difficult, the Navy has expressed concern regarding the danger of collisions. It is felt that submarines proceeding to periscope depth risk colliding with disposal barges being discharged within the areas or traversing the areas. Additionally, the Navy has suggested the remote possibility of dredged material being discharged upon a submerged vessel. To address the concerns expressed by the Navy, submarine operating areas U1, U2, and U5 will be excluded from further consideration for purposes of the Zone of Siting Feasibility (ZSF) analysis.

2.3 ZONE OF SITING FEASIBILITY DETERMINATION

2.3.1 ZSF ANALYSIS

2.3.1.1 Overview. The intent of the ZSF Analysis is to define a region in which the disposal of dredged material at a specific offshore site would be practicable. Both operational and economic factors are considered to define the zone. In this analysis, with several different dredging projects considered for ocean disposal and total project costs increasing by millions of dollars for each additional kilometer of haul distance, distinct breaks in costs do not occur. However, other uses of the Gulf of the Farallones, incompatible with the disposal of dredged material, occupy large areas offshore of San Francisco. Only a few sub-areas remain in consideration for a candidate disposal sites. By calculating the average haul distance to hypothetical sites within these general areas, a stepped economic analysis is achievable. Demarcation of the ZSF will be accomplished by considering the operational factors and subsequently examining the economics of sub-areas that may further delimit the zone.

2.3.1.2 Operational ZSF. The radar monitoring net of the USCG's Offshore Vessel Movement Reporting System (OVMRS) extends seaward approximately 44 km (24 nmi) from Pt. Bonita. Vessel position and movement can be monitored by the USCG in a way similar to plane monitoring by air traffic controllers. The stated purpose of the OVMRS is to decrease maritime accidents in the congested vessel traffic areas outside of San Francisco Bay. Dredging and disposal operations will increase vessel traffic by adding several round trips from the dredge site to the disposal site each day. Disposal vessel movement will be relatively slow, turns will be wide, maneuverability will be poor with scows towed at distances of up to 366 m (1200 ft) behind the tug, and operations will continue around the clock and through extended periods of fog common to the Gulf of the Farallones. The tug and barges are likely to encounter or be overtaken by other commercial vessels, oil tankers, numerous fishing and recreation craft, and vessels of the U.S. Navy and the USCG.

Many smaller vessels navigating within the Gulf of the Farallones operate without on-board radar to warn of the approach of other vessels. The responsibility of the COE to insure safe disposal operations coupled with the margin of safety provided by the OVMRS and subsequent radio communications and advisories, dictates bounding disposal activities by the limits of the Offshore Vessel Movement Reporting System (OVMRS) radar. Additionally, barges broken from their tows and adrift within the OVMRS radar net can be quickly secured with early detection and location via the radar. Disposal activities and related transport beyond the radar monitoring would be less safe.

The candidate Zone of Siting Feasibility (ZSF) determined by the range of the OVMRS radar net encompasses an area of over 1700 km^2 (500 nmi^2) and has depths ranging from 9 to 130 m (5 to 70 fathoms). Approximately 78% of the area delineated by the 44 km (24 nmi) radius is occupied by the Gulf of the Farallones National Marine Sanctuary, the U.S. Navy submarine operating area U1, and the traffic lanes and precautionary area established by the U.S. Coast Guard. Because the remaining area within the candidate zone is diverse and varies significantly in depth, selection of an environmentally acceptable site within this region of relative safety is considered practicable[1]. Unless restrained further by economics, the demarcation of the ZSF will be by the 44 km (24 nmi) radius from Pt. Bonita.

2.3.1.3 Economic Analysis. The single exception to the rapidly increasing costs with respect to haul distance occurs within a 18 km (9.5 nmi) radius from the Golden Gate Bridge. Within this radius costs increase only moderately with increases in haul distance. The western portion of this region is eclipsed be the USCG precautionary area. Concentric within the zone is the San Francisco Bar and large areas with depths less than 18 m (10 fathoms). The San Francisco Bar Channel and the Main Ship Channel bisect the zone. The remaining portion of this area lies east of the line between Mile Rock and Point Bonita that defines the Bay or lies in close proximity to the coasts of Marin or San Francisco Counties. The San Francisco Channel Bar Disposal Site, designated for material "composed primarily of sand having grain sizes compatible with that naturally occurring at the disposal site and containing approximately five percent of particles having grain sizes finer than that normally attributed to very fine sand," is located within this zone. It is very unlikely that another environmentally acceptable site, one designated for the disposal of fined grained materials, could be located in this region.

Potential areas for candidate disposal sites exist just beyond the perimeter of the precautionary area on both sides of the southbound traffic lane. West of the traffic lane, a site could be situated between submarine operating area U1 and the precautionary area. Another candidate site could be located east of the traffic lane near the precautionary

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[1]MPRSA and implementing Federal Regulations [40 CFR 228.5(e)] require, wherever feasible, the consideration of designating ocean disposal sites beyond the continental shelf. Opposite San Francisco is the only place on the West Coast where a 44 km (24 nmi) radius will not encompass a site beyond the shelf. Here, as in much of the Gulf Coast and South Atlantic Bight, sites off the continental shelf lie beyond the ZSF and are impractical (SAIC, 1986). The requirement under 40 CFR 228.5(e) to consider an off shelf site is satisfied.

area. Moving the eastern candidate site farther to the south would increase haul distance without changing significantly either depth or distance from shore and is not considered further in this analysis. Haul distances to the far southern edge of the USCG Precautionary Area and these potential siting areas, jump to approximately 30 km (16 nmi). Associated total dredged material disposal costs for the projects listed in Table 1-1 increase by almost $18 million over disposal within the 18 km (9.5 nmi) haul radius discussed above. The west and east areas are shown as area A and area C respectively in Figure 2-4.

Another potential disposal site area, area B in Figure 2-4, requires much longer haul distances for disposal vessels. Yet, area B is well within the boundary of the 44 km (24 nmi) candidate ZSF. One way haul distances in Area B range from 46 to 59 km (25 to 32 nmi). Disposal cost for the projects listed in Table 1-1 are about $100 million dollars more for a hypothetical site within area B than a site in either area A or C. The $100 million dollar increase in costs suggests further reduction of the ZSF based on economics. However, in the site selection process, the site chosen will have least adverse environmental impacts at acceptable economic costs. The $100 million dollar difference in costs will be given consideration in the Site Selection Analysis.

2.3.2 CONCLUSION

The Zone of Siting Feasibility (ZSF) for ocean disposal of dredged material will be bound by a 44 km (24 nmi) radius from Pt. Bonita. All federal waters excluding the Gulf of the Farallones National Marine Sanctuary, the USCG's marine traffic lanes and precautionary areas, and the U.S. Navy's submarine operating areas U1, U2, and U3, bound by this radius will be studied to locate an environmentally acceptable Ocean Dredged Material Disposal Site (ODMDS). Illustration of the ZSF is shown in Figure 2-5.

The chief factor in this determination has been safety for both the disposal vessel and other vessels navigating within the Gulf of the Farallones. Increased navigational safety is provided within the Offshore Vessel Movement Reporting System radar net of the U.S. Coast Guard. The ZSF is coincident with the radar's range from Pt. Bonita in normal weather conditions.

Economic considerations strongly suggested drawing the zone closer to the Golden Gate to reduce haul distance and disposal costs. One suggested economic demarcation was rejected as limiting the ZSF too severely. Cost increases beyond the first zone were almost linear, making definition of an economics based ZSF dependent solely on determining a specific maximum feasible cost. However, cost increases associated with the greater haul distances to the perimeter of the ZSF, amount to over $100 million for the anticipated projects. Cost increases of this magnitude are unacceptable without commensurate environmental benefits. As environmental comparisons will be made in the next step of the site designation report process, the Site Selection Analysis, no further delineation of an economic zone was attempted within the ZSF established to address safety concerns. Nonetheless, the exorbitant costs of disposal beyond the perimeter of the ZSF, reinforce limiting the ZSF to the 44 km (24 nmi) radius from Pt. Bonita.

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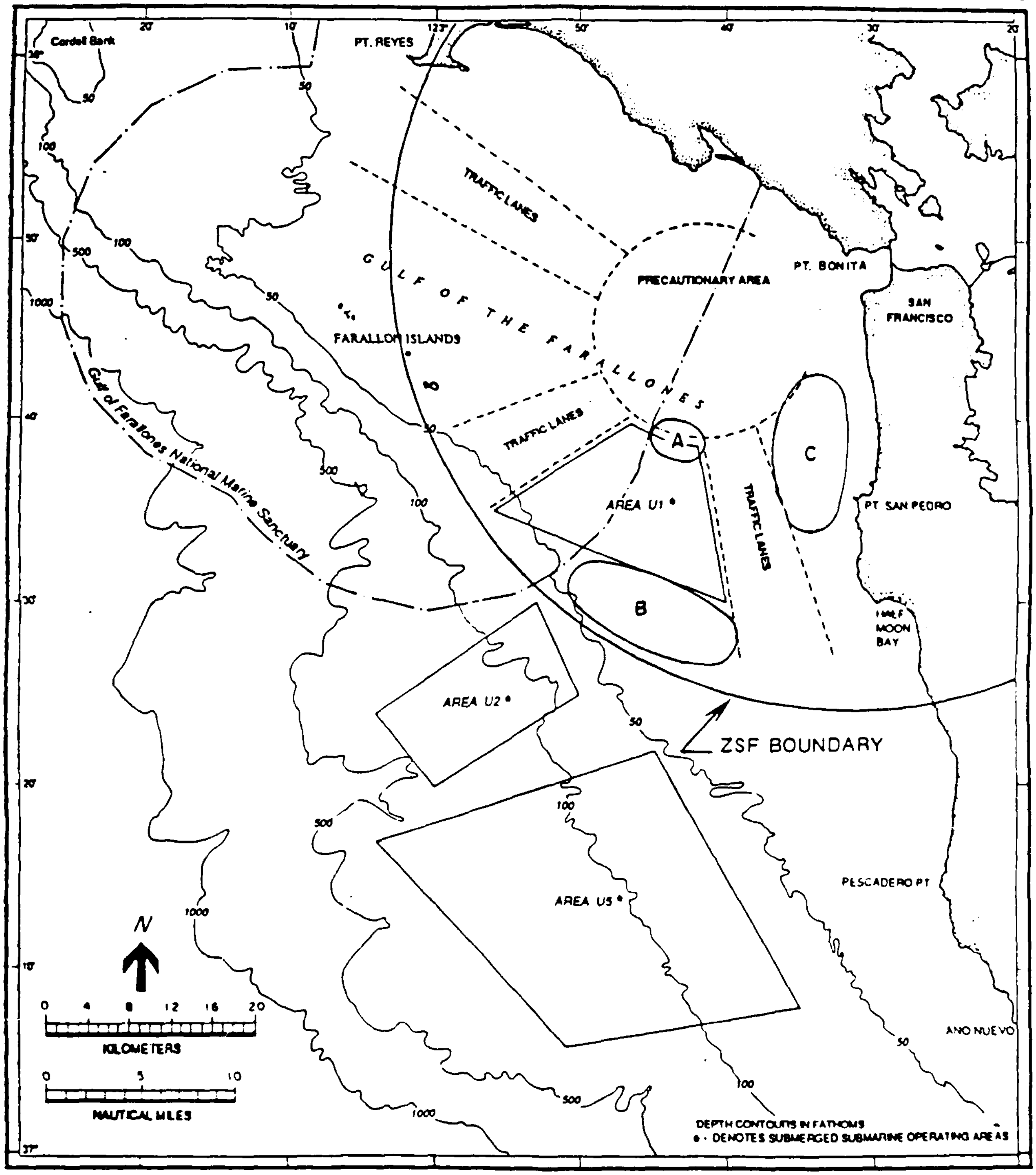

Figure 2-4 Areas of Potential Siting Within ZSF Boundary.

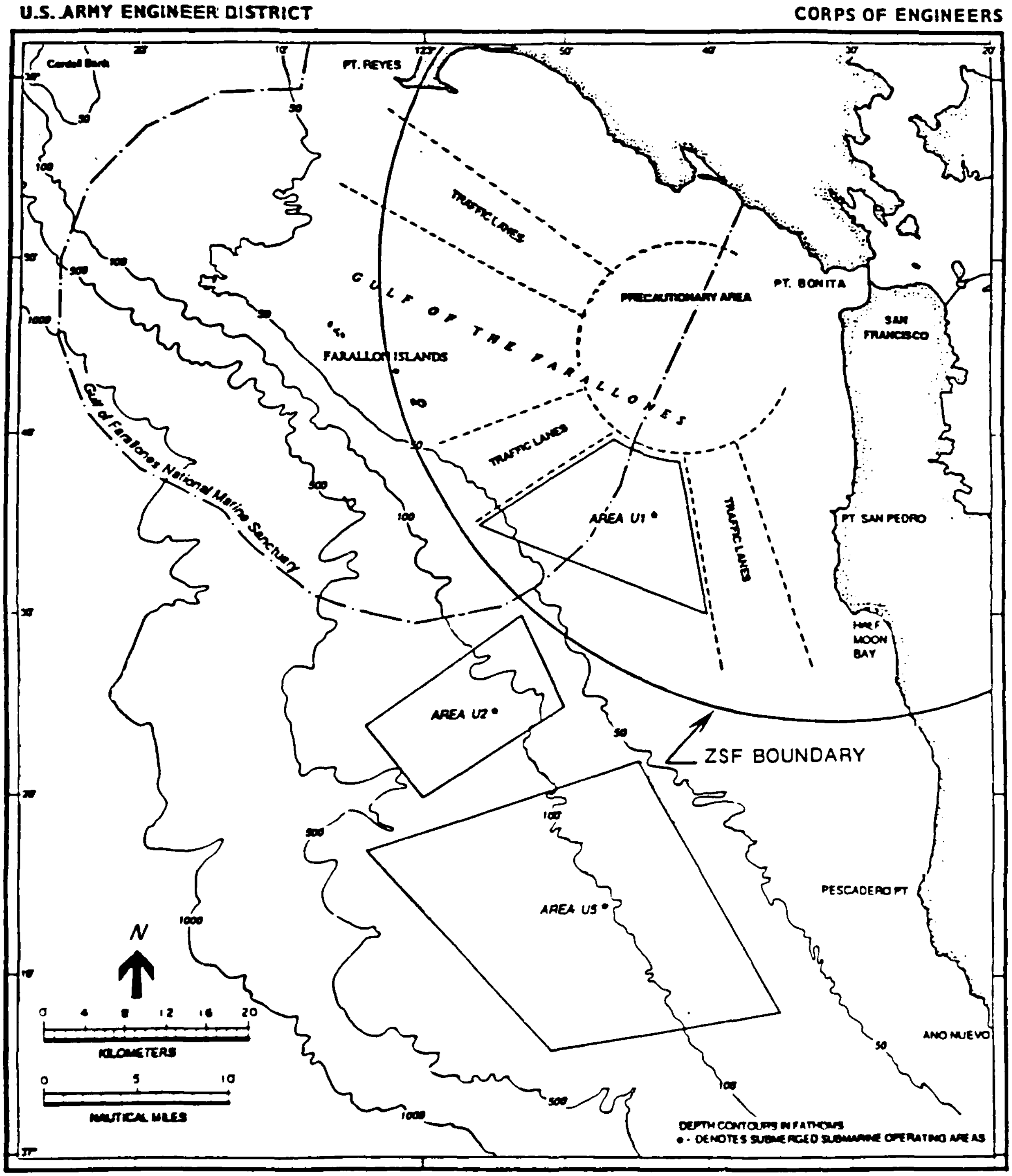

Figure 2-5 Zone of Sitting Feasibility Boundary, 24 nmi From Pt. Bonota.

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Appendix A

This appendix consists of Corps of Engineers developed graphs and tables of dredging and disposal costs per 0.76 m^3 (1.0 yd^3) of dredged material as a function of haul distance from the Golden Gate Bridge to an ocean disposal site for the following five projects:

Oakland Inner Harbor	(Figure A-1, Table A-[illegible]
Oakland Outer Harbor	(Figure A-[illegible], Table A-[illegible]
Richmond Harbor Phase I	(Figure A-[illegible], Table A-[illegible]
Richmond Harbor Phase II	(Figure A-4, Table A-[illegible]
Alcatraz Maintenance Dredging	(Figure A-[illegible], Table A-[illegible]

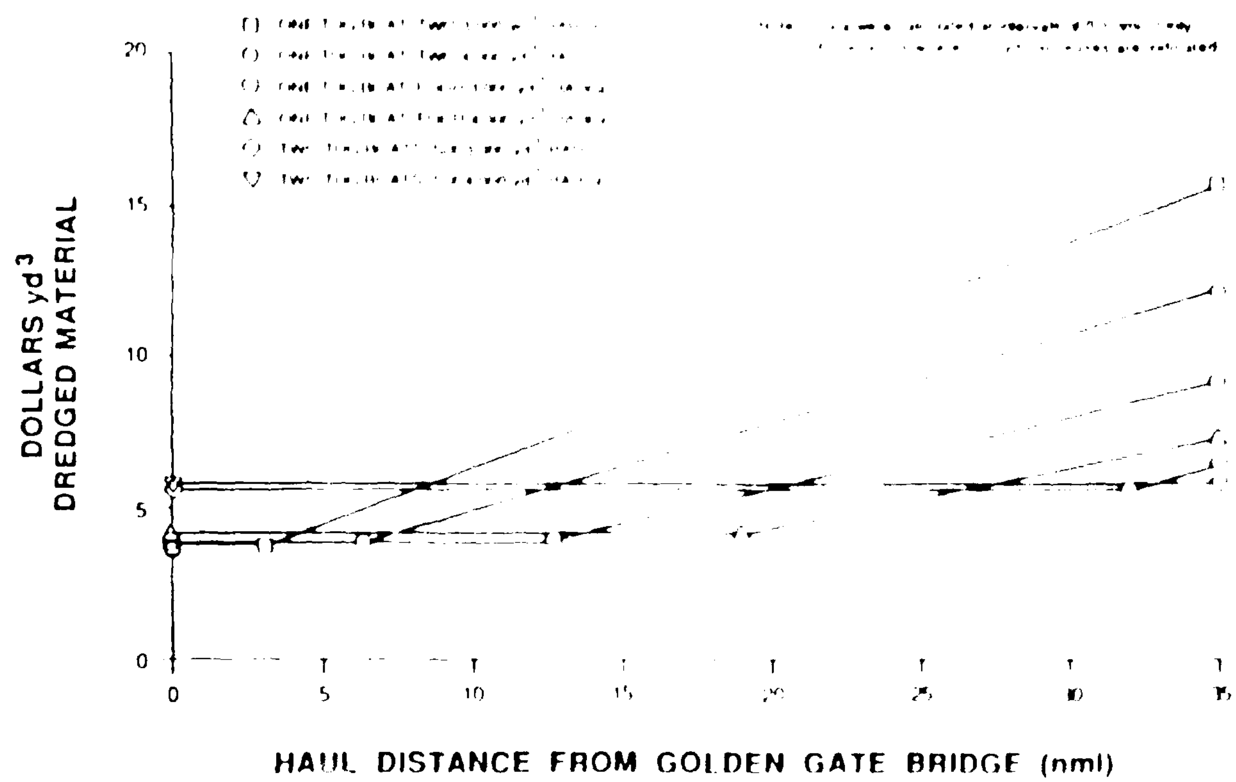

Figure A-1. Oakland Inner Harbor dredging and disposal costs per yd^3 of dredged material as a function of haul distance to the disposal site.

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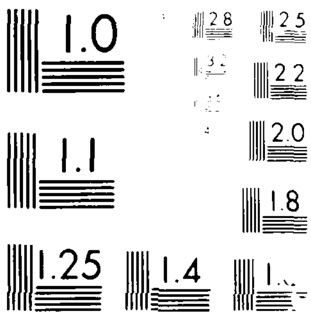
1.0
2.8
2.5
2.2
2.0
1.1
1.8
1.25
1.4

TABLE A-1: OAKLAND INNER HARBOR DREDGING AND DISPOSAL COSTS PER YD^3 OF DREDGED MATERIAL AS A FUNCTION OF HAUL DISTANCE TO THE DISPOSAL SITE.

Tug-Barge Configuration	Distance From GGB/a/ (nmi)/b/	Cost per yd^3
One Tug, Two 3,000-yd^3 barges		
	0.1	$ 3.61
	3.2	$ 3.61
	35.0	$15.90
One Tug, Two 4,000-yd^3 barges		
	0.1	$ 3.70
	6.4	$ 3.70
	35.0	$12.15
One Tug, Four 3,000-yd^3 barges		
	0.1	$ 3.96
	12.8	$ 3.96
	35.0	$ 8.65
One Tug, Four 4,000-yd^3 barges		
	0.1	$ 4.13
	19.2	$ 4.13
	35.0	$ 6.74
Two Tugs, Six 3,000-yd^3 barges		
	0.1	$ 5.60
	31.9	$ 5.60
	35.0	$ 6.05
Two Tugs, six 4,000-yd^3 barges		
	0.1	$ 5.84
	35.0	$ 5.84

/a/ Golden Gate Bridge
/b/ The second value in each series indicates the point at which cost per yd^3 begins to increase.

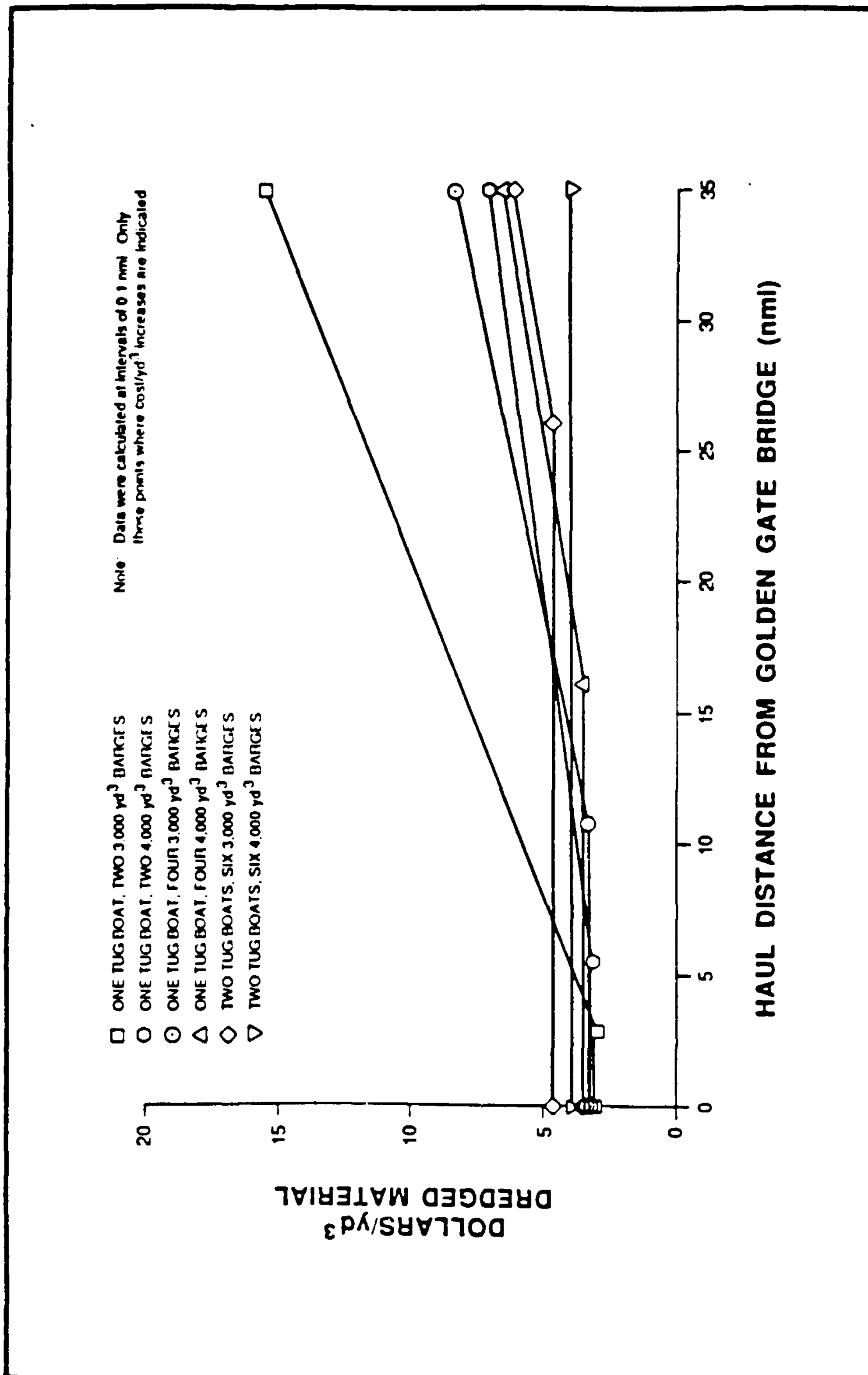

Figure A-2. Oakland Outer Harbor dredging and disposal costs per yd^3 of dredged material as a function of haul distance to the disposal site.

TABLE A-2: OAKLAND OUTER HARBOR DREDGING AND DISPOSAL COSTS PER YD^3 OF DREDGED MATERIAL AS A FUNCTION OF HAUL DISTANCE TO THE DISPOSAL SITE.

Tug-Barge Configuration	Distance From GGB/a/ (nmi)/b/	Cost per yd^3
One Tug, Two 3,000-yd^3 barges		
	0.1	$ 3.03
	2.8	$ 3.03
	35.0	$15.45
One Tug, Two 4,000-yd^3 barges		
	0.1	$ 3.10
	5.5	$ 3.10
	35.0	$11.80
One Tug, Four 3,000-yd^3 barges		
	0.1	$ 3.31
	10.9	$ 3.31
	35.0	$ 8.38
One Tug, Four 4,000-yd^3 barges		
	0.1	$ 3.45
	16.2	$ 3.45
	35.0	$ 6.52
Two Tugs, Six 3,000-yd^3 barges		
	0.1	$ 4.68
	27.0	$ 4.68
	35.0	$ 5.84
Two Tugs, Six 4,000-yd^3 barges		
	0.1	$ 4.89
	35.0	$ 4.89

/a/ Golden Gate Bridge
/b/ The second value in each series indicates the point at which cost per yd^3 begins to increase.

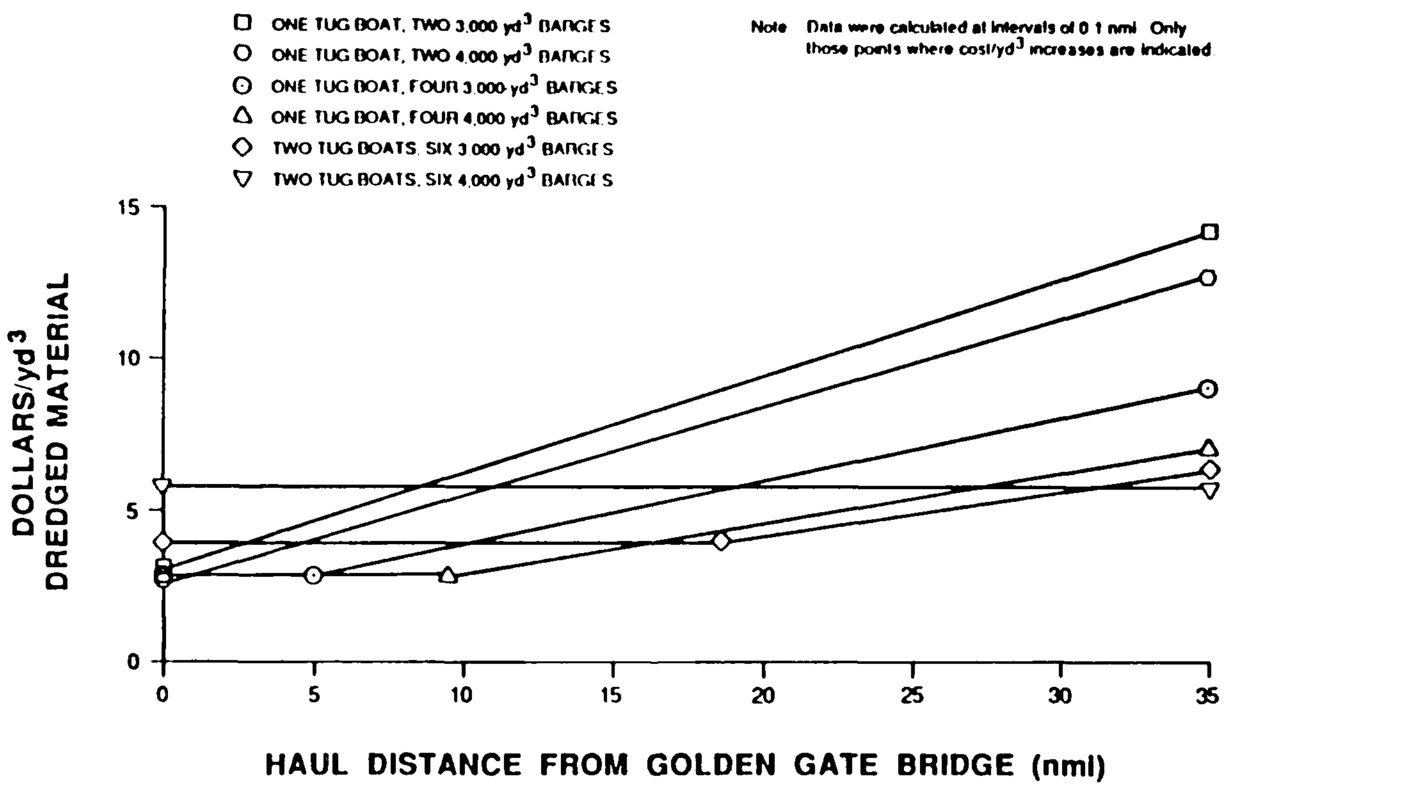

Figure A-3. Richmond Harbor Phase I dredging and disposal costs per yd^3 of dredged material as a function of haul distance to the disposal site.

TABLE A-3: RICHMOND HARBOR PHASE I DREDGING AND DISPOSAL COSTS PER YD^3 OF DREDGED MATERIAL AS A FUNCTION OF HAUL DISTANCE TO THE DISPOSAL SITE.

Tug-Barge Configuration	Distance From GGB/a/ (nmi)/b/	Cost per yd^3
One Tug, Two 3,000-yd^3 barges		
	0.1	\$ 3.35
	0.3	\$ 3.42
	35.0	\$14.37
One Tug, Two 4,000-yd^3 barges		
	0.1	\$ 2.63
	0.3	\$ 2.63
	35.0	\$12.69
One Tug, Four 3,000-yd^3 barges		
	0.1	\$ 2.81
	5.0	\$ 2.81
	35.0	\$ 8.98
One Tug, Four 4,000-yd^3 barges		
	0.1	\$ 2.93
	9.5	\$ 2.93
	35.0	\$ 7.02
Two Tugs, Six 3,000-yd^3 barges		
	0.1	\$ 3.97
	18.6	\$ 3.97
	35.0	\$ 6.34
Two Tugs, Six 4,000-yd^3 barges		
	0.1	\$ 4.98
	35.0	\$ 4.98

/a/ Golden Gate Bridge
/b/ The second value in each series indicates the point at which cost per yd^3 begins to increase.

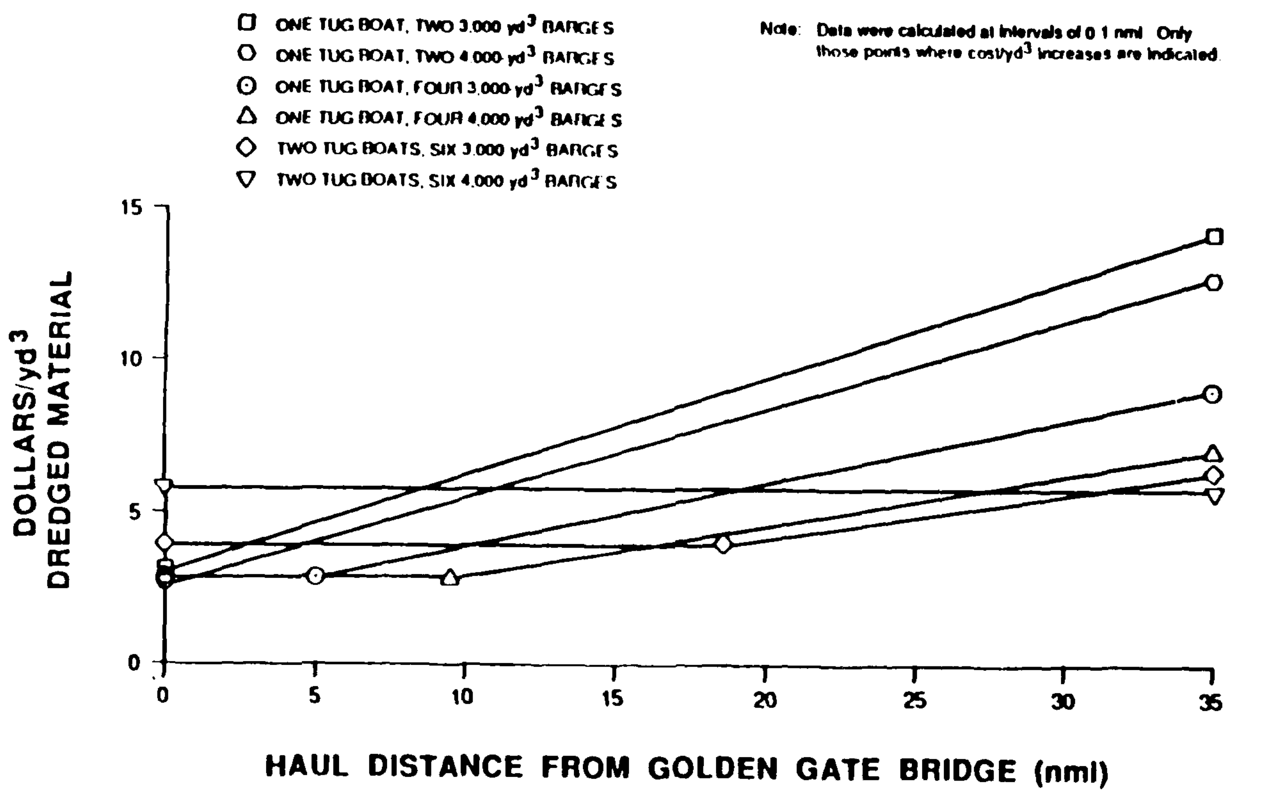

Figure A-4. Richmond Harbor Phase II dredging and disposal costs per yd^3 of dredged material as a function of haul distance to the disposal site.

TABLE A-4: RICHMOND HARBOR PHASE II DREDGING AND DISPOSAL COSTS PER YD^3 OF DREDGED MATERIAL AS A FUNCTION OF HAUL DISTANCE TO THE DISPOSAL SITE

Tug-Barge Configuration	Distance From GGB/a/ (nmi)/b/	Cost per yd^3
One Tug, Two 3,000-yd^3 barges		
	0.1	\$ 3.35
	0.3	\$ 3.43
	35.0	\$14.37
One Tug, Two 4,000-yd^3 barges		
	0.1	\$ 2.63
	0.3	\$ 2.63
	35.0	\$12.69
One Tug, Four 3,000-yd^3 barges		
	0.1	\$ 2.81
	4.9	\$ 2.81
	35.0	\$ 8.98
One Tug, Four 4,000-yd^3 barges		
	0.1	\$ 2.93
	9.5	\$ 2.93
	35.0	\$ 7.02
Two Tugs, Six 3,000-yd^3 barges		
	0.1	\$ 3.97
	18.6	\$ 3.97
	35.0	\$ 6.34
Two Tugs, Six 4,000-yd^3 barges		
	0.1	\$ 4.98
	35.0	\$ 4.98

/a/ Golden Gate Bridge
/b/ The second value in each series indicates the point at which cost per yd^3 begins to increase.

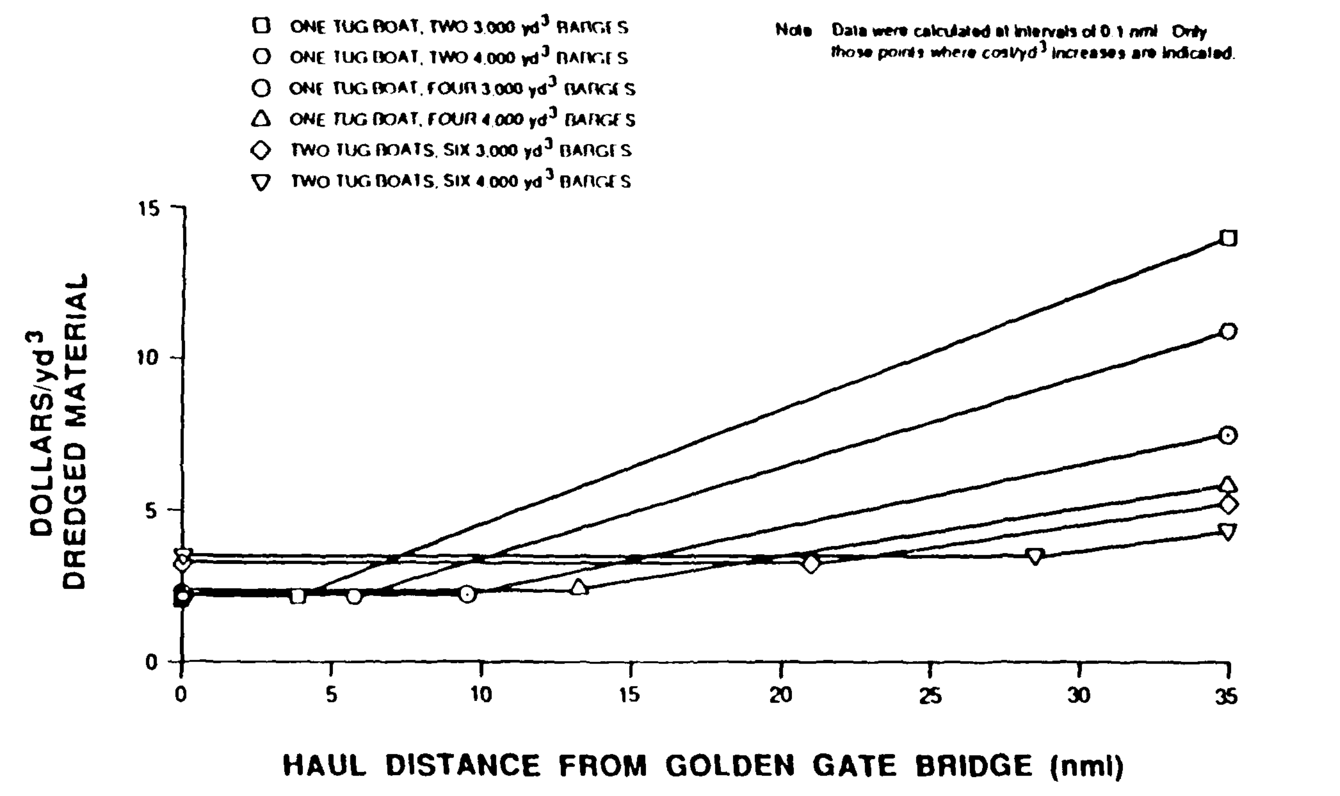

Figure A-5. Alcatraz Disposal Site dredging and disposal costs per yd^3 of dredged material as a function of haul distance to the disposal site.

TABLE A-5: MAINTENANCE OF ALCATRAZ DISPOSAL SITE DREDGING AND DISPOSAL COSTS PER YD^3 OF DREDGED MATERIAL AS A FUNCTION OF HAUL DISTANCE TO THE DISPOSAL SITE.

Tug-Barge Configuration	Distance From GGB/a/ (nmi)/b/	Cost per yd^3
One Tug, Two 3,000-yd^3 barges		
	0.1	\$ 2.16
	3.9	\$ 2.16
	35.0	\$14.18
One Tug, Two 4,000-yd^3 barges		
	0.1	\$ 2.20
	5.7	\$ 2.20
	35.0	\$10.85
One Tug, Four 3,000-yd^3 barges		
	0.1	\$ 2.36
	9.6	\$ 2.36
	35.0	\$ 7.69
One Tug, Four 4,000-yd^3 barges		
	0.1	\$ 2.45
	13.4	\$ 2.45
	35.0	\$ 5.96
Two Tugs, Six 3,000-yd^3 barges		
	0.1	\$ 3.33
	21.0	\$ 3.33
	35.0	\$ 5.38
Two Tugs, Six 4,000-yd^3 barges		
	0.1	\$ 3.49
	28.7	\$ 3.49
	35.0	\$ 4.20

/a/ Golden Gate Bridge
/b/ The second value in each series indicates the point at which cost per yd^3 begins to increase.

Appendix B

OCEAN DREDGED MATERIAL DISPOSAL SITES

Appendix B presents a listing of interim and final designated ocean sites for the disposal of dredged material along the Atlantic, Gulf and Pacific Coasts. A discussion of the statistical data presented and a listing of U.S. Army Corps of Engineers Districts follows.

Table B-1 CONTINENTAL U.S. OCEAN DREDGED MATERIAL DISPOSAL SITES:

CORPS DIST	EPA REG	SITE NAME	DISTANCE TO SHORE (nmi)	MINIMUM DEPTH (ft)
CENED	I	Portland	6.75	135
CENED	I	Cape Arundel	2.60	110
CENED	I	Mass Bay	14.50	159
CENAN	II	Fire Island	0.50	22
CENAN	II	Jones Inlet	0.50	23
CENAN	II	East Rockaway	0.38	20
CENAN	II	Rockaway Inlet	0.38	26
CENAN	II	Mud Dump	5.25	86
CENAN	II	Shark River	0.25	36
CENAP	II	Manasquan Inlet	0.25	20
CENAP	II	Abescon Inlet	4.75	50
CENAP	II	Cold Spring Inlet	0.75	28
CENAO	III	Dam Neck	3.10	30
CESAW	IV	Morehead City Harbor	1.50	47
CESAW	IV	Wilmington Harbor	0.90	24
CESAC	IV	Georgetown Harbor	3.00	23
CESAC	IV	Charleston Harbor	3.75	32
CESAC	IV	Port Royal Harbor North	4.25	18
CESAC	IV	Port Royal Harbor South	7.00	37
CESAS	IV	Savannah River	3.75	27
CESAS	IV	Brunswick Harbor	5.75	31
CESAJ	IV	Fernandia Harbor	5.70	35
CESAJ	IV	Jacksonville Harbor	4.50	41
CESAJ	IV	Canaveral Harbor	3.63	44
CESAJ	IV	Fort Pierce Harbor	4.00	50
CESAJ	IV	Palm Beach Harbor West	0.00	11
CESAJ	IV	Palm Beach Harbor East	2.90	301
CESAJ	IV	Port Everglades Harbor	1.50	201

continued.

Table B-1, continued.

CORPS DIST	EPA REG	SITE NAME	DISTANCE TO SHORE (nmi)	MINIMUM DEPTH (ft)
CESAJ	IV	Miami Beach	3.67	390
CESAJ	IV	Key West	5.70	130
CESAJ	IV	Charlotte Harbor	4.00	40
CESAM	IV	Port St. Joe North	4.75	40
CESAM	IV	Port St. Joe South	2.75	43
CESAM	IV	Panama City	1.00	49
CESAM	IV	Pesacola	2.25	35
CESAM	IV	Mobile	4.25	44
CESAM	IV	Pascugoula	2.00	30
CESAM	IV	Gulfport East	1.25	25
CESAM	IV	Gulfport West	0.60	27
CELMN	VI	Miss River-Baton Rouge S Pass	2.00	60
CELMN	VI	Miss River-Baton Rouge SW Pass	0.50	30
CELMN	VI	Miss River-Venice Tiger Pass	0.50	5
CELMN	VI	Waterway, Empire to Gulf	0.00	3
CELMN	VI	Barataria Bay Waterway	0.80	3
CELMN	VI	Bayou LaFouche, Jump WW	1.00	3
CELMN	VI	Houma Nav Ch, Cat Island	10.00	10
CELMN	VI	Atchafalaya River	9.00	10
CELMN	VI	Mermentau River East (A)	0.50	5
CELMN	VI	Mermentau River West (B)	0.50	5
CELMN	VI	Freshwater Bayou	0.30	0
CESWG	VI	Sabine-Neches Waterway 1	16.00	36
CESWG	VI	Sabine-Neches Waterway 2	12.00	36
CESWG	VI	Sabine-Neches Waterway 3	7.00	33
CESWG	VI	Sabine-Neches Waterway 4	2.70	23
CESWG	VI	Galveston Harbor	3.70	33
CESWG	VI	Freeport Harbor	1.25	30
CESWG	VI	Matagorde Ship Channel	1.30	30
CESWG	VI	Corpus Christi Ship Channel	1.00	39
CESWG	VI	Port Mansfield	0.60	16
CESWG	VI	Brazos Island Harbor	1.00	46
CESPL	IX	San Diego Point Loma (LA 4)	4.90	270
CESPL	IX	San Diego 100 Fathom (LA 5)	5.40	600
CESPL	IX	Newport Beach (LA 3)	3.75	1428
CESPL	IX	LA Long Beach (LA 2)	4.70	360
CESPL	IX	Port Hueneme	3.50	240
CESPN	IX	San Francisco Channel Bar	2.80	35
CESPN	IX	Noyo River	0.38	78
CESPN	IX	Humbolt Bay Harbor	1.00	50
CESPN	IX	Crescent City Harbor	1.25	73

continued.

Table B-1, continued.

CORPS DIST	EPA REG	SITE NAME	DISTANCE TO SHORE (nmi)	MINIMUM DEPTH (ft)
CENPP	X	Chetco River Entrance	0.50	66
CENPP	X	Rogue River Entrance	0.75	66
CENPP	X	Port Orford	0.25	40
CENPP	X	Coquille River Entrance	0.50	42
CENPP	X	Coos Bay Entrance (E)	0.80	58
CENPP	X	Coos Bay Entrance (F)	1.25	72
CENPP	X	Coos Bay (H)	3.50	165
CENPP	X	Umpqua River Entrance	0.90	58
CENPP	X	Suislaw River Entrance	0.60	43
CENPP	X	Yaquina Bay and Harbor	0.95	41
CENPP	X	Depoe Bay (2)	0.38	84
CENPP	X	Tillamook Bay Entrance	0.95	66
CENPP	X	Mouth of Columbia (A)	3.00	55
CENPP	X	Mouth of Columbia (B)	5.30	111
CENPP	X	Mouth of Columbia (E)	3.10	54
CENPP	X	Mouth of Columbia (F)	5.00	120
CENPS	X	Willapa Bay	2.75	60
CENPA	X	Nome East	0.00	0
CENPA	X	Nome West	0.00	0

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CENED New England Division
CENAN New York District
CENAP Philadelphia District
CENAO Norfolk District
CESAW Wilmington District
CESAC Charleston District
CESAS Savannah District
CESAJ Jacksonville District
CESAM Mobile District
CELMN New Orleans District
CESWG Galveston District
CESPL Los Angeles District
CESPN San Francisco District
CENPP Portland District
CENPS Seattle District
CENPA Alaska District

Appendix B, cont.

There are four historical dredged material disposal sites in the Gulf of the Farallones. Use of the Gulf of the Farallones site (SF-7) and the 100-fathom test site (E1) was discontinued when the Gulf of the Farallones National Marine Sanctuary was established in 1982. Sites SF-7 and E1 received 153,000 m^3 (200,000 yd^3) and 3,100 m^3 (4,000 yd^3) respectively. The Channel Bar site has been designated to receive dredged material from the annual maintenance dredging of the San Francisco Bay Entrance Channel. The dredged material discharged at the Channel Bar site is primarily sand and quantities range from 730,000 to 1,200,000 m^3 (950,000 to 1,500,000 yd^3) annually. The single largest quantity of fine grained sediments from San Francisco Bay has been discharged at the Seal Rock (D1) site. Exact figures are unavailable, but it is known that the bulk of the 4,340,000 m^3 (5,680,000 yd^3) of sediments excavated for the construction of the trans-Bay tube of the Bay Area Rapid Transit District (BART) that was not used for backfill, was transported to the site for disposal. The historically used sites are listed in the table below:

Table B-2: HISTORICAL DREDGED MATERIAL SITES IN THE GULF OF THE FARALLONES

CORPS DIST	EPA REG	HISTORICAL SITE NAME	DISTANCE TO SHORE (nmi)	MINIMUM DEPTH (ft)
CESPN	IX	Gulf of Farallones (SF-7)	24.0	600
CESPN	IX	100-Fathom Test Site (E1)	23.4	600
CESPN	IX	Channel Bar (SF-8)	2.8	35
CESPN	IX	BART, Seal Rock (D1)	1.0	47

New candidate sites in the Gulf of the Farallones are listed below. The depths and distances from shore of the new candidate sites exceed the national average. Because of the position of the Gulf of the Farallones National Marine Sanctuary, the USCG marine traffic lanes and precautionary area, and the U.S. Navy submarine operating areas, actual haul distances for these sites are much greater than the distances to shore. Haul distances for sites 1M, B1, B1A, and C1 are 15.6 nmi, 30.4 nmi, 31.1 nmi, and 14.3 nmi, from the Golden Gate, respectively. For most of the sites listed on pages B-1 through B-3, haul distances to the ocean site and distances to shore are nearly equivalent.

Table B-3: CANDIDATE DREDGED MATERIAL DISPOSAL SITES

CORPS DIST	EPA REG	CANDIDATE SITE NAME	DISTANCE TO SHORE (nmi)	MINIMUM DEPTH (ft)
CESPN	IX	1M	9.9	138
CESPN	IX	B1	13.9	276
CESPN	IX	B1A	11.6	270
CESPN	IX	C1	4.9	96

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