MINUTE ITEM
This Calend r Item No. C20
was approved as Minute Item
No. 20 by the State Lands
Commission by a vote of 3
to 0 at its 9/23/92
meeting.

CALENDAR ITEM

A 9

S 3

C 2 0

09/23/92
PRC 6708
Martinez

MAINTENANCE DREDGING PERMIT

APPLICANT:
Golden Gate Bridge
Highway and Transportation District
P. O. Box 9000, Presidio Station
San Francisco, California 94129

AREA, TYPE LAND AND LOCATION:
Ungranted sovereign lands in the natural channel of Corte Madera Creek at the Larkspur Ferry Terminal, Marin County.

LAND USE:
Dredge a maximum 221,000 cubic yards of sediment for the purpose of maintaining a navigable depth for ferries going to and from the Larkspur Ferry Terminal. The Applicant has proposed disposal of the dredged material at the United States Army Corps of Engineers approved Alcatraz Aquatic Disposal Site SF-11.

TERMS OF PROPOSED PERMIT:
Permit period:
One (1) year beginning September 23, 1992.

In-bay Disposal Fee:
$0.25 per cubic yard for material disposed in-bay.

PREREQUISITE CONDITIONS, FEES AND EXPENSES:
Filing and processing fees have been received.

STATUTORY AND OTHER REFERENCES:
A. P.R.C.: Div. 6, Parts 1 and 2; Div. 13.

B. Cal. Code Regs.: Title 3, Div. 3; Title 14, Div. 6.

AB 884:
01/15/93

OTHER PERTINENT INFORMATION:

1. Water quality testing performed pursuant to the United States Army Corps of Engineers and California Regional Water Quality Control Board permitting requirements found the materials to be suitable for disposal at SF-11 as proposed.

2. Questions have been raised about continuing to dispose of dredged material in San Francisco Bay. However, the current lack of an EPA/Corps-approved offshore disposal site severely limits the options available for disposal.

   Through participation in the Federal/State Joint Long-Term Management Strategy being conducted to identify and evaluate site options for the disposal of material dredged from San Francisco Bay, the State Lands Commission has emphasized the need to focus on the selection of ocean disposal or non-aquatic site(s). This need has also been expressed by the San Francisco Bay Conservation and Development Commission.

   Given the necessity of the proposed dredging in order to maintain navigability for the public ferry system, and the time constraints imposed in the interest of protecting the fishery resources, staff recommends authorization of the proposed dredging and disposal.

3. This activity involves lands identified as possessing significant environmental values pursuant to P.R.C. 6370, et seq. Based upon the staff's consultation with the persons nominating such lands and through the CEQA review process, it is the staff's opinion that the project, as proposed, is consistent with its use classification.

4. A Finding Of No Significant Impact (FONSI) prepared and adopted for this project by the United States Army Corps of Engineers. The document was circulated for public review as broadly as State and local law may require and notice were given meeting the standards in 14 Cal. Code Regs. 15072(a). Therefore, pursuant to 14 Cal. Code Regs. 15225, the staff recommends the use of the federal FONSI in place of a Negative Declaration.

APPROVALS OBTAINED:

United States Army Corps of Engineers and Regional Water Quality Control Board.

FURTHER APPROVALS REQUIRED:

SFBCDC.

EXHIBITS:

A. Vicinity and Site Map
B. Finding of No Significant Impact/Negative Declaration

IT IS RECOMMENDED THAT THE COMMISSION:

1. FIND THAT THE FINDING OF NO SIGNIFICANT IMPACT PREPARED AND ADOPTED FOR THIS PROJECT BY THE UNITED STATES ARMY CORPS OF ENGINEERS MEETS THE REQUIREMENTS OF THE CEQA THEREFORE PURSUANT TO 14 CAL. CODE REGS. 15225 ADOPT SUCH FEDERAL DOCUMENT FOR USE IN PLACE OF A NEGATIVE DECLARATION.

2. FIND THAT THIS ACTIVITY IS CONSISTENT WITH THE USE CLASSIFICATION DESIGNATED FOR THE LAND PURSUANT TO P.R.C. 6370, ET SEQ.

3. AUTHORIZE STAFF TO ISSUE TO GOLDEN GATE BRIDGE, HIGHWAY AND TRANSPORTATION DISTRICT, THE DREDGING PERMIT ATTACHED AS EXHIBIT "B" SAID PERMIT SHALL ALLOW DREDGING A MAXIMUM VOLUME OF 221 CUBIC YARDS OF MATERIAL FOR ONE YEAR COMMENCING SEPTEMBER 23, 1992, FROM THE NATURAL CHANNEL OF CORTE MADERA CREEK AT LARKSPUR FERRY TERMINAL, MARIN COUNTY. IT IS PREFERRED THAT DREDGED MATERIALS SHALL BE DISPOSED OF AT THE CORPS OF ENGINEERS APPROVED OFFSHORE OCEAN DISPOSAL SITE. IN THE ABSENCE OF AVAILABILITY OF SUCH SITES, THE MATERIAL MAY BE DISPOSED OF AT THE CORPS OF ENGINEERS' ALCATRAZ DISPOSAL SITE. AN IN-BAY DISPOSAL FEE OF $0.25 PER CUBIC YARD SHALL BE CHARGED FOR IN-BAY DISPOSAL OF THE DREDGED MATERIAL. SUCH PERMITTED ACTIVITY IS CONTINGENT UPON APPLICATION'S COMPLIANCE WITH APPLICABLE PERMITS, RECOMMENDATIONS, OR LIMITATIONS ISSUED BY FEDERAL, STATE, AND LOCAL GOVERNMENT AGENCIES.

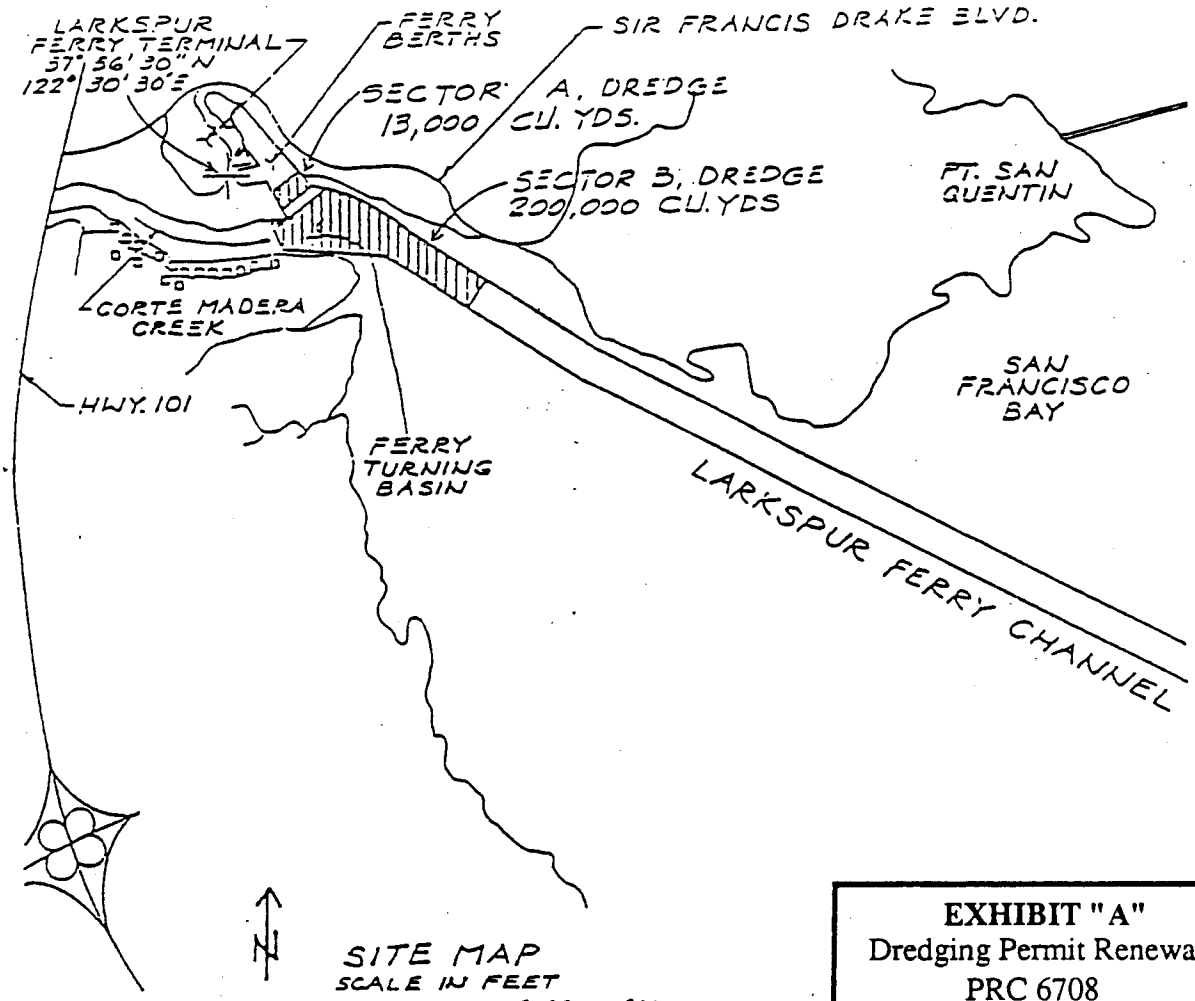
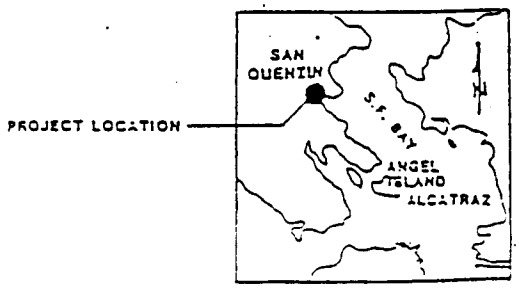


EXHIBIT "A"
Dredging Permit Renewal
PRC 6708
Golden Gate Bridge
Highway & Transportation District
Corte Madera Creek
MARIN COUNTY



VICINITY MAP

W. Y. 8/92

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EXHIBIT "B"

STATE OF CALIFORNIA — PETE WILSON, *Governor*

STATE LANDS COMMISSION

LEO T. McCARTHY, *Lieutenant Governor*
GRAY DAVIS, *Controller*
THOMAS W. HAYES, *Director of Finance*

EXECUTIVE OFFICE
1807 - 13th Street
Sacramento, CA 95814

CHARLES WARREN
Executive Officer

August 19, 1992
File: PRC 6708
FONSI 606

NOTICE OF PUBLIC REVIEW OF A PROPOSED FINDING OF NO SIGNIFICANT IMPACT, PREPARED BY THE U.S. ARMY CORPS OF ENGINEERS, IN PLACE OF NEGATIVE DECLARATION (SECTION 15073 CCR)

A Finding of No Significant Impact in place of Negative Declaration has been prepared pursuant to the requirements of the California Environmental Quality Act (Section 21000 et seq., Public Resources Code), the State CEQA guidelines (Section 15000 et seq., Title 14, California Code Regulations), and the State Lands Commission Regulations (Section 2901 et seq., Title 2, California Code Regulations) for a project currently being processed by the staff of the State Lands Commission.

The document is attached for your review. Comments should be addressed to the State Lands Commission office shown above with attention to the undersigned. All comments must be received by September 21, 1992.

Should you have any questions or need additional information, please call the undersigned at (916) 322-6375.

Linda Martinez

LINDA MARTINEZ
Division of Land Management

(4)

Attachment

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MINUTE PAGE 2868

STATE OF CALIFORNIA

PETE WILSON, Governor

STATE LANDS COMMISSION

LEO T. McCARTHY, *Lieutenant Governor*
GRAY DAVIS, *Controller*
THOMAS W. HAYES, *Director of Finance*

EXECUTIVE OFFICE
1807 - 13th Street
Sacramento, CA

CHARLES WARREN
Executive Officer

PROPOSED FINDING OF NO SIGNIFICANT IMPACT, PREPARED BY THE U.S. ARMY CORPS OF ENGINEERS, IN PLACE OF NEGATIVE DECLARATION

File: PRC 6708
FONSI 606
SCH No. 92083056

Project Title:	Larkspur Ferry Terminal Maintenance Dredging
Proponents:	Golden Gate Bridge, Highway & Transportation District
Project Location:	Larkspur Ferry Terminal on Corte Madera Creek, City of Larkspur, Marin County.
Project Description:	Maintenance dredging of 213,000 cubic yards of sediments from the Larkspur Ferry Channel to restore safe, navigable depths for continued ferry operations. (13,000 cubic yards will be dredged from Sector A and 200,000 cubic yards from Sector B, as shown on attached map.) Dredging will be to a depth of -13 feet MLLW with a 2' overdepth allowance. Dredged sediments would be barged to Alcatraz Disposal Site (SF-11) for disposal.
Contact Person:	Linda Martinez Telephone: 916/322-6375

This document is prepared pursuant to the requirements of the California Environmental Quality Act (Section 21000 et seq., Public Resources Code), the State CEQA Guidelines (Section 15000 et seq., Title 14, California Code Regulations), and the State Lands Commission regulations (Section 2901 et seq., Title 2, California Code Regulations).

Based upon the attached Initial Study, it has been found that:

/ X / this project will not have a significant effect on the environment.

/ __ / mitigation measures included in the project will avoid potentially significant effects.

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FINDING OF NO SIGNIFICANT IMPACT (FONSI)

1. Incorporated by reference is the Environmental Assessment (EA) for Permit Application Number: 19331N47 dated: 20 APR 92

2. Factors considered in this FONSI were the aquatic ecosystem, wetland, fish and wildlife resources including threatened and endangered species, water quality, cultural resources, navigation, and agency policies.

3. Based on information gathered during the preparation of the environmental assessment and received from cooperating Federal agencies having special expertise or having jurisdiction by law, or from the public, it is concluded that an Environmental Impact Statement will not be prepared.

Date

Stanley G. Phernambucq
Colonel Corps of Engineers
District Engineer

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

DEPARTMENT OF THE ARMY PERMIT EVALUATION AND DECISION DOCUMENT

Applicant: Golden Gate Bridge, Highway and Transportation District

Applicants No. 19331N47

This document constitutes my Environmental Assessment, Statement of Findings, and review and compliance determination according to the 404(b)(1) guidelines for the proposed work (applicant's preferred alternative) described in the attached Public Notice.

I. Proposed Project: The location and description of work are described in the attached Public Notice.

II. Environmental and Public Interest Factors Considered:

A. Purpose and Need: The applicant states that the purpose and need for this project is to return the project area to design depths to allow for safe operation of ferries.

B. Alternatives (33 CFR 320.4 (b)(4), 40 CFR 230.10):

1. No action would result in continued shoaling of the area. This would result in an increased potential for damage to ferries from accidental grounding and eventually prevent ferries from using the site.

2. Other project designs: The design as presented represents the minimum dredging necessary to re-establish the authorized project depths.

3. Other sites: The project is site specific.

ENVIRONMENTAL IMPACT ANALYSIS WORKSHEET IVB
SECTION 404(b)(1) IMPACT ASSESSMENT
AND ENVIRONMENTAL IMPACT ASSESSMENT

Applicant: GGBHTD ADP Number: 19331N47

Permit Manager: Smith Date: 20 APR 92

Environmental Coordinator: Eakle

II. ENVIRONMENTAL AND PUBLIC INTEREST FACTORS CONSIDERED

C. IMPACTS ON THE AQUATIC ECOSYSTEM

1. Physical/Chemical Characteristics and Anticipated Changes

Substrate - The removal of 213,000 cubic yards (cy) of sediment at the Larkspur Ferry Terminal near Corte Madera Creek would result in maintaining substrate elevations at -13 ft MLLW plus a 2 ft overdepth allowance. A conditional hydrographic survey completed in July 1991 indicated existing depths of -7 ft MLLW to -12 ft MLLW in the Turning Basin, -6 ft MLLW to -10 ft MLLW in the Ferry Channel, and -9 ft MLLW in Area A near the Berthing Basin. The last maintenance dredging episode at the Terminal occurred in April-May 1990. At that time, 40,989 cy of material was removed from Berths 1, 2, and 3, the Berthing Basin, and a portion of the Turning Basin to depths ranging from -13 ft MLLW to -18 ft MLLW. Changes in substrate elevations due to maintenance dredging in these areas would be considered a minor to moderate adverse impact.

Disposal of dredged material from the Larkspur Ferry Terminal at the Alcatraz Dredged Material Disposal Site (SF-11, DMDS) could result in altering the bottom substrate over a portion of the DMDS with a layer of new sediment. Sediments in the Berthing Basin were found to consist of sand (1.1-3.9%), silt (41.9-46.1%), and clay (50.5-57.0%). Sediments in the Ferry Channel were found to consist of 2.5% sand, 42.7% silt, and 50.5% clay. Sediments in Area A consisted of 0.34% sand, 71.9% silt, and 27.7% clay. Sediments at SF-11 were also found to consist of sand (12.3%), silt (37.7%), and clay (49.1%). Since SF-11 is primarily a dispersive disposal site, the amount of dredged material retained at the site would probably be minimal, and is considered to be a short-term, adverse impact.

Currents/Circulation - No effect

Drainage Patterns - No effect

Streamflow - No effect

Flood Control Function - No effect

Aquifer Recharge - No effect

Baseflow - No effect

Storm, Wave & Erosion Buffer - No effect

Erosion/Sedimentation Rate - Maintenance dredging at the Ferry Terminal to -13 ft MLLW in some areas could result in increasing the rate of sedimentation since suspended sediments may settle at greater rates in deeper areas. This in turn could result in the need to dredge the Terminal more frequently. The GGBHTD has not estimated sedimentation rates in these areas.

Water Supply (Natural) - No effect

Water Quality - Dredging at the Terminal, and disposal of the dredged material at the Alcatraz DMDS, could have short-term, adverse impacts on water quality variables such as temperature, total suspended solids (TSS), turbidity, dissolved oxygen (DO), salinity, and pH. Turbidity near the dredging and disposal sites would likely increase because of additional TSS in the water column, and DO levels would likely decrease at the DMDS during disposal events. However, these impacts would likely be short-term, localized, and minor.

Bulk sediment chemical analyses completed by the GGBHTD in January 1991 with composited sediment samples from the Turning Basin, Ferry Channel, and Area A are summarized in Attachment A (MEC Analytical Systems, Inc. 1991a. Results of Chemical, Physical, and Bioassay Analyses on Sediments from Larkspur Landing Ferry Terminal. 20 pp + appendix, and MEC Analytical Systems, Inc. 1991b. Results of Tier III Level Testing on Dredge Sediments at Larkspur Landing Ferry Terminal. 19 pp + appendices). Twelve (12) sediment cores were collected from the Turning Basin and composited into 3

test samples. Eight (8) cores were collected from the channel and composited into 1 test sample, and 6 cores were collected from Area A and composited into 1 test sample for solid-phase bioassay and bioaccumulation testing. Chemical analysis of the sediments to be dredged from the Turning Basin and Channel indicated lower levels of arsenic, mercury, cadmium, chromium, and lead than reference sediments collected at SF-11. Total phthalate esters, TRPH, zinc, silver, nickel, and selenium were elevated in the dredged material over SF-11 sediments. Polynuclear aromatic hydrocarbons (PAH's) were detected in the dredged material at 86.3-388.1 ppb, and in SF-11 sediments at 2326.5 ppb. Organotins were found in the sediments to be dredged at <2.50 ppb, while organotin species were found in SF-11 sediments at <1.79-3.96 ppb. No organic pesticides, PCB's, or phenols were detected in the dredged material or reference site sediments (MEC Analytical Systems, Inc. 1991a).

Chemical analyses of sediments collected in Area A resulted in higher levels of TRPH (42.9 ppm), selenium (<0.586 ppm), copper (58.3 ppm), nickel (73.8 ppm), silver (66.9 ppm), and PCB's (86 ppb), than sediments collected at SF-11 (MEC Analytical Systems, Inc. 1991b). Organotins were found in concentrations of <2.38 ppb. In comparison, tributyltin was detected in these sediments at 461.9 ppb in 1989, resulting in this area being restricted from dredging during the 1990 episode. Tributyltin biodegrades to dibutyltin then monobutyltin over time. This may be the case at the Ferry Terminal.

Impacts at the dredging site and disposal site due to chemical contaminants associated with the dredged material are likely to be short-term and localized. These contaminants would likely stay associated with the dredged sediments during disposal events, and release into the water column would be minimal.

2. Biological Characteristics and Anticipated Changes

Wetlands (Special Aquatic Site) - No effect

Mudflats (Special Aquatic Site) - No effect

Vegetated Shallows (Special Aquatic Site) - No effect

Pool and Riffle Areas (Special Aquatic Site) - No effect

Wildlife Sanctuaries - No effect

Endangered Species - Adult winter-run chinook salmon migrate through San Francisco Bay to spawning areas in the upper Sacramento River during the late fall and early winter. Juveniles travel downstream through the Bay and into the Pacific Ocean in the late fall as well. The movements of adult and juvenile salmon through the Bay are thought to be rapid during these migrations. Since impacts in the water column during dredged material disposal events at SF-11 are short-term, localized, and minor, potentially adverse impacts to winter-run chinook salmon that might be near the DMDS are not expected.

Habitat for Fish and Other Aquatic Organisms - The removal of 213,000 cy of bottom sediments at the Larkspur Ferry Terminal would have short-term, adverse impacts on fishes and fish habitat by temporarily increasing TSS in the water column, and possibly decreasing DO levels. However, conditions in the water column at the dredge site would likely return to pre-dredging conditions shortly after completion of the dredging operation. The removal of bottom sediments would also result in the removal of benthic organisms at the dredge site. However, it is expected that the areas to be dredged would be recolonized by benthic organisms within months following each dredging episode.

Disposal of dredged material from the Ferry Terminal at SF-11 would have short-term, adverse impacts on fishes and fish habitat. These impacts would include localized, increased turbidity due to additional TSS in the water column, and decreased DO levels. Water column impacts due to dredged material disposal at SF-11 are temporary, and conditions generally return to ambient within minutes following disposal events. Therefore, these impacts are considered to be minor.

Impacts to the benthic community at SF-11 due to disposal of Ferry Terminal sediments could include direct burial, substrate alteration, and possible chemical contaminant uptake from those sediments with higher concentrations of TRPH, selenium, copper, nickel, silver, zinc, PCB's and phthalates. Suspended particulate phase bioassays completed by the GGBHTD in January 1991 are summarized in Attachment A (MEC Analytical Systems, Inc. 1991a). The bioassays resulted in LC50 values >100% for each composited test sample, except Area B (9-12) which was 63.9%, and EC50 values >100%.

The LC50 value is that concentration of suspended particulate phase elutriate which produced 50% mortality in test organisms (Bay mussel larvae), and the EC50 value is that concentration of elutriate which produced 50% abnormality in developing larvae. The limiting permissible concentration (LPC) of the dredged material is 0.01% of the LC50 or EC50. The GGBHTD estimated the concentration of suspended particulate phase (Csp) at the dumpsite 4 hours after disposal of the dredged material to be 0.1005-0.1451% (MEC Analytical Systems, Inc. 1991a). Since the LPC (0.64-1.0% for all test samples) > Csp, no potentially adverse impacts in the water column would be expected from disposal of the dredged material.

The 10-day solid phase bioassay completed with the composited sediment sample from Area [redacted] resulted in 73% test organism survival, while survival in reference sediments collected near the DMDS resulted in [redacted]% survival (See Attachment A). The marine polychaete Neanthes arenaceodentata was the test organism. The increase in toxicity between the reference and test sediments was not significant, indicating no potentially adverse effects to the benthic community at SF-11 due to disposal of this dredged material (MEC Analytical Systems, Inc. 1991b).

The 28-day bioaccumulation test completed with the clam Macoma nasuta resulted in significant bioaccumulation of arsenic, chromium, and dibutyltin in the tissues of clams exposed to test sediments compared to reference sediments (See Attachment A).. Dibutlytin was found in clam tissues from the test sediments at 16.88 ppb, and 14.6 ppb from the reference sediments, a 15% increase. However, the test sediments were high in silt and clay (99%) and the reference sediments used were high in sand (97.6%), which could partly explain the experimental results (MEC Analytical Systems, Inc. 1991b). Macoma feeds on fine-grained sedimemts and will not process coarse sediments.

D. IMPACTS ON ENVIRONMENTAL RESOURCES OUTSIDE THE AQUATIC ECOSYSTEM

1. Physical Characteristics and Anticipated Changes

Air Quality - Short-term, adverse impacts to air quality would be expected as a result of emissions from dredging equipment operating at the Ferry Terminal, and the barging of the dredged material to the Alcatraz DMDS. These impacts are likely to be minor and localized.

Noise Conditions - Temporary increases in ambient noise conditions would also be expected as a result of maintenance dredging operations at the Ferry Terminal. However, given existing noise levels in the area from automobiles, watercraft, and commerical aircraft, these short-term increases are likely to be minimal.

Geologic Conditions - No effect

2. Biological Characteristics and Anticipated Changes

Terrestrial Habitat - No effect

Special Wildlife Areas - No effect

3. Socioeconomic Characteristics and Anticipated Changes

Aesthetic Quality - Dredging equipment and barges are frequently seen vessels on San Francisco Bay, so no impacts to visual resources are expected from the dredging operation at the Ferry Terminal and the barging of the dredged material to SF-11. The disposal of dredged material at SF-11, and the resultant turbidity plume following each disposal event, would have short-term adverse impacts on visual resources in the area. However, turbidity plumes associated with disposal events last only minutes. Therefore, the impact is considered to be minor.

Agricultural Activity - No effect

Commercial Fishing - No effect

Community Cohesion - No effect

Economics - Maintenance dredging at the Larkspur Ferry Terminal would have major, long-term beneficial impacts on the permit applicant. The Ferry Terminal provides passenger service between Larkspur and San Francisco. By maintaining the authorized berthing configurations at the Terminal, and the Channel that are periodically shoaled by the accumulation of sediment, the GGBHTD could continue to provide safe navigation for commuter ferries in San Francisco Bay.

Employment - No effect

Energy - No effect

Mineral Resources - No effect

Population/Growth Inducement - No effect

Prime and Unique Agricultural Lands - No effect

E. SUMMARY OF INDIRECT IMPACTS

None have been identified.

F. SUMMARY OF CUMULATIVE IMPACTS

Dredging and disposal of Larkspur Ferry Terminal sediments at the Alcatraz DMDS would cumulatively contribute to the resuspension of sediments in the San Francisco Bay system. The contribution of 213,000 cy of sediment to this process could probably be considered a moderate impact.

G. CONCLUSIONS AND RECOMMENDATIONS

Based on an analysis of the above identified impacts, a preliminary determination has been made that it will not be necessary to prepare an Environmental Impact Statement (EIS) for subject permit application. The Environmental Assessment for the proposed action has, however, not yet been finalized and this preliminary determination may be reconsidered if additional information is developed.

Recommended by: _____ Date _____
Environmental Coordinator

Concur with Recommendation: _____ Date 23 APR 92
Chief, Impact Analysis Section

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III. Findings:

A. Other authorization:

1. Water quality certification: Water quality certification issued on 3 Mar 92, resolution 92-00[illegible].

2. Coastal zone management consistency determination:

B. A complete application was received on 29 October 91. A Public Notice describing the project was issued on 22 November 91, and was sent to all interested parties including appropriate State and Federal agencies. All comments received on this action have been reviewed and are summarized below.

1. Summary of comments received:

a. Federal Agencies:

(1) U.S. Environmental Protection Agency (US EPA): no comment per telephone conversation, 17 December, 1991

(2) U.S. Fish and Wildlife Service (US F&WS): The US F&WS believes the practice of dredged material disposal within San Francisco Bay, particularly at the Alcatraz Disposal Site, is one of the principal causes of observed water and sediment quality degradation in the San Francisco Bay estuary, and its continuation has serious biological implications. Disposal of 213,000 cubic yards per year of contaminated material from the Larkspur Ferry terminal will make both an individual and cumulative contribution to the long term degradation of the estuarine environment, and adversely affect public trust resources of the Department of the Interior.

They are concerned about the way the Corps continues to evaluate impacts of in-bay disposal of dredged materials. The use of contaminated reference sediments from previously used disposal sites in bioassays is misleading at best. Judging dredged material to be suitable for in-bay disposal because it is no more toxic than already contaminated reference sediments leads to continued degradation of the San Francisco Bay ecosystem.

Therefore, until an appropriate upland disposal site is identified for the material to be dredged from the Larkspur Ferry Terminal, they will object to issuance of a permit for the work as proposed.

(3) U.S. National Marine Fisheries Service (NMFS): NMFS does not oppose issuance of the permit. Consultation under Sec 7 of the Endangered Species Act concluded the proposed action is not likely to jeopardize winter-run Chinook salmon.

(4) U.S. Coast Guard (US CG): Requested standard information for Notice to Mariners.

(5) Other Federal Agency (ies):

b. State and local agencies: No comments.

c. Organizations:

(1) Sierra Club Marin Group (SC): The SC requested the Corps require the GGBHTD investigate (1) whether the dredging may play some part in the erosion at the nearby Corte Madera Ecological Reserve and (2) alternatives to Alcatraz disposal.

(2) Marin Audubon Society (MAS): MAS expressed concern about a possible connection between erosion at the Corte Madera Ecological Reserve and dredging. They believe the importance of the reserve as Clapper Rail habitat warrants the addition of a special condition requiring the district to add to its ongoing study of erosion (1) an analysis of possible connections between erosion of the Reserve marsh and dredging of the ferry channel , and (2) a study of and recommendations for measures to remediate, prevent or at least control future erosion at the reserve. They also object to continued use of the Alcatraz disposal site for material that has higher levels of constituents than the sediments at Alcatraz. They would like the GGBHTD to take the lead in establishing a treatment system to remove constituents of concern from dredge material.

(3) Marin Conservation League (MCL): The MCL requested the Corps to look into land disposal sites for the sediments from this project.

(4) The Environmental Forum of Marin (EFM): The EFM believes the GGHBTD should be studying possible effects of dredging on the erosion taking place at the adjacent ecological reserve. They also are concerned the dredge sediments show higher levels of certain chemicals than the disposal site and believe upland disposal or treatment should be required.

d. Individuals: None

2. Evaluation:

I have reviewed and evaluated, in light of the overall public interest, the documents and factors concerning this permit application and the stated views of other interested agencies and the concerned public. In doing so, I have considered the possible consequences of this proposed work in accordance with regulations published in 33 CFR Part 320 and 40 CFR Part 230. The following paragraphs include my evaluation of comments received and how the project complies with the above cited regulations.

a. Consideration of comments: Several commentors expressed concern that the ferry operations and dredging might be affecting shoreline erosion in the adjacent Corte Madera Ecological Reserve. The applicant referenced the ongoing study by Philip Williams & Associates which indicates ferry operations are relatively small part of the complex and regional processes leading to erosion. They also point out work by Professor Ray Krone (Emeritus) of UC Davis has shown dredged channels have little to no impact on the degradation of adjacent mud flats in San Francisco Bay. Additionally, erosion rates in adjacent coves are equal to or greater than those along the shoreline of the Corte Madera Ecological Reserve and there are no ferries operating in these areas. This would indicate ferries are not the major cause of erosion.

The levels of contaminants in the sediments concerned two organizations, but the Regional Water Board issued a certification for the discharge and EPA had no concerns.

The Audubon Society and the Sierra Club recommended upland alternatives be used to dispose of the material, but at this time there are no practicable alternatives to in bay disposal.

The Audubon Society recommended GGBHTD establish a treatment system to remove constituents of concern from dredge sediments. The technology to do this is being evaluated, but it is currently not a practicable alternative.

b. Evaluation of Compliance with 404(b)(1) guideline (restrictions on discharge, 40 CFR 230.10):

(1) Alternative Test: There are no practicable alternatives to dredging this site. The dredge material disposal is taking place at an approved dredge material disposal site and at this time there are no practicable alternatives having less adverse impact on the aquatic ecosystem that do not involve discharges into waters of the United States.

(2) Special restrictions: The proposed discharge will not: (1) Violate State water quality standards, (2) violate toxic effluent standards (under Section 307 of the Act), (3) jeopardize endangered or threatened species or their critical habitat, (4) violate standards set by the Department of Commerce to protect marine sanctuaries.

c. General Evaluation (33 CFR 320.4(1)):

(1) Extent of the public and private need: Completion of this project will allow the transportation district to return the channel at the ferry terminal to design depths. This will allow the safe operation ferries.

(2) Alternative locations and methods: This is a site specific project and as such cannot be moved to another location. Currently there are no practicable alternatives to the in-bay disposal of dredged sediments.

(3) Beneficial and detrimental effects: This project has the benefit of allowing the transportation district to continue safe operations at the ferry terminal. Dredging and disposal of sediments at the Alcatraz dredge Material Disposal Site will have a minor to moderate impact on the San Francisco Bay system and could contribute to mounding at the disposal site.

IV. Determinations:

A. 404(b)(1) Compliance/Non-compliance Review (40 CFR 230.12).

The discharge complies with the guidelines.

B. Public interest determination: I find that issuance of a Department of the Army permit (with special conditions), as prescribed by regulations published in 33 CFR Parts 320 to 330, and 40 CFR Part 230 is not contrary to the public interest.

Date

Robert F. Smith
Regulatory Action Officer

Date

STANLEY G. PHERNAMBUCQ
Colonel, Corps of Engineers
District Engineer

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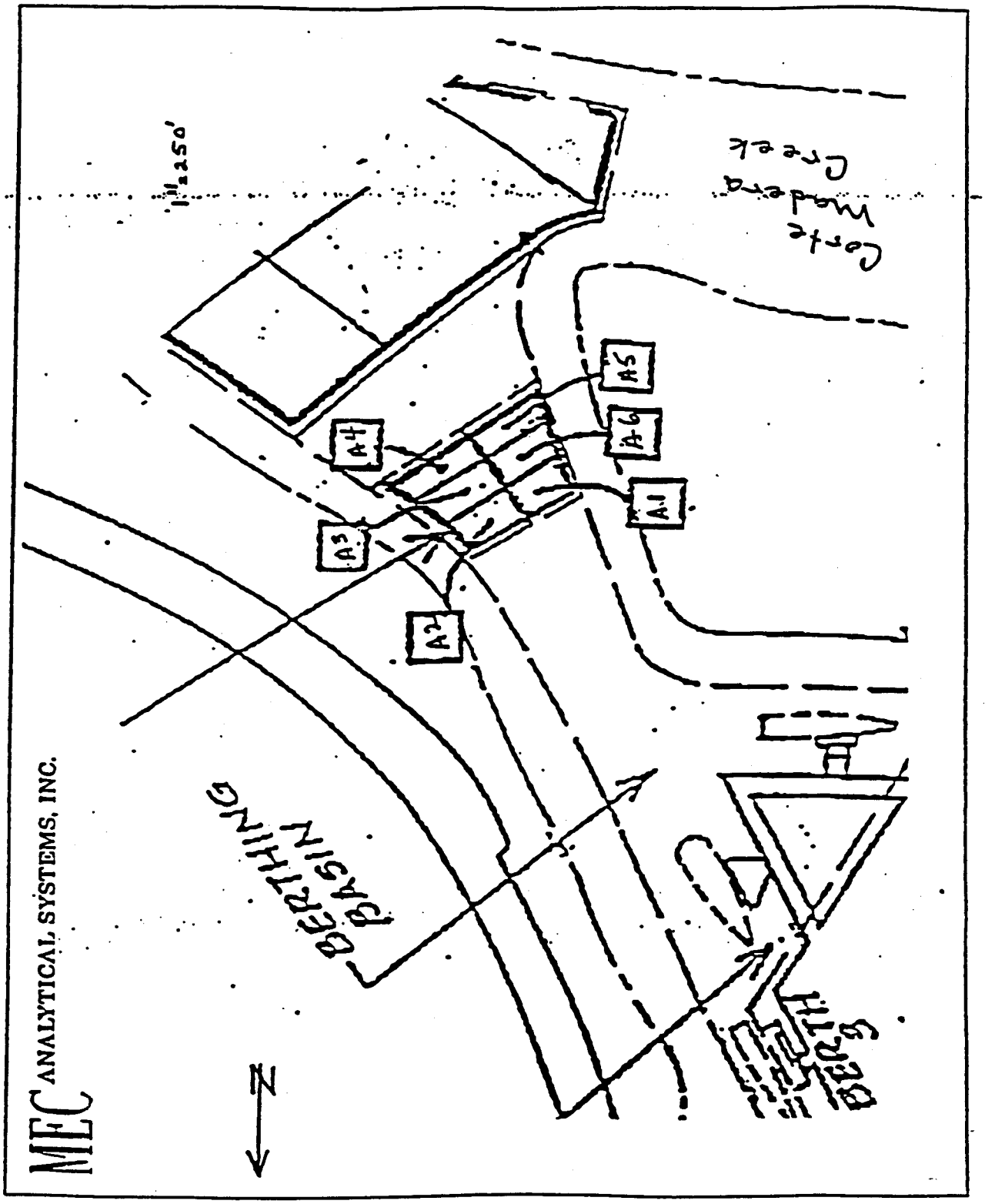
ATTACHMENT A



DRY [illegible] SITE A
LARKSPUR LAN[illegible] MARIN COUNTY

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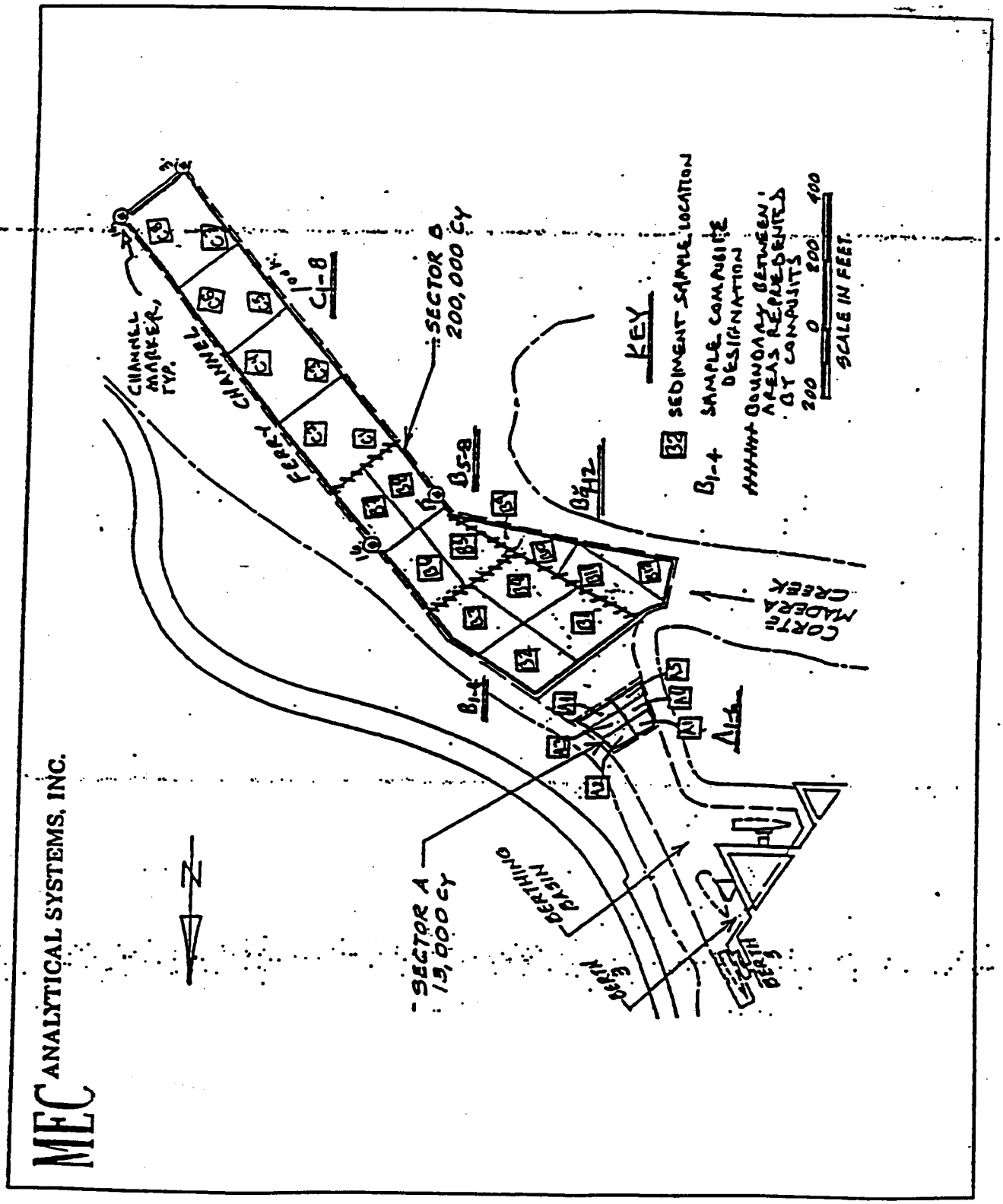
ATTACHMENT A

Coring Log

Area	Core	Water Depth (ft)	Core Depth (ft)	Core Length (ft)
A				
	A-1	10.3	15.5	5.2
	A-2	9.7	15.0	5.3
	A-3	10.9	15.7	4.8
	A-4	11.2	15.4	4.2
	A-5	9.6	15.0	5.4
	A-6	9.0	15.0	6.0

Depths are in feet, referenced to MLLW

ATTACHMENT A



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ATTACHMENT A

Coring Log

Area		Water Depth (ft)	Core Depth (ft)	Core Length (ft)
B 1-4				
	B-1	11.3	15.3	4.0
	B-2	12.2	15.7	3.5
	B-3	12.5	15.7	3.2
	B-4	13.1	15.0	1.9
B 5-8				
	B-5	12.2	15.0	2.8
	B-6	12.3	14.9	2.6
	B-7	13.5	15.1	1.6
	B-8	13.7	15.0	1.3
B 9-12				
	B-9	10.7	15.2	4.5
	B-10	11.2	15.0	3.8
	B-11	11.5	14.9	3.4
	B-12	9.8	15.0	5.2
C				
	C-1	13.7	15.0	1.3
	C-2	12.9	15.2	2.3
	C-3	13.8	15.1	1.3
	C-4	14.0	15.3	1.3
	C-5	13.1	15.2	2.1
	C-6	12.9	15.2	2.3
	C-7	13.9	15.3	1.4
	C-8	12.9	15.0	2.1

Depths are in feet, referenced to MLLW

ATTACHMENT A

SUMMARY OF TIER III SEDIMENT CHARACTERIZATION (1)

Site	Composite A	Reference	Detection Limits - Achieved	Detection Limits - Tier II (2)
Grain size (%)				
Sand	0.34	97.6		
Silt	71.9	1.7		
Clay	27.7	0.6		
Total Solids (%) (Dry Wt.)	42.0	80.0		0.1
Total Organic Carbon (%)	1.421	0.4		0.1
Sulfides (ppm)				
Total	5595	< 27.5		0.5
Water Soluble	0.04	0.033		0.1
Organotins (µg/kg)				
Tributyltin	< 2.38	< 1.25	1.0	1.0
Dibutyltin	< 2.38	< 1.25	1.0	1.0
Monobutyltin	< 2.38	< 1.25	1.0	1.0
TRPH (ppm)	42.9	< 12.5	12.5	1.0
Grease & Oil (ppm)	5.95	< 12.5	12.5	1.0
Cyanide (ppm)	6.81	0.124		0.1
Metals (mg/kg)				
Arsenic (As)	3.5	2.58		0.1
Mercury (Hg)	0.376	< 0.063	0.06	0.02
Selenium (Se)	< 0.586	< 0.313	0.3	0.1
Cadmium (Cd)	0.176	< 0.063	0.06	0.1
Chromium (Cr)	56.2	23.5		0.1
Copper (Cu)	58.3	4.05	0.1	0.1
Lead (Pb)	< 0.586	10.600	0.5	0.1
Nickel (Ni)	73.8	24.5		0.1
Silver (Ag)	66.9	< 0.063	0.63	0.1
Zinc (Zn)	42.4	38.4		2.0
Pesticides and PCBs (ug/kg)				
4,4' - DDD	ND	ND	2	1
4,4' - DDE	ND	ND	2	0.5
4,4' - DDT	ND	ND	2	1
Aldrin	ND	ND	2	0.5
Alpha-BHC	ND	ND	2	0.5-1.0
Beta BHC	ND	ND	2	0.5-1.0
Chlorodane	ND	ND	25	5
Delta BHC	ND	ND	2	0.5-1.0
Dieldrin	ND	ND	2	0.5
Endosulfan I	ND	ND	10	2
Endosulfan II	ND	ND	2	0.5
Endosulfan Sulfate	ND	ND	25	10
Endrin	ND	ND	2	0.5
Endrin Aldehyde	ND	ND	10	5
Heptachlor	ND	ND	2	0.5
Heptachlor Epoxide	ND	ND	10	5
Gamma-BHC	ND	ND	2	0.5-1.0
Toxaphene	ND	ND	25	30
PCB 1016	ND	ND	20	20
PCB 1221	ND	ND	20	20
PCB 1232	ND	ND	20	20
PCB 1242	ND	ND	20	20
PCB 1248	ND	ND	20	20
PCB 1254	ND	ND	20	20
PCB 1260	86	ND	20	20

(1) All chemical analyses are given as dry weight basis.
(2) Tier II detection limits are given as wet weight basis.
(3) Achieved detection limits are in wet weight.
(4) ND = Not detected.

ATTACHMENT A

SUMMARY OF TIER II SEDIMENT CHARACTERIZATION (1)

Site	Composite A	Reference	Detection Limits Achieved	Tier II (2)
Phenols (ug/kg)				
4-Chloro-3-Methyphenol	ND	ND	10	10
2-Chlorophenol	ND	ND	10	20
2, 4-Dichlorophenol	ND	ND	10	100
2, 4-Dimethylphenol	ND	ND	10	10
2,4-Dinitrophenol	ND	ND	50	50
2-Methyl-4,6-Dinitrophenol	ND	ND	50	50
2-Nitrophenol	ND	ND	10	10
4-Nitrophenol	ND	ND	50	100
Pentachlorophenol	ND	ND	100	20
Phenol	ND	ND	10	10
2,4,6-Trichlorophenol	ND	ND	10	10
PAHs (ug/kg)				
Acenaphthene	ND	ND	20	20
Acenaphthylene	ND	ND	20	20
Anthracene	ND	ND	20	20
Benzo (A) Anthracene	ND	ND	20	20
Benzo (A) Pyrene	ND	ND	20	20
Benzo (B)Fluoranthene	ND	ND	20	20
Benzo (G,H,I) Perylene	ND	ND	20	20
Benzo (K) Fluoranthene	ND	ND	20	20
Chrysene	ND	ND	20	20
Dibenzo (A,H) Anthracene	ND	ND	20	20
Fluoranthene	62.9	ND	20	20
Fluorene	ND	ND	20	20
Ideno (1.2.3-CD) Pyrene	ND	ND	20	20
Naphthalene	ND	ND	20	20
Phenanthrene	ND	ND	20	20
Pyrene	84.8	ND	20	20
Totals	147.7	0		
Phthalate Ester (ug/kg)				
Bis(2-Ethylhexyl) Phthalate	ND	ND	50	50.0
Butyl Benzyl Phthlate	ND	ND	8.5	8.5
Di-N-Butyl Phthlate	ND	ND	9	9.0
Deithyl Phthlate	ND	ND	12	12.0
Dimethyl Phthlate	ND	ND	7.3	7.3
Di-N-Octyl Phthlate	ND	ND	75.0	75.0
Total Phthalates	0	0		

(1) All chemical analyses are given as dry weight basis.
(2) Tier II detection limits are given as wet weight basis.
(3) Achieved detection limits are in wet weight.
(4) ND = Not detected.

ATTACHMENT A

SUMMARY OF TIER II SEDIMENT CHARACTERIZATION (1)

	Composite B1-4	B5-8	B9-12	C	Alcatraz	Detection Limits Achieved	Tier II (2)
Grain size (%)							
Sand	1.4	1.1	3.9	2.5	12.3		
Silt	46.1	41.9	45.1	42.7	37.7		
Clay	52.5	57.0	50.5	54.8	49.1		
Solids (%) (Dry Wt.)	43	44	40	48	56		0.1
Total Organic Carbon (%)	1.237	1.278	1.298	1.367	1.28		0.1
Sulfides (mg/kg)							
Total	826	161	< 55.0	< 45.8	1409	45.8	0.5
Water Soluble	0.114	0.143	0.168	0.229	0.195		0.1
Organotins (mg/kg)							
Tributyltin	< 2.33	< 2.27	< 2.50	< 2.08	3.96	1.0	1.0
Dibutyltin	< 2.33	< 2.27	< 2.50	< 2.08	< 1.79	1.0	1.0
Monobutyltin	< 2.33	< 2.27	< 2.50	< 2.08	< 1.79	1.0	1.0
TRPH (mg/kg)	29.5	28.9	31.8	21	18.6	16.5	1.0
Oil & Grease (mg/kg)	< 2.33	< 2.27	< 2.5	2.08	18.6	41.7	1.0
Cyanide	6.86	0.455	0.328	0.223	1.66		0.1
Metals (mg/kg)							
Arsenic (As)	3.21	2.45	4.90	3.29	7.61		0.1
Mercury (Hg)	0.349	0.352	0.343	0.290	0.845		0.02
Selenium (Se)	<0.597	< 0.559	< 0.623	< 0.508	< 0.436		0.1
Cadmium (Cd)	0.347	0.152	0.150	0.175	0.416		0.1
Chromium (Cr)	28.4	36.4	31.0	32.9	61.3		0.1
Copper (Cu)	55.3	57.3	53.0	52.5	55.4		0.1
Lead (Pb)	< 0.579	< 0.559	< 0.623	< 0.508	35.9	0.508	0.1
Nickel (Ni)	82.1	82.7	72.3	72.1	63.4		0.1
Silver (Ag)	0.458	0.339	0.385	0.325	0.334		0.1
Zinc (Zn)	53.3	48.4	51.8	47.1	42.7		2.0
Pesticides and PCBs (ug/kg)							
4,4' - DDD	ND	ND	ND	ND	ND	2	1
4,4' - DDE	ND	ND	ND	ND	ND	2	0.5
4,4' - DDT	ND	ND	ND	ND	ND	2	1
Aldrin	ND	ND	ND	ND	ND	2	0.5
alpha-BHC	ND	ND	ND	ND	ND	2	0.5-1.0
beta BHC	ND	ND	ND	ND	ND	2	0.5-1.0
Chlorodane	ND	ND	ND	ND	ND	25	5
delta BHC	ND	ND	ND	ND	ND	2	0.5-1.0
Dieldrin	ND	ND	ND	ND	ND	2	0.5
Endosulfan I	ND	ND	ND	ND	ND	10	2
Endosulfan II	ND	ND	ND	ND	ND	2	0.5
Endosulfan Sulfate	ND	ND	ND	ND	ND	25	10
Endrin	ND	ND	ND	ND	ND	2	0.5
Endrin Aldehyde	ND	ND	ND	ND	ND	10	5
Heptachlor	ND	ND	ND	ND	ND	2	0.5
Heptachlor Epoxide	ND	ND	ND	ND	ND	10	5
gamma-BHC	ND	ND	ND	ND	ND	2	0.5-1.0
Toxaphene	ND	ND	ND	ND	ND	25	30
PCB 1016	ND	ND	ND	ND	ND	20	20
PCB 1221	ND	ND	ND	ND	ND	20	20
PCB 1232	ND	ND	ND	ND	ND	20	20
PCB 1242	ND	ND	ND	ND	ND	20	20
PCB 1248	ND	ND	ND	ND	ND	20	20
PCB 1254	ND	ND	ND	ND	ND	20	20
PCB 1260	ND	ND	ND	ND	ND	20	20

(1) All chemical analyses are given as dry weight basis.
(2) Tier II detection limits are given as wet weight basis.
(3) Achieved detection limits are in wet weight.
(4) ND = Not detected.

ATTACHMENT A

SUMMARY OF TIER II SEDIMENT CHARACTERIZATION (1)

	Composite B1-4	B5-8	B9-12	C	Alcatraz	Detection Limit Achieved	Detection Limit Tier II (2)
Phenols (ug/kg)							
4-Chloro-3-Methyphenol	ND	ND	ND	ND	ND	10	10
2-Chlorophenol	ND	ND	ND	ND	ND	10	20
2, 4-Dichlorophenol	ND	ND	ND	ND	ND	10	100
2, 4-Dimethyiphenol	ND	ND	ND	ND	ND	10	10
2,4-Dinitrophenol	ND	ND	ND	ND	ND	50	50
2-Methyl-4,6-Dinitrophenol	ND	ND	ND	ND	ND	50	50
2-Nitrophenol	ND	ND	ND	ND	ND	10	10
4-Nitrophenol	ND	ND	ND	ND	ND	50	100
Pentachlorophenol	ND	ND	ND	ND	ND	100	20
Phenol	ND	ND	ND	ND	ND	10	10
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	10	10
PAHs (ug/kg)							
Acenaphthene	ND	ND	ND	ND	62.1	20	20
Acenaphthylene	ND	ND	ND	ND	38.8	20	20
Anthracene	ND	ND	55.3	ND	152	20	20
Benzo (A) Anthracene	ND	ND	ND	ND	229	20	20
Benzo (A) Pyrene	ND	ND	ND	ND	ND	20	20
Benzo (B) Fluoranthene	ND	ND	ND	ND	ND	20	20
Benzo (G,H,I) Perylene	ND	ND	ND	ND	ND	20	20
Benzo (K) Fluoranthene	ND	ND	ND	ND	ND	20	20
Chrysene	ND	ND	ND	ND	257	20	20
Dibenzo (A,H) Anthracene	ND	ND	ND	ND	ND	20	20
Fluoranthene	86.3	114	114	129	557	20	20
Fluorene	ND	ND	ND	ND	48.6	20	20
Ideno (1,2,3-CD) Pyrene	ND	ND	ND	ND	ND	20	20
Naphthalene	ND	ND	ND	ND	ND	20	20
Phenanthrene	ND	58.9	52.8	55.0	330	20	20
Pyrene	ND	165	166	171	652	20	20
Total PAHs	86.3	337.9	388.1	355	2326.5		
Phthalate Esters (ug/kg)							
Bis(2-Ethylhexyl)Phthalate	ND	ND	ND	ND	ND	50	50
Butyl Benzyl Phthalate	ND	ND	ND	ND	ND	8.5	8.5
Di-N-Butyl Phthalate	ND	30.5	78.8	ND	ND	9	9
Diethyl Phthalate	82.8	ND	48.8	ND	ND	12	12
Dimethyl Phthalate	ND	ND	ND	ND	ND	7.3	7.3
Di-N-Octyl Phthalate	ND	ND	ND	ND	ND	75	75
Total Phthalates	82.8	30.5	127.6	0	0		

(1) All chemical analyses are given as dry weight basis.
(2) Tier II detection limits are given as wet weight basis.
(3) Achieved detection limits are in wet weight.
(4) ND = Not detected.

ATTACHMENT A

Neanthes arenaceodentata
SUMMARY OF MORTALITY DATA
FOR THE 10 DAY SOLID PHASE
TOXICITY BIOASSAY

Site	Rep	Initial Count	Final Count	Percent Survival	Average % Survival
Control	1	20	18	90	
	2	20	20	100	
	3	20	19	95	
	4	20	20	100	
	5	20	18	90	95.0
Reference	1	20	16	80	
	2	20	18	90	
	3	20	17	85	
	4	20	16	80	
	5	20	16	80	83.0
Area A	1	20	17	85	
	2	20	14	70	
	3	20	10	50	
	4	20	19	95	
	5	20	13	65	73.0

ATTACHMENT A

Macoma nasuta
RESULTS OF TISSUE ANALYSIS

Tissue Burden (mg/kg dry weight unless indicated)

Sediment	Analyte	Replicate 1	2	3	4	5	Mean	Standard Deviation
Reference	Arsenic	8.66	11.00	8.69	8.98	11.70	9.81	1.436
	Mercury	1.27	1.36 •	1.09 •	1.63 •	1.14 •	1.30	0.214
	Selenium	6.49 •	7.14 •	5.92 •	7.50 •	6.13 •	6.64	0.669
	Cadmium	0.06 •	0.06 •	0.05 •	0.07 •	0.05 •	0.06	0.008
	Chromium	6.49	7.14 •	5.92 •	7.50 •	6.40	6.69	0.628
	Copper	32.80	27.60	19.90	28.80	17.80	25.38	6.308
	Lead	11.60	9.14	7.90	13.40	10.90	10.59	2.142
	Nickel	13.00 •	2.26	6.33	8.43	3.38	6.68	4.288
	Silver	1.30 •	1.43 •	1.18 •	46.20	1.23 •	10.27	20.087
	Zinc	170.00	138.00	123.00	172.00	156.00	151.80	21.076
	Tributyl Tin (µg/kg)	14.90 •	14.30 •	12.50 •	16.70 •	12.50 •	14.18	1.770
	Dibutyl Tin (µg/kg)	16.90	14.60	12.50 •	16.70 •	12.50 •	14.64	2.151
	Monobutyl Tin (µg/kg)	47.00	14.30 •	12.50 •	16.70 •	12.50 •	20.60	14.858
Area A	Arsenic	15.60	14.00	16.40	14.40	19.60	<u>16.00</u>	2.227
	Mercury	1.40 •	1.24 •	1.19 •	0.90 •	1.36 •	1.22	0.197
	Selenium	6.56 •	6.13 •	5.74 •	5.00 •	6.49 •	5.98	0.640
	Cadmium	0.60 •	0.05 •	0.05 •	0.04 •	0.06 •	0.16	0.246
	Chromium	23.10	16.50	18.60	5.00 •	16.00	<u>15.84</u>	6.676
	Copper	18.40	31.50	20.90	13.20	39.70	24.74	10.696
	Lead	16.60	18.00	8.49	5.00	13.10	12.24	5.464
	Nickel	8.23 •	10.70	7.35	8.90	9.50	8.94	1.269
	Silver	1.31	1.23 •	46.80	1.00 •	6.87	11.44	19.919
	Zinc	170.00	179.00	186.30	111.00	20.60	133.38	69.719
	Tributyl Tin (µg/kg)	14.30 •	12.50 •	12.50 •	10.00 •	14.30 •	<u>12.72</u>	1.767
	Dibutyl Tin (µg/kg)	17.70	17.30	14.20	17.30	17.90	<u>16.88</u>	1.521
	Monobutyl Tin (µg/kg)	14.30 •	12.50 •	12.50 •	10.00 •	14.30 •	12.72	1.767

• Values are below detection limits.

Underlined values are statistically significant from the reference, indicating bioaccumulation.
The statistical analyses performed is the Dunnett's test (ANOVA) with homogeneity of variance testing.
All statistical analyses are to 95% confidence limits.

ATTACHMENT A

Macoma nasuta

SUMMARY OF MORTALITY DATA FOR THE 28 DAY SOLID PHASE AND BIOACCUMULATION BIOASSAY

Site	Rep	Initial Count	Final Count	Percent Survival	Average % Survival
Control	1	20	18	90	
	2	20	20	100	
	3	20	20	100	
	4	20	20	100	
	5	20	17	85	95.0
Reference	1	20	18	90	
	2	20	19	95	
	3	20	19	95	
	4	20	19	95	
	5	20	20	100	95.0
Test	1	20	20	100	
	2	21	20	95.2	
	3	20	20	100	
	4	20	20	100	
	5	20	20	100	99.0

ATTACHMENT A

Mytilus edulis
SUMMARY OF BIOASSAY RESULTS

Concentration (%)	Total Larvae/ml	% Treatment Mortality	LC50 (%)	% Abnormality	EC50 (%)	NOEC (%)	LOEC (%)	MATC (%)
Initial Counts	23.5	-		-				
Alcatraz Control	23.5	NA		1.7				
Area B (1-4)			> 100%		> 100%	100%	> 100%	> 100%
1	23.2	1.1		1.7				
10	19.8	15.6		0.7				
50	24.9	0.0		1.9				
100	22.2	5.4		1.8				
Area B (5-8)			> 100%		> 100%	100%	> 100%	> 100%
1	29.5	0.0		2.9				
10	31.9	0.0		2.7				
50	19.3	17.9		2.8				
100	19.8	15.6		0.7				
Area B (9-12)			63.9%		> 100%	50%	> 100%	70.7%
1	18.9	19.3	(50-100)	4.6				
10	15.9	32.1		2.5				
50	15.1	35.5		0.0				
100	5.7*	75.6		2.3				
Area C			> 100%		> 100%	100%	> 100%	> 100%
1	23.3	0.8		1.7				
10	29.0	0.0		4.1				
50	27.0	0.0		0.7				
100	29.1	0.0		0.7				
Reference Sediments			> 100%		> 100%	100%	> 100%	> 100%
Alcatraz Control	23.5	NA		1.7				
1	21.1	9.9		6.6*				
10	23.0	2.0		4.1				
50	22.7	3.1		3.5				
100	24.7	0.0		5.7*				

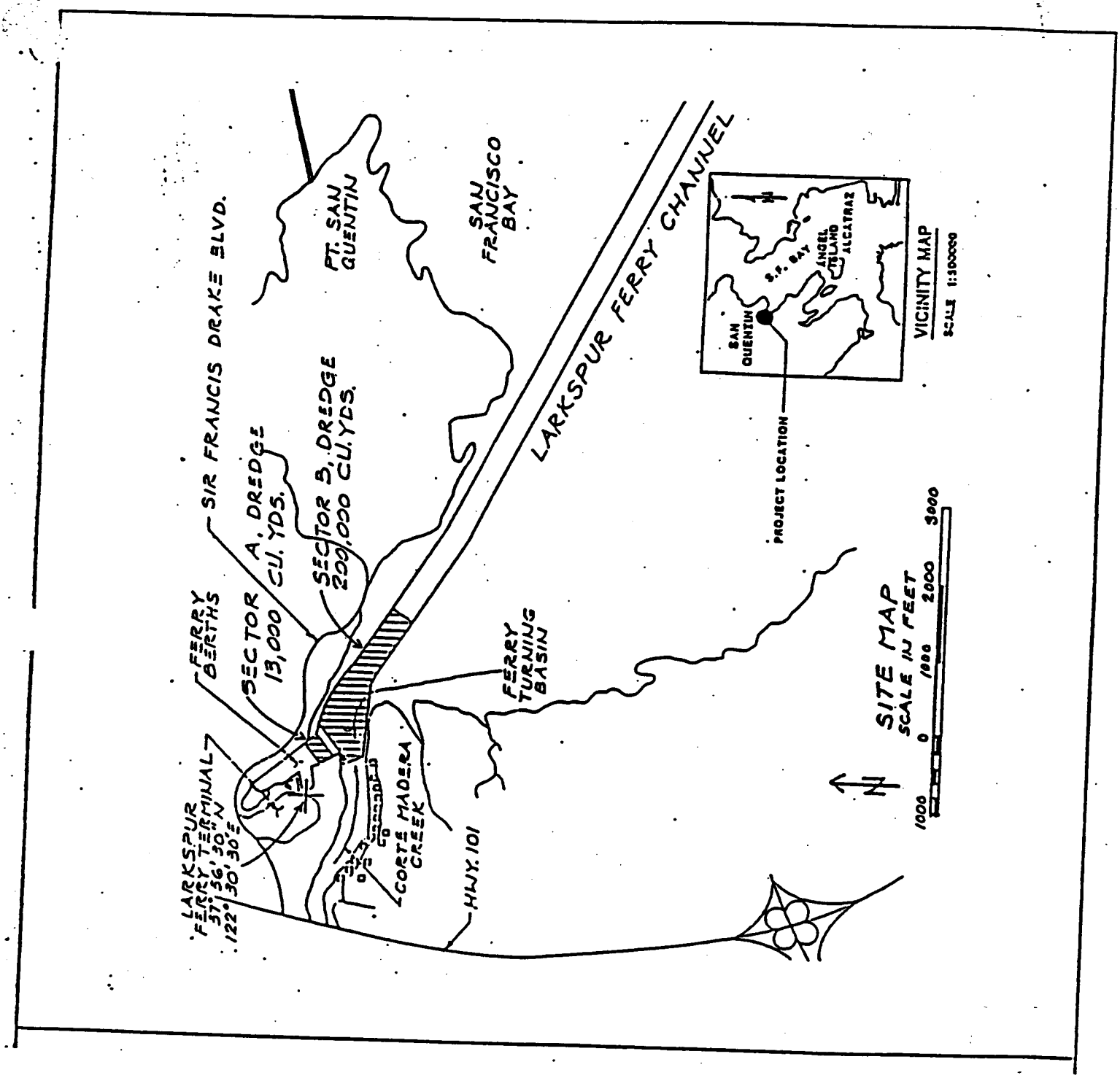
*Statistically significant from Alcatraz Control.
**Statistically significant from Laboratory Control.
Values in parentheses denote 95% confidence limits.
NOEC: No Observable Effects Concentration.
LOEC: Lowest Observable Effect Concentration.
MATC: Maximum Allowable Toxic Concentration.

ATTACHMENT A

Mytilus edulis
SUMMARY OF BIOASSAY RESULTS

Concentration (ug/L)	Total Larvae/ml	% Treatment Mortality	LC50 (ug/L)	% Abnormality	EC50 (ug/L)	NOEC (ug/L)	LOEC (ug/L)	MATC (ug/L)
Initial Counts	23.5	-		-				
Laboratory Control	24.9	NA		2.9				
Copper sulfate			> 2		> 2	1	2	1.4
0.13	20.3	18.7		4.6				
0.25	33.0	0.0		6.1				
0.5	23.7	4.8		7.3				
1	18.8	24.6		9.6				
2	18.3	26.5*		25.1*				

ATTACHMENT B



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