STATE OF CALIFORNIA – THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200
FAX (415) 904-5400

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PROPOSED FINDINGS

ON CONSISTENCY DETERMINATION

Consistency Determination No.	CD-071-02
Staff:	LJS-SF
File Date:	9/20/02
60th Day:	11/19/02
75th Day:	12/4/02
Commission Vote:	11/6/02
Hearing on Findings:	1/8/03

FEDERAL AGENCY: **Corps of Engineers**

PROJECT LOCATION: Marine Corps Recruit Depot/Naval Training Center Boat Channel, San Diego (Exhibits 1 and 2).

PROJECT DESCRIPTION: Expansion of a recreational small boat marina and construction of a recreational fishing pier (Exhibit 3).

PREVAILING COMMISSIONERS: Commissioners Burke, Dettloff, Hart, Kruer, McClain-Hill, Peters, Potter, Reilly, Wooley, and Chairman Wan.

SUBSTANTIVE FILE DOCUMENTS:

1. Draft Environmental Assessment, Marine Corps Recruit Depot San Diego Marina Expansion Project, July 2002 (Corps Of Engineers).
2. Coastal Development Permit 5-02-135 (Balboa Bay Club, Inc.).
3. Coastal Development Permit 6-97-64 (San Diego Princess Resort).
4. Consistency Determination CD-089-99 (U.S. Navy, CVN Homeporting at Naval Air Station North Island, San Diego).

5. Consistency Determination CD-031-01 (U.S. Navy, Pier Construction at Naval Station San Diego).
6. State of California Harbors and Navigation Code, Division 3 (Vessels), Chapter 6 (Vessel Sanitation).
7. Plan for California's Nonpoint Source Pollution Control Program (CCC and State Water Resources Control Board, January 2000).

EXECUTIVE SUMMARY

The Corps of Engineers has submitted a consistency determination for expansion of an existing 36-slip recreational small boat marina and construction of a new fishing pier at the Marine Corps Recruit Depot (MCRD), located on the eastern shoreline of the boat channel that separates the MCRD and the now-closed Naval Training Center, at the northern end of San Diego Bay in San Diego. The proposed project consists of adding 36 new boat slips (to accommodate boats up to 36 feet long) by installing pre-fabricated, wooden, floating dock sections similar to those at the existing dock. The new 5,160 sq.ft. dock will be supported by 14 concrete pilings and would be placed on the north side of the existing dock. The current prohibition of live-aboard boat use at the marina will extend to the proposed dock expansion. The project also includes the construction of a new 15-foot-wide by 50-foot-long recreational fishing pier, supported by four concrete pilings. Electrical and water utilities would be extended to the dock and pier. The Corps anticipates that the separation of the boating and fishing activities will eliminate most of the existing conflict between these two user groups at the MCRD marina.

The proposed project is consistent with the water quality policies (Sections 30231 and 30232) of the Coastal Act due to the incorporation of best management practices at the marina to protect water quality during project construction and during operation of the marina.

The proposed project is an allowable use under Section 30233(a), is the least environmentally damaging feasible alternative with respect to activities involving fill, will not adversely affect eelgrass beds within the boat channel, and is not located within California least tern foraging habitat. The proposed dock expansion and fishing pier are consistent with the marine resource and dredging and filling policies (Sections 30230 and 30233) of the Coastal Act.

The proposed dock expansion and fishing pier would not adversely affect public access to or recreational use of coastal waters. Both facilities would be constructed within the boundary of the MCRD and would not intrude into waters used by the general public nor affect the public's existing use of the NTC channel. While the proposed facilities would not be available to the general public, they will serve the large population of active duty and retired military personnel who are assigned to the MCRD and/or who reside in the San Diego region, and will expand opportunities for low-cost recreational activities along the MCRD shoreline. The proposed dock expansion and fishing pier are consistent with the public access and recreation policies (Sections 30210-13, 30220, and 30224) of the Coastal Act.

STAFF SUMMARY AND RECOMMENDATION:

I. Project Description. The Corps of Engineers proposes to expand an existing recreational small boat marina and construct a recreational fishing pier in the boat channel at the Marine Corps Recruit Depot (MCRD) in San Diego (Exhibits 1-4). The marina serves active duty and retired military personnel and is located on the eastern shoreline of the boat channel that separates the MCRD and the now-closed Naval Training Center, at the northern end of San Diego Bay. The marina consists of a floating dock with 36 leased boat slips, a second floating dock with watercraft to rent, a boathouse, storage structures, a boat launch ramp, a picnic shelter, and a parking area. The slips can accommodate boats up to 36 feet long. No live aboard use of boats docked at the marina is allowed. The marina complex is heavily used by military personnel, a three to six month waiting list exists for rental boat slips, and conflicts between boaters and fishermen are common as the two groups compete for limited dock space.

The proposed project calls for adding 36 new boat slips (to accommodate boats up to 36 feet long) by installing pre-fabricated, wooden, floating dock sections similar to those at the existing dock. The new 5,160 sq.ft. dock will be supported by 14 concrete pilings and would be placed on the north side of the existing dock. The current prohibition of live aboard use of boats at the marina will extend to the proposed dock expansion. The project also includes the construction of a new 15-foot-wide by 50-foot-long recreational fishing pier, supported by four concrete pilings. Electrical and water utilities would be extended to the dock and pier. The Corps anticipates that the separation of the boating and fishing activities will eliminate most of the existing conflict between these two user groups. Construction of the dock and pier is expected to take approximately two weeks.

II. Status of Local Coastal Program. The standard of review for federal consistency determinations is the policies of Chapter 3 of the Coastal Act, and not the Local Coastal Program (LCP) of the affected area. If the LCP has been certified by the Commission and incorporated into the California Coastal Management Program (CCMP), it can provide guidance in applying Chapter 3 policies in light of local circumstances. If the LCP has not been incorporated into the CCMP, it cannot be used to guide the Commission's decision, but it can be used as background information. The City of San Diego LCP was certified by the Commission and incorporated into the CCMP.

III. Federal Agency's Consistency Determination.

The Corps of Engineers has determined the proposed project consistent to the maximum extent practicable with the CCMP.

IV. Motion.

I move that the Commission adopt the following findings of its concurrence in the U.S. Army Corps of Engineers' consistency determination CD-071-02.

V. Staff Recommendation.

The staff recommends a **YES** vote on this motion. Pursuant to Section 30315.1 of the Coastal Act, adoption of findings requires a majority voter of the members of the prevailing side present at the November 6, 2002, hearing, with at least three of the prevailing members voting. Only those Commissioners on the prevailing side of the Commission's action on the consistency determination are eligible to vote. A majority vote by the prevailing Commissioners listed on page 2 of this report will result in adoption of the findings.

VI. Resolution to Concur with Consistency Determination:

The Commission hereby **concurs** with the consistency determination by the U.S. Army Corps of Engineers on the grounds that the project described therein is fully consistent, and thus is consistent to the maximum extent practicable, with the enforceable policies of the CCMP.

VI. Findings and Declarations.

The Commission finds and declares as follows:

A. Water Quality. The Coastal Act provides the following:

Section 30231

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30232

Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

1. Water and Sediment Quality in NTC Boat Channel. The project site is located in northwest corner of the mile-long NTC boat channel, which contains 15 acres of surface water. Freshwater inputs to the channel originally came from 13 storm drains on the MCRD and the

NTC and from surface water runoff. Contaminants in those freshwater flows are the primary reasons for poor water quality conditions in the boat channel dating back decades. A 1982 study of channel currents indicated poor water flushing capacity with minimal intermixing with San Diego Bay waters, while a second 1982 study confirmed poor water quality in the channel due to surface runoff contaminants and poor circulation and mixing of channel waters. However, beginning in July 2001, the MCRD began redirecting storm water flows from the boat channel outfalls into the MCRD storm water discharge and treatment system. An action related to the closure of the NTC was a 1999 remedial investigation examining boat channel sediments and the potential risk to human health and the environment. The investigation resulted in the identification of a sediment area of ecological concern in the channel and designating the boat channel as a federal CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) site (Superfund site). Sediment contamination, primarily from metals, pesticides, and PAHs in stormwater runoff and discharges from the NTC and the MCRD, was highest at the northern end of the boat channel, where the proposed project is located.

2. Piling Installation. Given that contaminated sediments are located at several sites within the boat channel, the installation of 18 concrete pilings to support the boat dock expansion and the new fishing pier could adversely affect water quality in the boat channel should those pilings be driven into contaminated sediments. The Draft EA first examines the potential impact at the dock expansion site:

> *The Proposed Action would occur in the general vicinity of contaminants present in the boat channel, resulting from polluted storm water inflow. Several core samples were taken, however, that demonstrate that the contaminated soil is not located within the project boundaries of the dock extension (See Section 4.11). Subsequently, the EPA has indicated that the polluted areas are outside the region of the proposed MCRD dock extension, which would not be an impediment to that part of the project, and would not have a significant impact.*

The Draft EA next examines the potential water quality impact at the fishing pier site:

> *The site for the new fishing pier occurs in the general vicinity of metal contaminants (i.e., arsenic, barium, cobalt, copper, lead, nickel, chromium, vanadium, and zinc) which occurred due to past, polluted storm water inflows going into the northern end of the boat channel via large concrete culvert pipes from the Department of Navy (DON) operation at the former Naval Training Center (NTC), adjacent to the boat channel. The DON boat channel sediment became a DON, Installation Restoration (IR) Site (number 12) in 1996, following the 1995 Base Realignment and Closure (BRAC) of the NTC. To prevent disturbance to any remaining contaminants in the area, the driving of pilings, not drilling, to secure the new fishing pier in place would significantly reduce the disturbance of contaminated sediment. Only a small amount of contaminated sediment would be disturbed during the placing and installation of the four (4) pilings. This effect would be temporary and disturbed contaminated sediment would readily settle back to the floor of the boat channel. Preventative measures, to properly protect construction workers and MCRD visitors and to avoid any health risk, will be in place as part of the project's Plans and*

Specification (Plans & Specs) documentation, and enforced on the project site, if metal contaminant exposures exceed permissible exposure levels set by the state of California Occupational Safety and Health Agency (CAL-OSHA) in the California Code of Regulation (CCR) Title B and the federal Occupational Safety and Health Administration (OSHA) in Title 29 Code of Federal Regulations (CFR) Part 1910. MCRD has also proposed this potential impact to be not significant by considering an alternative fishing pier site(s) to avoid potentially contaminated areas.

Sediment disturbance from driving pilings at the dock expansion site, in sediments that are not contaminated, will not create adverse water quality impacts beyond the temporary and localized turbidity that will occur during the several days needed to install the 14 pilings at this site. With the project commitments made by the Corps in the Draft EA, installing the four pilings for the fishing pier, at a site adjacent to contaminated sediments, will not generate adverse impacts on water quality in the boat channel. At both work locations, a small amount of sediment would be disturbed during the placement of each piling. This effect would be temporary and disturbed sediment would readily settle back to the bottom of the channel. Because currents and tidal movement at the head of the boat channel are limited, very little migration of disturbed sediment would occur. The Corps concluded, based on the sediment and IR studies completed to date and with the water quality control measures to be implemented during pile driving, that project construction will not adversely affect water quality and that continuation of existing recreational boating in the NTC boat channel during and after project construction will not pose an unacceptable risk to human health.

3. Best Management Practices for Marina Construction and Operations. The proposed small boat marina expansion at the MCRD will provide for long-term berthing of up to 72 recreational vessels with a maximum length of 36 feet. In general, marina operations hold the potential to adversely affect water quality at and adjacent to the boat slips, in particular regarding boat maintenance activities and the disposal of on-board generated sewage and wastewater. In recent years, the Commission has reviewed numerous reports concerning the adverse effects on marine organisms, habitat, and coastal recreation of water pollution from marinas, docks, and piers. On January 11, 2000, the Coastal Commission adopted the *Plan for California's Nonpoint Source Pollution Control Program* (co-authored by the Commission and the State Water Resources Control Board, as required by the federal Coastal Zone Management Act), which provides a framework to focus, expand, and coordinate actions to prevent and control nonpoint source pollution statewide. The *Plan* was subsequently approved by U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Administration on July 17, 2000.

Regarding marinas and recreational boating activities, the *Plan* states in part that:

Recreational boating and marinas are increasingly popular uses of coastal areas and inland surface water bodies (e.g., lakes and delta). And, they are an important means of public access, and California must balance the need for protecting the environment and the need to provide adequate public access (USEPA, 1991). Because marinas and boats are located at the water's edge, pollutants generated from these sources are less likely to be buffered or filtered by natural processes. When boating and adjunct activities (e.g., marinas and boat

maintenance areas) are poorly planned or managed, they may pose a threat to water quality and the health of aquatic systems and may pose other environmental hazards. Sources of pollution associated with marinas and boating include:

- *Poorly flushed waterways;*
- *Pollutants discharged from boats (recreational boats, commercial boats, and "live-aboards");*
- *Pollutants carried in storm water runoff;*
- *Physical alteration of wetlands and of shellfish/other benthic communities during construction of marinas, ramps, and related facilities;*
- *Pollutants generated from boat maintenance activities on land and in the water.*

There are 16 MMs [management measures; see **Exhibit 5**] *to address marina and boating sources of nonpoint pollution. Effective implementation of these MMs can (1) avoid impacts associated with siting marinas and boat maintenance areas, (2) ensure the best available design and construction practices (for new and expanding facilities), (3) ensure appropriate operation and maintenance practices to prevent and/or reduce the delivery of NPS pollutants to State waters, and (4) encourage the development and use of effective pollution control and education efforts. The MMs cover the following operations and facilities:*

- *Any facility that contains ten or more slips, piers where ten or more boats may tie up, or any facility where a boat for hire is docked;*
- *Any residential or planned community marina with ten or more slips;*
- *Any mooring field where ten or more boats are moored;*
- *Public or commercial boat ramps;*
- *Boat maintenance or repair yards that are adjacent to the water and any federal, State, or local facility that involves recreational boat maintenance or repair on or adjacent to the water.*

The Implementation Plan involves targeting implementation of six of the 16 marina and boating MMs, specifically those measures for water quality assessment, sewage facilities, boat cleaning and maintenance, hazardous waste management, and public education. These MMs and related actions were identified by representatives of the marina and boating community at four meetings held between December 1998 and April 1999 and by the SWRCB, RWQCBs, and CCC.

Using the *Plan* and its management measures for marinas and boating activities, the Commission has developed Best Management Practices (BMPs) to ensure that the construction and operation of proposed activities, particularly those involving in- and/or over-water construction activities, are consistent with the water quality protection policies of the Coastal Act (Sections 30231 and 30232). The Commission, in coastal development permit applications (see CDP 5-02-135; CDP 6-97-64) and in federal consistency determinations (see CD-89-99; CD-031-01) conditions permit applicants and encourages federal agencies to include appropriate water quality BMPs in their proposed projects. Cleaning and scraping of boats, improper discharges of bilge water and

sewage waste, and the use of caustic detergents and solvents are among the primary contributing factors to water quality degradation at and adjacent to small boat marinas. Potential adverse effects on water quality due to the proposed expansion of the MCRD small boat marina can be minimized by implementing construction and operations BMPs designed to protect water quality and marine resources.

(a) Construction BMPs. The Draft EA for the proposed project includes the following water quality environmental commitments made by the Corps for construction activities:

- *The contractor shall include a spill contingency plan that will cover any discharge that may occur from the vessels used during this project. Crews shall be made fully aware of the plan and have the ability to effectively implement prevention and cleanup procedures.*
- *Fueling and maintenance of other equipment that may be used during the project shall be done in a manner so that spills cannot enter waterways. Water craft construction vehicles shall be continuously examined for leaking fluids.*
- *Litter, petroleum products, cleaning agents, wash down waters, and related toxic or oxidizable cleaning or construction related materials shall be prevented from entering marine waters.*

With these commitments, the Corps ensures that proposed construction activities will not adversely affect water quality in the NTC boat channel and the Commission determines that the project is consistent with the water quality policies of the Coastal Act.

(b) Marina Operation BMPs. The Draft EA states that all boats stored at the marina must comply with MCRD MWR Instruction 1710.1A (Assignment and Use of Small Craft Slips), which dictates regulations for operation, care, and safety of boats (See **Exhibit 6** of this report). This document includes the following BMPs for water quality protection:

- *Boat owners are responsible for maintaining their boat and adjacent dock area in a clean and orderly condition:*

    1. *Major maintenance projects which impact adjacent dock areas are prohibited.*
    2. *Boat owners are responsible for keeping the area free of dirt and debris.*
    3. *Docks will be protected from painting operations. Offending boat owners will be liable for the cost of cleaning or replacing dock boards.*

- *Fueling operations are prohibited at the MCRD Marina.*

- *Storing gasoline in any container other than the vessel fuel tank is prohibited.*

- *Storing flammable agents in dock boxes is prohibited.*

- *It is illegal to throw, discharge, pump, or deposit from any boat or float any refuse, oil, spirits, flammable liquids, hazardous waste or polluting matter into estuary waters, or onto land adjacent to the Marina.*

- *Marina and shoreside trash cans are intended as receptacles for paper, cans, plastic, and other common refuse items only. Using trash cans to dispose of batteries, used engine oil, large pieces of wood or metal, and the like, is prohibited. Engine oil and batteries may be disposed of at the Depot Auto Hobby Shop. Large items of trash are to be removed from the Marina and placed in the Boathouse dumpster by the boat owner.*

- *Boat owners are responsible for the actions of bottom cleaners and other vendors hired to perform work on their vessels. Boat owners are to ensure that bottom cleaners and other vendors perform their services only during normal daytime business hours when Boathouse personnel are present. Likewise, boat owners are responsible for ensuring that vendors report in at the Boathouse Office prior to commencing work, and that all other Marina rules and regulations are complied with.*

The Corps also reported in a separate document that the following BMPs are currently in place at the MCRD marina:

- *Signage is placed on all regular trash containers to indicate that hazardous wastes may not be disposed of in the container. The containers will notify boaters as to how to dispose of hazardous wastes and where to recycle certain recyclable wastes.*

- *The cleaning of fish at the marina is restricted to the use of the fish cleaning facility.*

- *Absorbent pads for oil waste clean-up are available at the marina free of charge, and the marina has procedures in place to deal with fuel spills and the response and reporting of spills.*

- *A boating education program exists at the marina and includes, in part, information on marina regulations, BMPs for maintenance of water quality, spill response, enforcement program, and U.S. Coast Guard notices.*

In addition, the Draft EA states, and a Corps of Engineers staff representative confirmed, that there is no fueling station at the MCRD marina and that boats docked in the slips typically contain portable toilet facilities for the collection of human wastes. The portables are then hand-carried to the restroom facilities located within the MCRD Boathouse, where the wastes are then flushed into a septic system for on-site treatment. The Corps also reports that there is a land-based recreational vehicle sewage pump-out facility located nearby on the MCRD that can be used by boats towed on trailers, and that there are two on-water facilities within one-half mile of the MCRD marina that provide pump-out stations for boaters. The Corps also stated that should a boat with a holding tank berth at the marina, dye tablets will be placed in the tank to help in ensuring that sewage and wastewater are not dumped into bay waters. This dye tablet program will be overseen and enforced by Marine Corps personnel at the marina boathouse.

With the aforementoned elements in place, the Commission agrees with the Corps that a new sewage pump-out facility at the MCRD marina is not necessary to protect water quality at and

adjacent to the project site. In conclusion, the Commission finds that the proposed project is consistent with the water quality policies (Sections 30231 and 30232) of the Coastal Act, due to the inclusion of adequate BMPs to protect water quality during project construction and during operation of the expanded small boat marina.

B. Marine Resources. The Coastal Act provides the following:

Section 30230

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30233

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

. . .

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities. . . .

1. Fill of Coastal Waters. The proposed dock expansion and fishing pier at the Marine Corps Recruit Depot (MCRD) marina involves filling within coastal waters (pilings to support a dock expansion and new fishing pier); no dredging is proposed. The proposed fill triggers the three-part test of Section 30233(a): (1) the project must be one of the eight enumerated allowable uses; (2) the project must be the least damaging feasible alternative; and (3) the project must include feasible mitigation measures to minimize adverse environmental effects. The project involves installing a total of 18 concrete pilings (covering 32 sq.ft. of the channel floor) to support an expansion of a floating dock and construction of a recreational fishing pier at the MCRD marina in order to improve access and recreational opportunities for military personnel at the base (See **Exhibit 7** for a survey of the effects of concrete on the marine environment). Thus, the proposed project is an allowable use under Section 30233(a)(4).

The proposed project calls for the driving of 18 concrete pilings into the channel floor to support the dock expansion and fishing pier. The pilings are the minimum size and number needed to

anchor and secure both structures to the shoreline and channel floor. The Corps of Engineers examined several alternatives to the proposed project:

- No-Action
- Dock expansion only, with no construction of the fishing pier. This alternative provides needed capacity to dock more boats but does not address conflicts between boaters and fishermen.
- Fishing pier construction only, with no expansion of the boat dock. This alternative separates users but does not address the need for additional boat slips.
- Alternative dock expansion configuration where one-third of the new boat slips would be sited due west of the existing dock and two-thirds of the new slips in the proposed alternative location to the northwest.
- Locate the proposed fishing pier south of the existing marina.
- Construct the dock expansion at a shoreline location outside the MCRD. This alternative is not feasible because the MCRD presently controls no additional shoreline property and acquisition costs of property would make the expansion project prohibitive.

Given that the identified alternatives require the use of concrete pilings to support an expanded boat dock and new fishing pier, that there are no feasible alternative methods to support and anchor these structures, and (as discussed below and in the Water Quality section) that the proposed location of the dock expansion and new fishing pier avoids sensitive eelgrass habitat, least tern foraging areas, and contaminated sediment areas, the Commission determines that the proposed project is the least damaging feasible alternative.

Section 30233 requires that a project which includes fill of open coastal waters also provide adequate mitigation to minimize any adverse environmental effects that may arise due to the fill. Placement of the 18 concrete pilings will displace 32 sq.ft. of soft bottom habitat in the boat channel. However, the concrete pilings will provide new vertical surfaces for colonization by various types of marine organisms (e.g., mussels, barnacles, snails). The minor loss of common soft bottom habitat will be adequately offset by the creation of vertical, hard-surfaced substrate that will be colonized by subtidal and intertidal organisms. Therefore, no additional mitigation for the proposed fill is necessary. In conclusion, the Commission finds that the proposed project is consistent with Section 30233 of the Coastal Act.

2. Eelgrass Habitat. Eelgrass (*Zostera marina*) is an aquatic plant and a valuable resource that grows in the shallow waters of San Diego Bay. Eelgrass provides refuge and habitat for numerous species of algae, invertebrates, and fishes, and provides foraging habitat for the Federally endangered California least tern. Eelgrass typically grows in dense, linear beds along the shoreline, and its extent is limited by dryness at the inland margin and steep slopes or limited

light on the waterside. The Draft Environmental Assessment (EA) for the proposed project examines the status of eelgrass in the vicinity of the project site and states that:

> *A sparse, narrow band of eelgrass exists throughout the study area at depths ranging from –1 to –6 feet mean lower low water (MLLW). Most of the deep portions of the channel, including all of the boat channel north of the San Diego International Airport (Lindberg Field), did not support eelgrass growth because of natural light limitations at this depth (Bechtel, 1999a). Eelgrass distributions in the vicinity of the marina expansion site, in the northern NTC boat channel, were previously described by Merkel & Associates (1998) and recently confirmed by Heilprin and Basmadjian (2001). Merkel & Associates observed that there was extensive coverage of eelgrass along the southern portion of the NTC boat channel's shoreline at approximate depths of 0 to –3 feet MLLW. During a recent site visit by Heilprin and Basmadjian, only thin patches of eelgrass were observed sporadically at shallow water depths (-1 to –3 feet MLLW) around the perimeter of the existing MCRD marina boat dock and walk ramp. The U.S. Army Corps of Engineers (Corps) work on navigational projects in this portion of San Diego Bay has shown that eelgrass typically has not been observed in waters greater than 10 feet in depth which has been corroborated by the U.S. Fish and Wildlife Service (USFWS). The boat dock expansion would be located at 23 feet, beyond the typically known depth for eelgrass to exist in the NTC boat channel. The fishing pier would be constructed approximately 300 feet northeast of the boat dock extension area off of a shoreline where no eelgrass has been observed.*

The consistency determination concludes that the proposed dock extension and new fishing pier would not adversely affect eelgrass, either from direct construction impacts or from post-construction shading impacts, because none is present at or adjacent to either location in the boat channel. However, in the event that eelgrass is observed along the shoreline at the new fishing pier prior to the start of construction, the Draft EA states that:

> *. . . MCRD would mitigate for any eelgrass habitat disturbance, as defined by the July 31, 1999, Southern Eelgrass Mitigation Policy. Impacts to eelgrass are covered by the Southern California Eelgrass Mitigation Policy (NMFS 1991) requiring a mitigation ratio of 1.2:1 if applied concurrent with the project. For the Proposed Action, a worse case assumption would be that 0.0008 acre would require mitigation (0.0007 acre combined footprint of disturbance from piling installation x 1.2), although it is unlikely that eelgrass would occur throughout the disturbance area. Mitigation of this conservative acreage would be consistent with the eelgrass policy and reduce potential impacts to less than significant levels. For the Proposed Action, mitigation would be accomplished by applying credit from the Navy's North and North-Central Eelgrass Mitigation Bank.*

With the commitments by the Corps to conduct a pre- and post-construction survey of the project site to delineate the presence of eelgrass beds, define work access limits at the boat dock and fishing pier sites, prohibit anchoring and the running of propellers in eelgrass areas, and to mitigate any disturbance to eelgrass beds due to project construction, the Commission finds that the proposed dock expansion and fishing pier construction will not adversely affect eelgrass beds in the NTC boat channel.

3. California Least Tern. Nesting colonies of the Federally endangered California least tern are located in San Diego Bay at North and South Delta Beach on the Naval Amphibious Base, D Street Fill, the South Bay salt works, and Naval Air Station North Island. The Draft EA reports that the California least tern has not been sighted within the project area for approximately ten years:

> *Seven species of waterfowl were recently observed at the project site. However, the Federally protected California least tern has not been reported within the project area. In the past, this species has been observed nesting on a former landfill area east of the boat channel at the NTC (Bechtel, 1999a). However, a recent survey (Keane, 2000) revealed California least tern no longer nest at the landfill site, probably due to the presence of predators such as feral cats, gray foxes, and birds of prey like red-tailed hawk (Bechtel, 1999a).*

Notwithstanding the absence of least tern foraging activity in the boat channel, construction of the proposed dock expansion and fishing pier will occur outside the traditional April 1-September 15 least tern nesting season in order to further avoid any potential adverse effects on least terns that might appear at or near the project site. Therefore, given the distance to existing nesting colonies, the absence of foraging activity by the California least tern in the waters at and adjacent to the proposed dock expansion and fishing pier, and the proposed construction schedule, the Commission finds that the proposed project will not adversely affect the nesting or foraging activities of tern populations in San Diego Bay.

In conclusion, the Commission finds that the proposed project is an allowable use under Section 30233(a), is the least environmentally damaging feasible alternative, and avoids adversely affecting eelgrass beds and California least tern foraging habitat. Therefore, the Commission finds that the proposed dock expansion and fishing pier are consistent with the dredging and filling and marine resource policies (Sections 30230 and 30233) of the Coastal Act.

C. Public Access and Recreation. The Coastal Act provides the following:

> **Section 30210**
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> *In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*
>
> **Section 30211**
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> *Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*

Section 30212

(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources. . . .

Section 30213

Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred.
. . .

Section 30220

Coastal areas suited for water-oriented recreational activities that cannot be readily provided at inland water areas shall be protected for such uses.

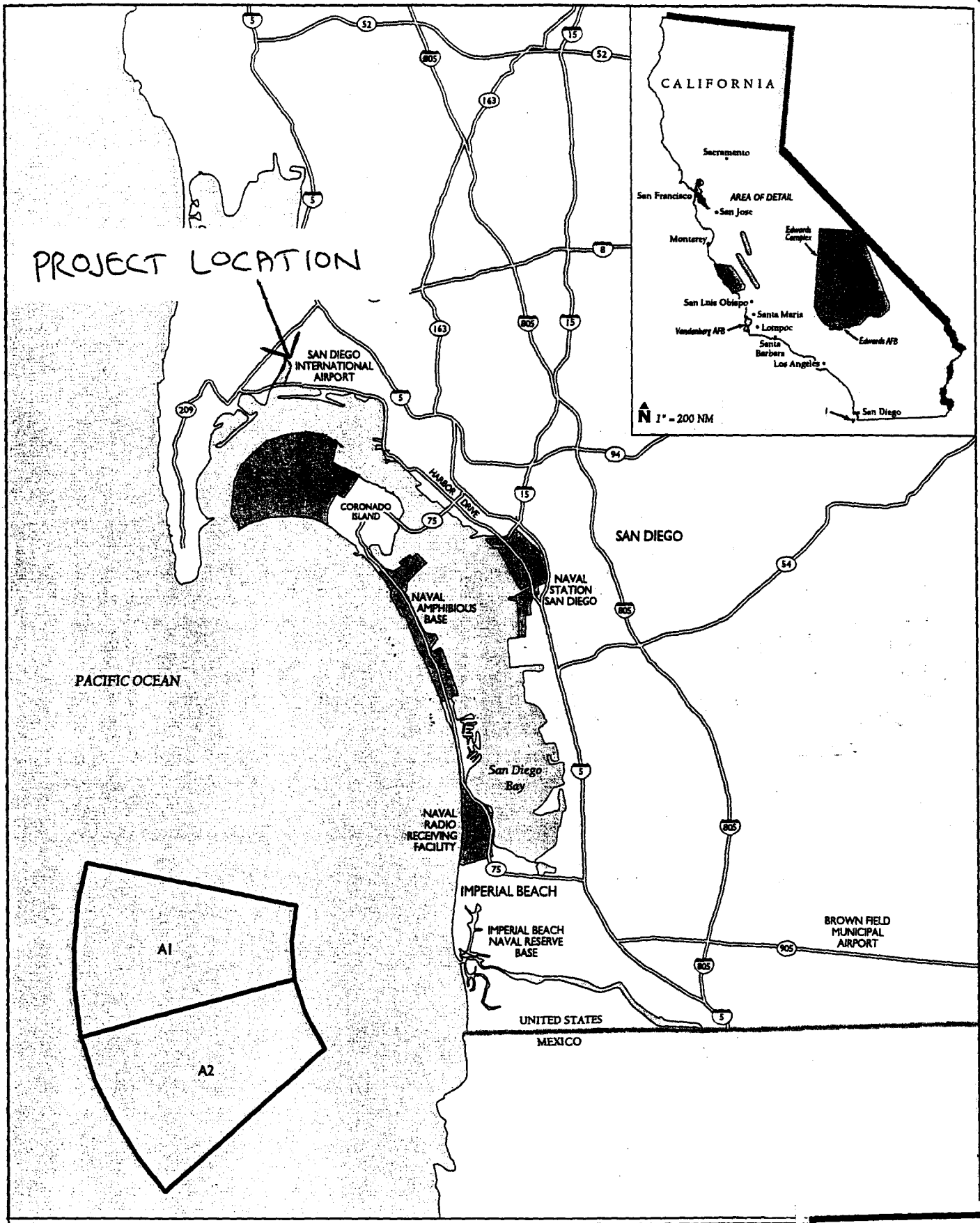
Section 30224

Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.

The proposed boat dock expansion and fishing pier construction would occur in an area with an unusual pattern of public access. The boat channel, commonly referred to as the Naval Training Center (NTC) channel, extends from the northern edge of San Diego Bay in a northeasterly direction for approximately one mile to a point just northwest of San Diego Airport. For most of its length the channel lies within the boundary of the now-closed NTC. However, the Marine Corps Recruit Depot (MCRD) boundary bisects the head of the channel and as a result, the eastern shoreline and perhaps two-thirds of the surface water area at the channel head is a restricted access area under the control of the U.S. Marine Corps. Since the closure of the NTC in 1997, the western shoreline and the balance of the NTC channel is within the jurisdiction of the City of San Diego. Therefore, the general public cannot access that part of the boat channel and the adjacent shoreline within MCRD jurisdiction due to the security restrictions at this still-open military reservation. However, with the closure of the NTC and the City of San Diego's receipt of NTC lands and waters, the general public now enjoys access to and recreational use of the balance of the boat channel.

The proposed dock expansion and fishing pier would not adversely affect public access to or recreational use of the NTC boat channel. Both facilities would be constructed within the

boundary of the MCRD and would not intrude into waters used by the general public nor affect the public's existing use of the NTC channel. While the proposed facilities would not be available to the general public, they will serve the large population of active duty and retired military personnel who are assigned to the MCRD and/or who reside in the San Diego region, and will expand opportunities for low-cost recreational activities along the MCRD shoreline. Therefore, the Commission finds that the proposed dock expansion and fishing pier are consistent with the public access and recreation policies (Sections 30210-13, 30220, and 30224) of the Coastal Act.



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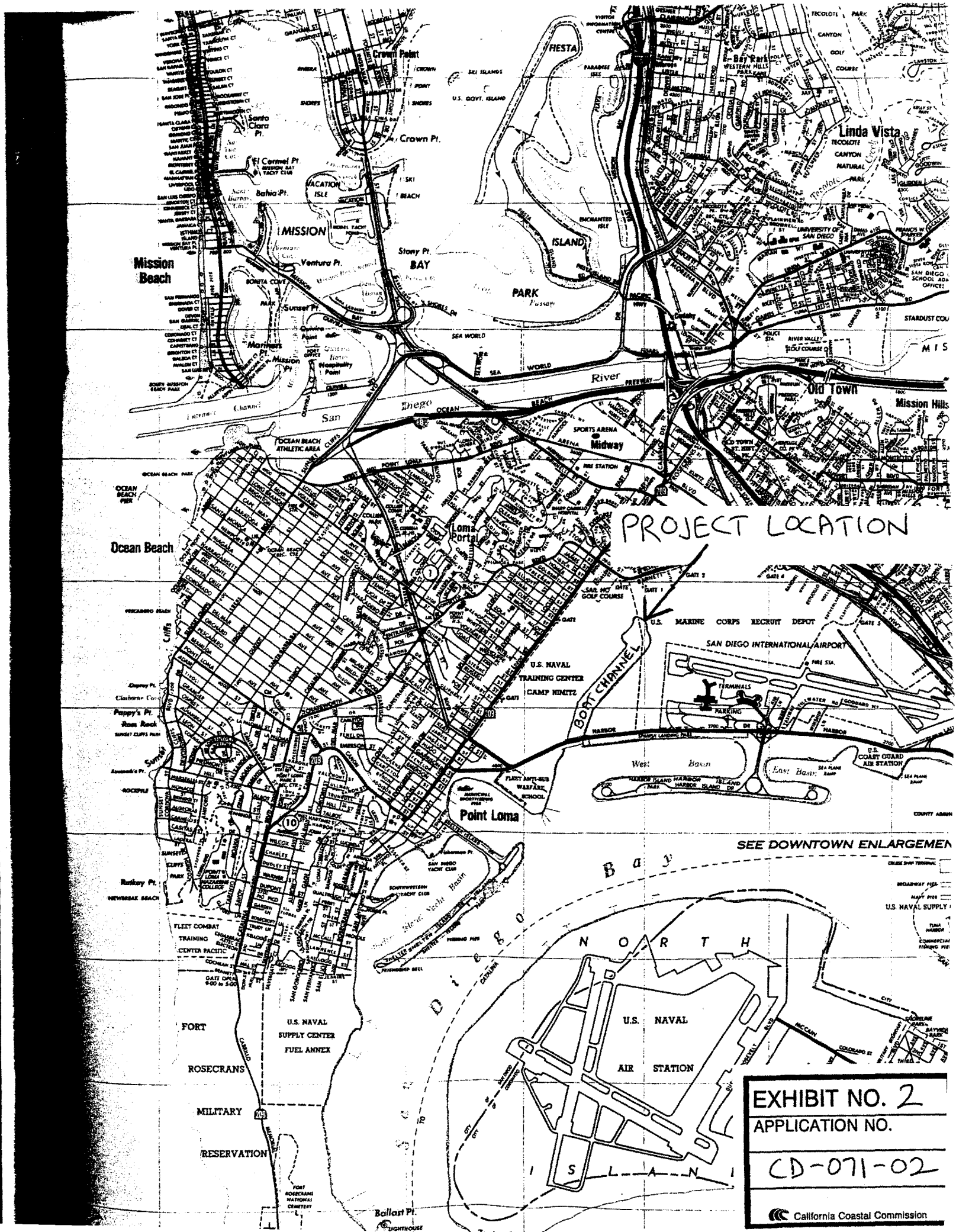
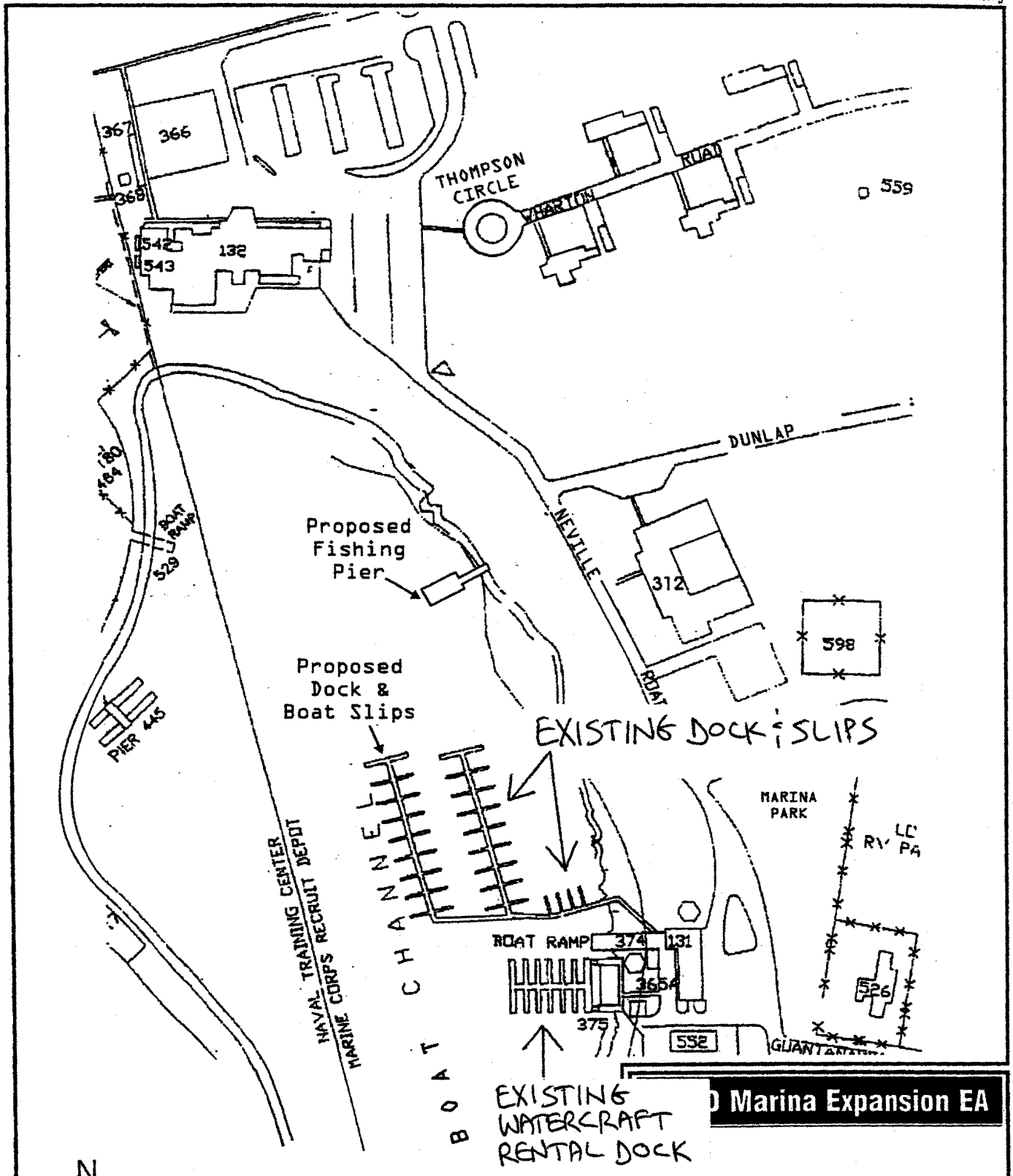


EXHIBIT NO. 2

APPLICATION NO.

CD-071-02

California Coastal Commission



Marina Expansion EA

Figure 1-2
Project Site Location

EXHIBIT NO. 3
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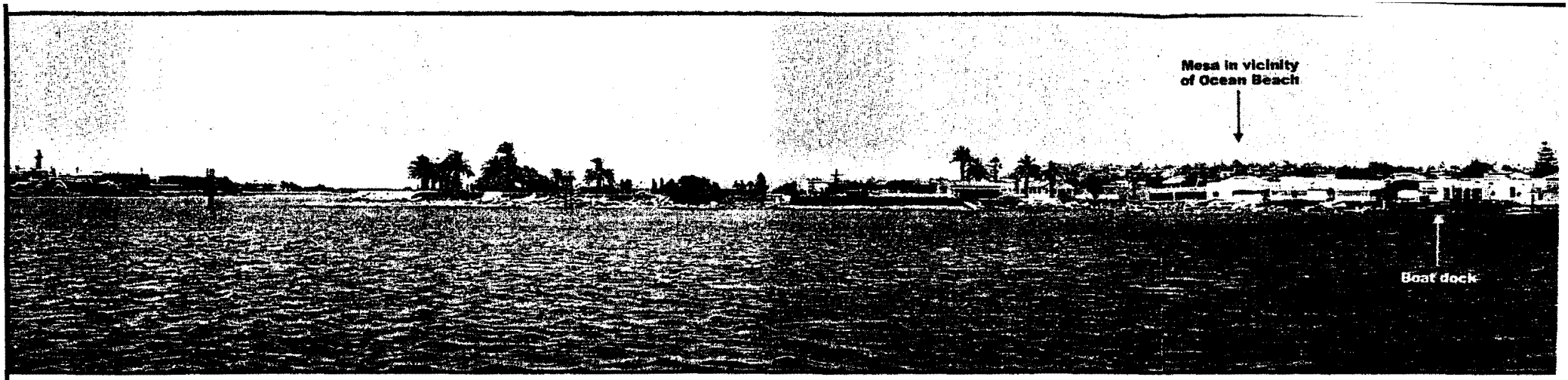
1. **Viewpoint from existing dock looking east toward the boat ramp and boathouse.**

2. **Viewpoint from existing dock looking east at the shoreline and open space.**

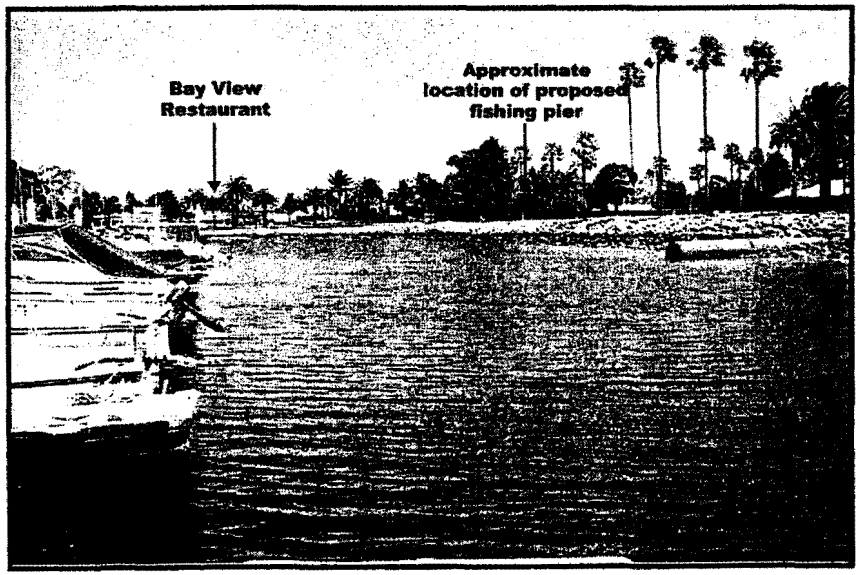
MCRD Marina Expansion EA

Figure 4-1

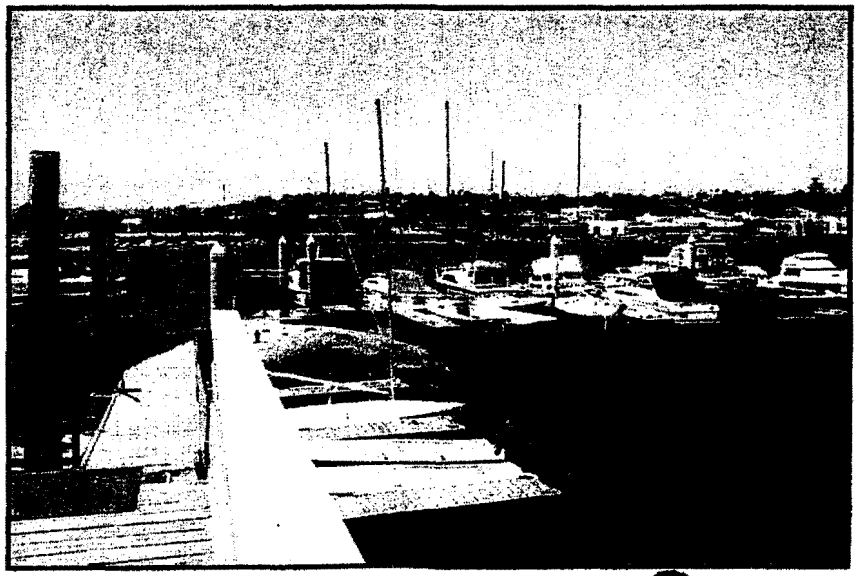
Project Area Photos



4. Viewpoint looking west towards former Naval Training Center (NTC). The backdrop feature is a mesa in the Ocean Beach vicinity.



3. Viewpoint from existing dock looking north along the shoreline and the bay view restaurant that is in the deep middle ground.



5. Viewpoint from entrance to existing boat dock ing west.

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E. Marinas and Recreational Boating Management Measures[24]

Recreational boating and marinas are increasingly popular uses of coastal areas and inland surface water bodies (e.g., lakes and delta). And, they are an important means of public access, and California must balance the need for protecting the environment and the need to provide adequate public access (USEPA, 1993). Because marinas and boats are located at the water's edge, pollutants generated from these sources are less likely to be buffered or filtered by natural processes. When boating and adjunct activities (e.g., marinas and boat maintenance areas) are poorly planned or managed, they may pose a threat to water quality and the health of aquatic systems and may pose other environmental hazards. Sources of pollution associated with marinas and boating include:

- Poorly flushed waterways;
- Pollutants discharged from boats (recreational boats, commercial boats, and "live-aboards");
- Pollutants carried in storm water runoff;
- Physical alteration of wetlands and of shellfish/ other benthic communities during construction of marinas, ramps, and related facilities;
- Pollutants generated from boat maintenance activities on land and in the water.

California's marina and recreational boating MMs:

4.1 Assessment, Siting and Design
- A. Water Quality Assessment
- B. Marina Flushing
- C. Habitat Assessment
- D. Shoreline Stabilization
- E. Storm Water Runoff
- F. Fueling Station Design
- G. Sewage Facilities
- H. Waste Management Facilities

4.2 Operation and Maintenance
- A. Solid Waste Control
- B. Fish Waste Control
- C. Liquid Material Control
- D. Petroleum Control
- E. Boat Cleaning and Maintenance
- F. Maintenance of Sewage Facilities
- G. Boat Operation

4.3 Education/Outreach
- A. Public Education

There are 16 MMs to address marina and boating sources of nonpoint pollution. Effective implementation of these MMs can (1) avoid impacts associated with siting marinas and boat maintenance areas, (2) ensure the best available design and construction practices (for new and expanding facilities), (3) ensure appropriate operation and maintenance practices to prevent and/or reduce the delivery of NPS pollutants to State waters, and (4) encourage the development and use of effective pollution control and education efforts. The MMs cover the following operations and facilities:

- Any facility that contains ten or more slips, piers where ten or more boats may tie up, or any facility where a boat for hire is docked;
- Any residential or planned community marina with ten or more slips;
- Any mooring field where ten or more boats are moored;
- Public or commercial boat ramps;
- Boat maintenance or repair yards that are adjacent to the water and any federal, State, or local facility that involves recreational boat maintenance or repair on or adjacent to the water.

The Implementation Plan involves targeting implementation of six of the 16 marina and boating MMs, specifically those measures for water quality assessment, sewage facilities, boat cleaning and maintenance, hazardous waste

[24] Commercial and military ports are not targeted in this Program Plan because they are subject to the storm water NPDES permits regulating industrial and construction activities. Commercial ports are also required to submit a port master plan (PMP) for certification by the CCC. The PMP must include the conditions contained in Coastal Act section 30711. An NPS-related condition is "an estimate of the effect of development on habitat areas and the marine environment, a review of existing water quality, habitat areas, and quantitative and qualitative biological inventories, and proposals to minimize and mitigate any substantial adverse impact." Section 30711 further states that, "each city, county, or city and county which has a port within its jurisdiction shall incorporate the certified [PMP] in its [LCP]." In addition, activities in military ports are subject to federal consistency review by the CCC, affording the State an opportunity to ensure that appropriate NPS pollution prevention and control measures are in place. Ports located in the San Francisco Bay are under the jurisdiction of SFBCDC and subject to regulations of the MPA.

management, and public education. These MMs and related actions were identified by representatives of the marina and boating community at four meetings held between December 1998 and April 1999 and by the SWRCB, RWQCBs, and CCC. The 1994 Marina TAC Report provided additional recommendations. The 16 MMs are summarized below.

Assessment, Siting, And Design Management Measures:

41.A **Water Quality Assessment.** Consider impacts to water quality in siting and designing new and expanding marinas.

41.B **Marina Flushing.** Site and design marinas to provide for maximum flushing and circulation of surface waters, which can reduce the potential for water stagnation, maintain biological productivity, and reduce the potential for toxic accumulation in bottom sediment.

41.C **Habitat Assessment.** Site and design marinas to protect against adverse impacts on fish and shellfish, aquatic vegetation, and important locally, State, or federally designated habitat areas.

41.D **Shoreline Stabilization.** Stabilize shorelines where shoreline erosion is a pollution problem.

41.E **Storm Water Runoff.** Implement runoff control strategies to remove at least 80 percent of suspended solids from storm water runoff coming from boat maintenance areas (some boatyards may conform to this provision through NPDES permits).

41.F **Fueling Station Design.** Locate and design fueling stations to contain accidental fuel spills in a limited area; and provide fuel containment equipment and spill contingency plans to ensure quick spill response.

41.G **Sewage Facilities.** Install pump out, pump station, and restroom facilities at new and expanding marinas where needed to prevent sewage discharges directly to State waters.

41.H **Waste Management Facilities.** Install facilities at new and expanding marinas where needed for the proper recycling or disposal of solid wastes (e.g., oil filters, lead acid batteries, used absorbent pads, spent zinc anodes, and fish waste as applicable) and liquid materials (e.g., fuel, oil, solvents, antifreeze, and paints).

Operation And Maintenance Management Measures:

4.2A **Solid Waste Control.** Properly dispose of solid wastes produced by the operation, cleaning, maintenance, and repair of boats to limit entry of these wastes to surface waters.

4.2B **Fish Waste Control.** Promote sound fish waste management where fish waste is an NPS problem through a combination of fish cleaning restrictions, education, and proper disposal.

4.2C **Liquid Material Control.** Provide and maintain the appropriate storage, transfer, containment, and disposal facilities for liquid materials commonly used in boat maintenance; and encourage recycling of these materials.

4.2D **Petroleum Control.** Reduce the amount of fuel and oil that leaks from fuel tanks and tank air vents during the refueling and operation of boats.

4.2E **Boat Cleaning and Maintenance.** Minimize the use of potentially harmful hull cleaners and bottom paints and prohibit discharges of these substances to State waters.

4.2F **Maintenance of Sewage Facilities.** Maintain pumpout facilities in operational condition and encourage their use so as to prevent and control untreated sewage discharges to surface waters.

4.2G **Boat Operation.** Prevent turbidity and physical destruction of shallow-water habitat resulting from boat wakes and prop wash.

Education and Outreach Management Measures:

4.3A **Public Education.** Institute public education, outreach, and training programs to prevent and control improper disposal of pollutants into State waters.

EX. 5

MWR
Morale, Welfare and Recreation
Marine Corps Recruit Depot
3800 Chosin Avenue
San Diego, CA 92140-5196

MWRIntInst 1710.1A
14
6 Dec 94

MORALE, WELFARE AND RECREATION INTERNAL INSTRUCTION 1710.1A

From: Assistant Chief of Staff, MWR
To: Distribution List

Subj: ASSIGNMENT AND USE OF SMALL CRAFT SLIPS

1. Purpose. To publish instructions and regulations governing the assignment, use and supervision of the MCRD San Diego small craft slips.

2. Cancellation. MWRIntInst 1710.1.

3. Background. There are a limited number of small craft slips for use by eligible participants at MCRD San Diego.

4. Usage. Fees will be published in the Recreation Branch fee schedule. Fees are due on the first day of the of each month and must be paid by the tenth of each month.

5 Eligibility

a. Active duty military personnel and dependents stationed at the Marine Corps Recruit Depot, San Diego.

b. Active duty military personnel and dependents of the Navy, Army, Air Force, Coast Guard, and Marine Corps (not attached to MCRD).

c. Retired military personnel and dependents of all services.

d. Civilian employees of the Department of Defense, including NAFI employees.

6. Method of Applying for a slip. Eligible persons must apply in person at the Depot Boathouse, Building 131. Slips will be assigned on a first come serve basis.

7. Eligibility List. The Boathouse Manager will establish and maintain a log of persons applying, with the time and date of the application and eligibility. Future slips will be assigned from that list. When a slip is assigned, usage fees must be paid and an agreement signed. All patrons will read and by signature agree to abide by the following set of Marina Regulations.

8. Regulations Governing Use

a. Boat owners must inspect their vessels at least once a week. More frequent inspections are required during periods of severe weather. Boat owners will be solely responsible for the safe mooring of their boat. Boat owners are also responsible for the inspection of mooring attachments and reporting of unsafe fitting to the Boathouse Manager. Unsafe mooring lines will be replaced by Boathouse personnel, resulting in a bill for time and materials on boat owner's next account statement.

b. Boat owners must abide by all state, federal, and local boating regulations governing vessel operation, safety, and required equipment.

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c. Boat owners are responsible for the security of their vessel and its contents:

(1) All equipment shall be stowed below deck, or in compartments.

(2) All hatches shall be locked.

(3) Security gates are not to be left propped open when Boathouse personnel are not present.

d. Boat owners are responsible for maintaining their boat and adjacent dock area in a clean and orderly condition:

(1) Major maintenance projects which impact adjacent dock areas are prohibited.

(2) Boat owners are responsible for keeping the area free of dirt and debris.

(3) Docks will be protected from painting operations. Offending boat owners will be liable for the cost of cleaning or replacing dock boards.

e. Individual boat owners must provide their own dock boxes. Dock boxes must be of triangular design, 12 square feet capacity, and white in color. Siting of the dock box must be approved by the Boathouse Manager prior to installation.

f. Fueling operations are prohibited at the MCRD Marina.

g. Storing gasoline in any container other than the vessel fuel tank is prohibited.

h. Storing flammable agents in dock boxes is prohibited.

i. Open-flame cooking, including barbecues, is prohibited in slips. Shoreside barbecue facilities are available for boat owner's use.

j. The Boathouse Manager must be notified immediately if there is a change in vessel ownership. Slips will not convey to new owners unless: (a) The new owner is an eligible patron of MCRD MWR, (b) There is no request for the slip from MCRD active duty military personnel on the slip waiting list, and (c).A new Agreement is completed.

k. The Boathouse Manager must be notified immediately if the boat owner plans to purchase a new vessel. Boat owners will be allowed to retain their slip, providing the new vessel fits the slip to the Manager's satisfaction.

l. Boat owners may not sub-lease or loan their slip to any person for any period of time. The only vessel authorized to be in the boat owner's slip is the vessel on record with the Boathouse Manager.

m. The Recreation Branch reserves the right to utilize slips when boat owner's vessel is absent.

n. The Manager must be notified when boat owners vacate their slip for a period in excess of daily use.

EX. 6

o. Boat owners are not to alter docks, fixtures, or other MNR-owned equipment in any way.

p. "Living aboard" boats is not authorized, although occasional overnight stays are permissible.

q. Use of automotive battery chargers in the Marina is prohibited.

r. Swimming or diving from boats in the Marina is prohibited.

s. It is illegal to throw, discharge, pump, or deposit from any boat or float any refuse, oil, spirits, flammable liquids, hazardous waste or polluting matter into estuary waters, or onto land adjacent to the Marina.

t. Marina and shoreside trash cans are intended as receptacles for paper, cans, plastic, and other common refuse items only. Using trash cans to dispose of batteries, used engine oil, large pieces of wood or metal, and the like, is prohibited. Engine oil and batteries may be disposed of at the Depot Auto Hobby Shop. Large items of trash are to be removed from the Marina and placed in the Boathouse dumpster by the boat owner.

u. Prior to plugging into Marina electrical service, the patron's vessel electrical system must meet established standards. These standards will be furnished to patrons at the time of slip assignment.

v. Parents shall restrict children under the age of 12 from docks and waterfront areas unless closely supervised. Boat owners are also responsible for the behavior and safety of all guests, including minor children.

w. Only one permanent slip per boat owner may be authorized at any given time.

x. Boat owners have responsibility for all keys issued to them. Lost or stolen keys shall be immediately reported to the Boathouse Manager. Keys shall be surrendered when use of slip is terminated, or when requested by the Boathouse Manager.

y. Boat owners are responsible for the actions of bottom cleaners and other vendors hired to perform work on their vessel. Boat owners are to ensure that bottom cleaners and other vendors perform their services only during normal daytime business hours, when Boathouse personnel are present. Likewise, boat owners are responsible for ensuring that vendors report in at the Boathouse office prior to commencing work, and that all other Marina rules and regulations are complied with.

z. Termination of the Slip Agreement by boat owner must be done in writing on a standard notice form provided at the Boathouse, and should be received 30 days in advance of vessel departure. Termination will be effective no sooner than one month from the date of submission of notice. No refunds will be given for unused portions of months already paid for.

aa. Message-taking by Boathouse personnel will be limited to recording name and phone number, and conducting a public address system page. Boat owners are expected to use the pay telephone in front of Building 131 for outgoing calls.

bb. Services rendered by Boathouse personnel which may be classified as personal, and directly benefit specific boat owners, or their vessels, shall be billed to the boat owner at the established hourly rate for such services.

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MWRIntInst 1710.1A
6 Dec 94

cc. The Boathouse Manager has sole discretion in the assignment of slips. Boathouse-generated slip reassignments may also be made from time to time. Boat owners desiring a new position within the Marina may place their request for future consideration. However, the Boathouse Manager is not obligated to oblige such requests.

dd. Proof of vessel insurance is required in specific amounts and coverage prior to admission to the Marina.

ee. Boat owners are responsible for any and all damage to MWR facilities resulting from their vessel's presence at the MCRD Marina, whether or not damage to the MWR facilities results from the boat owner's negligence.

ff. The Marina and recreational boating programs are under the immediate supervision of the Boathouse Manager. Matters which cannot be resolved at the level of Boathouse Manager will be forwarded to the MWR Recreation Branch Director.

R. D. Parker

DISTRIBUTION: B
Plus Boathouse Patrons

EX. 6

STATE OF CALIFORNIA – THE RESOURCES AGENCY GRAY DAVIS, *Governor*

CALIFORNIA COASTAL COMMISSION
45 FREMONT STREET, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

W 10a

Addendum

Date: **October 30, 2002**

To: **Commissioners and Interested Persons**

From: **Peter Douglas, Executive Director**
Larry Simon, Federal Consistency Staff

Subject: **Consistency Determination CD-71-02,**
Corps of Engineers, small boat marina expansion

In light of recently expressed Commission concerns over the effects of placement of various substances into the marine environment, the Commission staff has performed a brief literature search looking for studies that have analyzed the effects of concrete on the marine environment. The staff has also informally discussed the possibility of such effects with industry representatives, researchers, and aquarium operators. The following excerpts (items I-XI below) present relevant information from this effort. Item XII below presents the staff's tentative conclusion upon conducting this effort.

I. GUIDELINES FOR MARINE ARTIFICIAL REEF MATERIALS

Compiled by the Artificial Reef Subcommittee of the Technical Coordinating Committee
Gulf States Marine Fisheries Commission, Ronald R. Lukens, Project Coordinator
January 1997 (conducted in cooperation with the U.S. Fish and Wildlife Service, and funded by Federal Aid in Sport Fish Restoration Administrative Funds, FWS).

> *Concrete, either in fabricated units specifically designed for artificial reefs or rubble from razed buildings, sidewalks, roadways and bridges, has a demonstrated high success rate as artificial reef material in both marine and estuarine environments. The obvious reason for this high rate of success is the strong compatibility of the material with the environment in which it is placed, and for the purpose for which it is placed. A scan of the national database for artificial reefs, developed through the Artificial Reef Development Center at the Sport Fishing Institute, indicates that, as of 1993, 35% of the 717 known permitted artificial reefs used concrete materials of opportunity. The*

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data for Florida indicate that 285 (62.2%) of the 458 state or federally funded deployments have been concrete materials. Four (4) percent, nation-wide, used concrete in prefabricated units. [Emphasis added]

Webster's Dictionary defines concrete as "a hard, strong building material made by mixing a cementing material (commonly Portland cement) and a mineral aggregate with sufficient water to cause the material to set and bind." Portland cement is largely made from lime, a component of limestone. Limestone is comprised primarily of calcium carbonate, which is the substance of which coral reefs are made. Portland cement falls into five classes, as designated by the American Society of Testing Materials in the Designation Standard Specifications for Portland cement. Type I Portland cement is not suitable for marine applications, because it will deteriorate quickly under attack from sulfates, carbon dioxide, and Magnesium ions. Sea water contains 150 to 1500 parts per million (ppm) of sulfates, so concrete must be sulfate resistant. Type II Portland cement can be expected to provide a life expectancy in the marine environment of 20 to 35 years. Higher grades of concrete, using perhaps Type V Portland cement, are recommended for longer life expectancies. Marine applications of concrete under load bearing conditions, such as bridge spans, require at least Type II Portland cement. Scrap concrete from other sources, such as building foundations or parking lots, may not possess necessary strength due to the use of Type I Portland cement. These materials may not last as long as expected in marine applications such as artificial reefs. [Emphasis added]

Lime (calcium hydroxide) in "green" or uncured cement may have surface pH levels of 10 to 11, which is significantly more basic that sea water, which has a pH of 8.3. This can make the surface of uncured concrete toxic to invertebrate organisms for 3 to 12 months. Pozzalanic materials can help to neutralize the surface pH by combining with the free lime. Such materials include coal combustion fly ash, diatomaceous earth, clays, shales, pumicites, micro-silica, among others. A pozzalanic material reacts with the free lime, lowering the pH and also providing for better bonding between aggregates, thus making the concrete stronger.

...

Coal combustion fly ash is regularly used in concrete products manufactured by both private and governmental enterprises (see section 2.10, Ash Byproducts). Fly ash is probably one of the principal additives found in artificial reef concrete materials of opportunity, including bridge rubble, pilings, power poles, culverts, and others. Of the 47.8 million tons of fly ash generated nation-wide in 1993, 6.8 million tons went into concrete products and cement. Benefits of fly ash use can include significant enhancement of compressive strength, improved workability, reduced permeability, increased resistance to sulphate attack, reduced heat of hydration, increased resistance to alkali-silica reactivity, and lower costs (Federal Highway Administration 1995). ...

The coal source of fly ash in concrete products available for reef projects is often unknown. Florida alone has several coal-burning plant operations providing a source

EX.7

of fly ash to the construction industry. The hazards of heavy metal leachates from fly ash vary with the coal source and treatment process. There are thousands of tons of scrap concrete placed in the ocean annually off Florida alone, indicating that this is an issue which should be addressed in the future.

The Texas Game and Fish Commission used six foot long concrete pipes cabled together in three separate units for a reef site established 11 miles offshore of Galveston in 1962 (Jan Culbertson, Texas Parks and Wildlife Department, personal communication). ... Numerous anglers have been observed fishing at this reef site periodically since it was constructed (Bob Bass, personal communication).

Benefits –

- *Artificial reef projects using bridge rubble can be financed directly by the state Department of Transportation as a cost-effective way to manage the material.*
- *Concrete materials are extremely compatible with the marine environment. [Emphasis added]*
- *Concrete is highly durable, stable, and readily available.*
- *The flexibility to cast concrete into a great variety of forms makes the material ideal for developing prefabricated units.*
- *Concrete provides excellent surfaces and habitat for the settlement and growth of encrusting or fouling organisms, which in turn provide forage and refuge for other invertebrates and fish.*

Drawbacks

- *A major drawback with the use of concrete material is its heavy weight, and the consequent need for heavy equipment to handle it. This increases the costs both at the landside transportation stage and loading and transport at sea.*
- *Deployment of large concrete pieces or prefabricated units requires heavy equipment at sea, which is hazardous and expensive. Another drawback related to the weight of concrete materials is the potential for subsidence into the bottom.*
- *Most concrete materials that have been used are in the form of rubble or pieces, and must be piled high in order to provide an artificial reef with a high bottom profile. This can be challenging depending upon the sea state, water depth, and current velocity.*
- *While concrete materials are known to last a long time in the marine environment (concrete pipes planted in 1962 are still evident off Perdido Pass, Alabama), it is thought that the cement binding material will eventually leach out, leaving only the remaining aggregate, reinforcement rods, and wire. [Emphasis added]*

EX. 7

Recommendations

- *Concrete rubble from parking lots, buildings, or other sources may have other materials mixed in with it. Examples include dirt, plastic sheeting (moisture barrier), building materials (wood, fiberglass, etc.), among others. Loads of concrete rubble should be inspected for such associated, undesirable materials prior to deployment.*

- *To enhance durability, use concrete materials which have Type II or greater Portland cement as the binding agent.*

II. American Concrete Institute

Leachability of Trace Metal Elements from Fly Ash Concrete: Results from Column-Leaching and Batch-Leaching Tests, Min-Hong Zhang, Marcia C. Blanchette, and V. Mohan Malhotra, March 1, 2001, ACI Journal

This paper deals with the effect of leaching conditions on the leachability of trace metal elements from concrete incorporating two fly ashes. The data from the column-leaching tests to simulate wetting and drying, and batch-leaching tests using buffered acetic acid and synthetic acid rain as leachants, are discussed. The United States Environmental Protection Agency (EPA) Regulatory Method 1311Toxicity Characteristic Leaching Procedure (TCLP) was used as a reference. The results indicated that, regardless of the type of the fly ash used, the percentage of fly ash, and the water-cementitious ratio (w/cm) of the concrete, none of the trace metals analyzed (As, Cd, Cr, Cu, Pb, Se, and Zn) in the leachates from the fly ash concrete samples exceeded the regulated concentration levels specified in the TCLP leaching test. The concretes incorporating the fly ashes are, therefore, considered stable. In the batch- and column-leaching tests, the leached trace metal levels from the fly ash concretes were also well below the regulatory levels for the leachate quality criteria. The fly ash content and w/cm did not appear to have significant effect on the leachability of the trace metal elements when using column-leaching tests and the 24-week batch-leaching test. The observed concentrations of metals leached using synthetic-acid rain were less than that observed for the buffered acetic acid. This is consistent with the pH dependence of the leachability of the metals. For Se, all measured values of the leachates from the four different types of tests were at or below the detection limit. Cadmium, Cr, Ni, Pb, and Fe in the leachates from the fly ash concretes were also measured at or near detection limits or at levels below or similar to those of the control portland cement concrete. Arsenic, and to a lesser extent Cu and Zn, were the only metals that showed any significant leaching trends in the tests. Arsenic showed a correlation between the metal content in fly ash and the concentrations of the metals leached from the fly ash concrete. Similar correlations for Zn and Cu were not observed.

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III. Environmental Protection Agency

The following is an excerpt from the EPA's "Cement and Concrete Containing Fly Ash; Guideline for Federal Procurement" as published in the Federal Register / Vol. 48, No. 20 / Friday, January 28, 1983 / Rules and Regulations:

> *Regarding hazards of using flyash in concrete:*
>
> *Findings to date indicate that little, if any, fly ash exhibits characteristics defined as hazardous in the Federal regulations. Therefore, Subtitle C regulations will have no significant impact of the use of fly ash in cement and concrete.*
>
> *A few commenters suggested that EPA limit the use of fly ash in concrete, restricting its use in potable water sources or in storage areas for food. The rationale given for these suggestions was the potential for leaching of trace metal elements out of the fly ash. The commenters provided no documentation as to the likelihood or extent of leaching when fly ash is used in concrete.*
>
> *While it is true that fly ash contains trace amounts of certain elements, which can be toxic in larger concentrations, it is unlikely that fly ash as used in concrete would exhibit leaching characteristics. First, the permeability of concrete containing fly ash is negligible compared to the permeability of fly ash as typically disposed. This reduced permeability prevents water or other liquids from penetrating concrete and providing a leaching medium through which contaminants could travel.*
>
> *Second, when used in concrete, fly ash becomes an integral part of the final product. The surface area of individual fly ash particles, from which leaching of trace constituents takes place, is so greatly reduced in this application as to be almost nonexistent. It is not possible through conducting leaching tests or raw fly ash to estimate the leaching, if any, which would take place in a concrete containing fly ash. Thus, the commenters suggestion that dams and pipes not be constructed using fly ash appears to have no technical basis.*
>
> ...
>
> *The use of fly ash as a cement replacement will also affect the quantity of radon emitted by the building material. Although the rate at which radon is created is directly proportional to the radium content, other factors may inhibit radon emanation from a material. Because fly ash is produced at high temperatures, it has a glassy structure which keeps most of the radon from escaping. The fraction of radon which escapes from fly ash (emanation fraction) has been measured at no more than a few percent. In contrast, typical soil and soil like materials tend to have an emanation fraction in the neighborhood of 20 percent. Thus, although fly ash on the average, has a greater radium content than the cement it replaces, the use of fly ash as a partial cement replacement is likely to reduce the radon gas contribution of the final concrete product.*

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During the proposal period for this guideline EPA has been investigating this issue more thoroughly. Tests recently conducted for EPA substantiate the conclusions above, i.e., that the radon emanation rate of fly ash in its raw state and as used in concrete is only a few percent compared to the absolute radium concentration. Thus, while fly ash use in cement would, on the average, result in a small increase in gamma radiation exposure, this small increase in gamma exposure is likely to be offset by a decreased radon exposure. In light of this, EPA believes that the use of typically-occurring fly ash in concrete does not constitute a significantly different radiation risk, than the risk from the cement it replaces, and neither of these is significantly different from the radiation risk posed by common soil.

IV. Monterey Bay Aquarium

E-mail communication:

After pouring a concrete aquarium tank we leach the concrete for several days (or a week or two) in fresh water to remove the leachable calcium hydroxide. Following that treatment the tanks are suitable for the maintenance/culture of fishes, invertebrates and algae.

For concrete footings and seawalls under the aquarium, no such treatment was used. I don't know that any tests were done, but I am unaware of any adverse environmental effects resulting from the pouring of our footings or seawalls.

We also poured concrete artificial rockwork in the Great Tidepool area below the aquarium deck. These rocks were immediately colonized by weedy algae (filamentous green and red algae - I have color slides of these stages) and then, within a year, went through a succession to a more mature assemblage of intertidal seaweeds, barnacles, limpets, etc. I suspect that the high dilution factor in the well-circulated ocean water beneath the aquarium precluded any measurable effects of whatever leaching occurred in the first few weeks following the pour.

V. Studies in Environmental Science Article

"Environmental compatibility of cement and concrete," Sprung, S; Rechenberg, W.; Bachmann, G., published in Studies in Environmental Science 1994, 60(Environmental Aspects of Construction with Waste Materials), 1994.

Abstract: Leaching tests on ordinary Portland cement (OPC), Portland fly ash cement (CE II/B-V), and Portland pozzolana cement (CE II/A-Q) in drinking water and aggressive carbon dioxide (120 mg/l) water for chromium, mercury, and thallium were conducted. Conclusion is that utilization of concrete in sensible field of drinking water is harmless and compatible with environment and human health. Leaching of heavy metals depends on density of concrete and time. (37 references)

In this Study, the authors concluded the following:

From these experimental results the conclusion may be drawn that the utilization of concrete in the sensible field of drinking water is harmless and, therefore, compatible with the environment and human health. The leaching of heavy metals depends in the first line on the density of the concrete structure, given by the water cement ratio and the curing conditions. Within a concentration range for Cr, Hg, and Tl which is known from experience with the utilization of different kinds of additives the leaching is - besides a first surface wash-off effect- diffusion controlled and within a fairly wide range independent from the heavy metal concentrations or from the amount per m^3 of concrete.

VI. Cement and Concrete Research Article

" Long-Term Leaching of Toxic Trace Metals From Portland Cement Concrete," Hilliera, S. R.; Sangha, C. M.; Plunkett, B. A.; Walden, P. J., published in Cement and Concrete Research 1999.

Abstract: Over the past 30 years, environmental regulations in the United Kingdom have become increasingly stringent. Concerns recently were aired over cementitious materials coming into contact with water for human consumption. Some of these materials, by virtue of their origin, can contain toxic trace metals in their composition. Results of a study investigating the long-term leaching of toxic trace metals from various Portland cement mortars in an aqueous environment are presented. Test samples were subjected to a leaching procedure based on criteria detailed by the Netherlands "diffusion" method. The leachates generated were analyzed for various toxic metals outlined in directive 80/778/EEC using atomic absorption spectroscopy. The analytical results revealed only vanadium leached in detectable quantities from poorly cured concrete, and its removal was restricted from the surface only.

This study included the following conclusions:

1. Well-cured Portland cement concrete released no detectable concentrations of the toxic metals outlined in directive 80/778/EEC 41 (water fit for human consumption).

2. Poorly cured Portland cement concretes released detectable concentrations of vanadium; however the leaching was restricted to the surface only.

3. The water-to-cement ratio had no significant effect on the leaching potential of vanadium from concrete.

VII. Journal of Environmental Engineering Article

"Long-Term Leaching Of Metals From Concrete Products," Webster, Matthew T. and Loehr, Raymond C., Journal of Environmental Engineering, August 1996.

Abstract: The long-term leaching of metals from concrete products made with spent abrasive media was investigated using a sequential extraction procedure employing both an acidic extraction fluid and seawater. By using seawater, leaching behavior under conditions encountered in the environment (especially coastal areas) can be determined. Chromium, cadmium, and lead concentrations were substantially less for the seawater sequential extractions than for the acidic sequential extractions. The environment created during the acidic sequential extractions resulted in the leaching of substantial amounts of alkalinity from the concrete, and leachate pH levels dropped below 4 where metals are highly soluble. Also, as only one-tenth of the alkalinity that leached in the acidic extractions leached in the seawater extractions, the integrity of the calcium matrix within the concrete seemed to play a role in the successful stabilization of cadmium and lead. Acidic extraction tests provide more severe conditions than concrete products are likely to encounter in real-world applications.

This study included the following conclusions:

> *The laboratory acidic sequential extraction leaching tests performed in this study provided an extremely severe leaching environment. The use of an acidic leachant, coupled with the crushing of the concrete sample prior to extraction, resulted a worst-case scenario for the leaching of metals from concrete Comparisons of metals leaching under the influence of acid and seawater leachants have shown ... that concrete in contact with seawater will leach substantially smaller amounts of metals than concrete in contact with acidic lechants. The seawater sequential extractions were also conducted on crushed samples. Therefore, the leaching of metals from monolithic concrete ...should be expected to be substantially less than was observed in the laboratory seawater sequential extractions conducted in this study.*
>
> *The conclusions of the sequential extraction leaching tests using acidic and seawater leachants were the following:*
>
> *1. Leachate pH alone could not fully explain the leaching behavior of the metals present in the concrete products subjected to sequential extraction leaching tests.*
>
> *2. The severe environment created during the acidic sequential extractions resulted in the leaching of substantial amounts of alkalinity from the concrete. Leachate pH levels dropped below 4, where metals are highly soluble.*
>
> *3. Leachate cadmium and lead concentrations were substantially less for the seawater extractions than for the acidic extractions. The amount of chromium leached was two times lower for the seawater extractions than for the acidic extractions. As only one-tenth of the alkalinity that leached in the acidic extractions leached in the seawater extractions, the integrity of the calcium matrix within the concrete seemed to play a role in the successful stabilization of cadmium and lead.*

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4. Acidic leaching tests provide for much more severe conditions than the concrete products are likely to encounter in real-world applications.

5. The extent of metals leaching from concrete in contact with seawater could be expected to be less than that observed in these seawater sequential extractions, as the tests were performed on crushed samples.

VIII. Waste Management Institute Article

"Long-term Diffusion of Elements from Municipal Solid Waste Combustor Ash Blocks in the Marine Environment," Breslin, Vincent T. and Roethel, Frank J. , Waste Management Institute, Marine Sciences Research Center, SUNY at Stony Brook, Received 6 December 1993 and in revised form 8 March 1994

Abstract: *Municipal solid waste (MSW) combustor ash was combined with Portland cement to form blocks which were placed in Conscience Bay, Long Island Sound, New York. During a 4-5-year period, ash blocks were returned to the laboratory to examine changes in the total elemental content of the ash blocks following placement. A continuous loss of calcium, potassium and zinc from the ash blocks was measured following submersion. Calculated effective diffusion coefficients ranged from 4 75 x lO-8 cm2s I for potassium to 5 56 x 10 - 8 cm2 s-1 for calcium. In contrast, lead and cadmium were effectively retained within the cementitious matrix of the submerged ash blocks, Following seawater submersion, the substitution of magnesium for calcium in the ash block pore spaces, the alkaline ash block porewaters and the encapsulation of ash particles within the* ***Portland cement matrix contribute to reduce the leaching of contaminants from ash blocks in the marine environment.***

IX. Florda Institute of Technology Article

"Toxicological Evaluation of the Effects of Waste-To-Energy Ash-Concrete on Two Marine Species," Hamilton Kirk L., Nelson, Walter G., and Curie, Jeri L., Department of Oceanography, Ocean Engineering, and Environmental Science, Florida Institute of Technology, *(Received 8 June* 1992; *Accepted* 3 *February* 1993).

Abstract - The toxicological effects of waste-to-energy ash-concrete on survivorship, growth, and fecundity (end-point parameters) of Mysidopsis bahia and on survivorship and growth of Menidia beryllina were evaluated with the 7-d [7-Day] *static-renewal toxicity test. Leachate (10-, 5-, and 1 -d) and elutriate (100, 50, 25, 12.5, and 6.25%) solutions were prepared from experimental ash-concrete test cylinders constructed from concrete with additions of either bottom ash (mix BA), mixed bottom ash and scrubber residue (70:30%; mix BA:SR), or mixed bottom ash and fly ash (60:4O%, mix BA:FA). Control experiments with concrete (without ash) and pH (7-9.5) were conducted to assess any toxic effects of the stabilization process. pH did not affect end-point*

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> *parameters of Mysidopsis bahia or Menidia beryllina.* ***However, the 100% elutriate solution made from concrete reduced survivorship of Mysidopsis bahia.*** *For experiments with ash-concrete test cylinders with the BA mix,me. 10-d leachate solution reduced survivorship of Mysidopsis bahia and the 100% elutriate solutions reduced survivorship of Mysidopsis bahia and Menidia beryllina. With the BA:SR mixture, the 100 and 50% elutriate solutions reduced survivorship of Mysidopsis bahia, and the 10-d leachate solution reduced survivorship of Menidia beryllina. The BA:FA 10- and 5-d leachate solutions and the 100, 50, and 25% elutriate solutions reduced survivorship of Mysidopsis bahia.*

Note: Although the 100% elutriate solution Portland cement without fly-ash resulted in significant mortality of one of the tested species, the study did not investigate the reason for this high mortality. It is difficult to draw any conclusions from these results because the other species did not have high mortality rates and these tests do not accurately reflect natural conditions. In describing these tests the authors state:

> *This procedure may be a realistic exposure level in the case of organisms exposed repeatedly to a given effluent concentration from a continuous discharge source. In the case of the elutriate experiment with WTE ash-concrete, however, chronic renewal methods clearly represent a extreme worst-case scenario.* ***Artificial reef units would have to be completely crushed to gravel and smaller sized particles, with no subsequent dilution for 24 hrs and this catastrophic exposure would need to be repeated seven times to reach exposures similar to those of laboratory procedures. Therefore, laboratory procedures should be considered extremely conservative predictors of field toxicity.*** (emphasis added)

X. Steinhart Aquarium

E-mail communication:

> *Your question regarding the effects of cement and PVC pipe on marine environments has been passed to me. Here at Steinhart we find the PVC pipe to be inert and therefore ideal for use in our systems. We use cement for tank construction. However that requires "conditioning" before the tank can be used. Calcium hydroxide leaches from the freshly set cement and causes upward shifts in pH. We counter this with water changes and treatment with phosphoric acid until the pH is stable. This leaching should be less problematic in marine tanks because of the buffering effect of the salt water itself. However, it can be disastrous in Fresh water environments. Here, at Steinhart, to be on the safe side, we stabilize all tanks on both fresh and salt water systems.*

XI. Typical Constituents of Concrete

Typical Chemistry		
Portland Cement		**Class F Fly Ash**
21.95%	SILICA	52.8%
5.1	ALUMINA	22.3
63.8	LIME	trace
2.4	IRON	9.2
2.4	SULFUR	0.7
2.7	MAGNESIUM	0.2
0.5	AVAILABLE ALKALIES	0.5
1.2	LOSS ON IGNITION	3.2
3.15	SPECIFIC GRAVITY	2.25

XII. Conclusion

Based on the normal constituents of concrete, discussions with experts who have experience with the use of concrete in the marine environment, and a literature search, the Commission staff concludes that the use of concrete in the marine environment would not raise water quality or chemical leaching concerns.

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