STATE OF CALIFORNIA—THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *GOVERNOR*

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

F 19c

STAFF RECOMMENDATION

ON CONSISTENCY DETERMINATION

Consistency Determination No.	CD-016-08
Staff:	LS/JG-SF
File Date:	3/28/2008
60th Day:	5/27/2008
75th Day:	6/11/2008
Commission Meeting:	5/9/2008

FEDERAL AGENCY: **U.S. Navy and U.S. Army Corps of Engineers**

PROJECT LOCATION: Port Hueneme Harbor, Ventura County (Exhibits 1 and 2)

PROJECT DESCRIPTION: Maintenance dredging of Port Hueneme Harbor approach channel, entrance channel, turning basin, Navy wharves, and Oxnard Harbor District wharves; placement of contaminated sediments in a confined aquatic disposal site in the turning basin; and placement of clean sandy sediments on Hueneme Beach.

SUBSTANTIVE FILE DOCUMENTS: See Page 24

EXECUTIVE SUMMARY

The U.S. Navy and the U.S. Army Corps of Engineers have submitted a joint consistency determination for maintenance dredging, construction of a confined aquatic disposal (CAD) site, and beach nourishment at Port Hueneme Harbor in Ventura County. The CAD cell will be created, filled, and covered as a one-time construction project to isolate existing pollutants from the environment in a secure location maintained by the Navy, Corps, and Oxnard Harbor District. The CAD cell would be excavated in the center of the harbor's turning basin. The proposed size of the CAD is approximately 800 feet by 800 feet with a final floor elevation between -75 to -85 feet mean lower low water (MLLW), and approximately 40 to 50 feet below the floor of the harbor. Approximately 572,000 cu.yds. of clean sand will be excavated from the CAD site and hydraulically pumped to and placed into the littoral zone just south of the harbor entrance channel and east jetty where waves and currents will move the sand onto Hueneme Beach. Next, approximately 327,000 cu.yds. of contaminated dredged material from OHD and Navy wharves and from three areas within the Corps navigation channels will be placed within the CAD using bottom-dump barges. The contaminated sediments at the bottom of the CAD will then be covered with approximately 183,000 cu.yds. of clean sand excavated from Corps navigation channels and placed in the CAD using bottom-dump barges to create a ten-foot-thick cap. Lastly, a one-half-foot to three-foot-thick layer of gravel will be placed over portions of the cap which are subjected to high levels of propeller wash in order to protect the cap against scouring. Dredging and disposal operations are scheduled to occur between October 2008 and September 2009 on a 24 hours per day, seven days per week schedule.

The proposed dredging of sediments from the Port Hueneme Harbor approach, entrance, and navigation channels, the turning basin, wharves, and berths is an allowable use. The proposed Hueneme Beach disposal site for the clean sandy sediments is the least damaging feasible alternative and the proposed CAD facility is the least damaging feasible alternative for disposal of contaminated sediments. Mitigation measures are incorporated into the project where necessary to protect coastal resources. The project is consistent with the allowable use, alternatives, and mitigation tests contained in the dredge and fill policy of the California Coastal Management Program (CCMP) (Coastal Act Section 30233).

The project includes dredging of sediments contaminated with elevated concentrations of chemicals including pesticides, tributyltin (TBT), and polychlorinated biphenyl (PCB) within the Port Hueneme Harbor, and their placement and confinement in an engineered confined aquatic disposal (CAD) facility. Once the approximately 327,000 cubic yards of contaminated sediment have been placed within the CAD facility, it will be covered with approximately 183,000 cubic yards of clean sediments to form a cap to prevent migration of contaminants into the water column or the surficial sediment layer. The contaminated sediments proposed for dredging and disposal in the proposed CAD facility will remain permanently isolated in the CAD facility and the project would not adversely affect water quality and marine resources of Port Hueneme Harbor and the adjacent waters of the coastal zone. The project is consistent with the marine resources and water quality policies of the California Coastal Management Program (Coastal Act Sections 30230, 30231, and 30230).

The proposed project will remove shoaling within the approach, entrance, and navigation channels and vessels berths at Port Hueneme Harbor and, as a result, will significantly increase the safety of charter fishing vessels at the harbor. The project would significantly improve public access and recreational opportunities due to the placement of approximately 572,000 cubic yards of clean and grain-size compatible sand along the stretch of eroding Hueneme Beach immediately downcoast of the Port Hueneme Harbor east jetty. The project is consistent with the public access, recreation, and sand supply policies of the California Coastal Management Program (Coastal Act Sections 30210, 30211, 30213, 30220, 30221, 30234, 30234.5, and 30233(b))

STAFF SUMMARY AND RECOMMENDATION

I. STAFF SUMMARY.

A. Project Description. The U.S. Navy and the U.S. Army Corps of Engineers have submitted a joint consistency determination for maintenance dredging, construction of a confined aquatic disposal (CAD) site, and beach nourishment at Port Hueneme Harbor in Ventura County (**Exhibits 1 and 2**). The CAD will be created, filled, and covered as a one-time construction project to isolate existing pollutants from the environment in a secure location maintained by the Navy, Corps, and Oxnard Harbor District. The harbor is located approximately 60 miles northwest of Los Angeles at the head of a submarine canyon that provides a deep water approach to the harbor's approach and entrance channels. Commercial shipping in the harbor is managed by the Oxnard Harbor District (OHD); the harbor also serves as a military port for the Naval Base Ventura County. The OHD, the Navy, and the Corps of Engineers are responsible for maintaining authorized depths in different parts of the harbor. The OHD and the Navy are responsible for maintaining water depths along their wharves and berths, and the Corps is responsible for maintaining safe navigation depths in the approach channel, entrance channel, and turning basin.

The accumulation of sediments, including contaminated sediments, is affecting military and commercial vessel operations and navigation within the harbor. The Navy and the Corps propose to dredge approximately 70 acres of the harbor to remove contaminants and restore authorized navigation depths. The Navy berths were last dredged in 1965 and the OHD berths in 1988. The Corps navigation channels and turning basin were dredged in 1983, 1989, and between 2000 and 2005. The OHD berths have subsequently accumulated between three and 13 feet of sediment, and the Navy berths between three and 10 feet of sediment. The most recent sediment investigations identified contaminated sediments along the Navy and OHD berths, three areas of contaminated sediments within the Corps navigation channels, and clean sandy materials in the remaining navigation channel and turning basin areas.

The presence of contaminated sediments has prevented maintenance dredging from occurring within the harbor for close to a decade due to the high costs associated with disposal of contaminated materials. However, the Navy and the Corps, in coordination with the OHD, now propose to implement a dredging project that would isolate and cap contaminated harbor sediments in a CAD facility to be constructed within the turning basin; the project would also place clean dredged sands on eroding Hueneme Beach. The three agencies will share the monetary costs of the project, the Corps will execute the construction contract on behalf of all three agencies, and the Navy will retain the ability to direct the contract and monitor project activities.

The CAD cell would be excavated in the center of the harbor's turning basin (**Exhibits 2 and 3**). The proposed size of the CAD is approximately 800 feet by 800 feet with a final floor elevation between -75 to -85 feet mean lower low water (MLLW), and approximately 40 to 50 feet below the floor of the harbor. Approximately 572,000 cu.yds. of clean sand will be excavated from the CAD site and hydraulically pumped to and placed into the littoral zone just south of the harbor entrance channel and east jetty where waves and currents will move the sand onto Hueneme Beach. Next, approximately 327,000 cu.yds. of contaminated dredged material from OHD and Navy wharves and from three areas within the Corps navigation channels will be placed within the CAD using bottom-dump barges. The contaminated sediments at the bottom of the CAD will then be covered with approximately 183,000 cu.yds. of clean sand excavated from Corps navigation channels and placed in the CAD using bottom-dump barges. These clean sands will be a product of previously-authorized maintenance dredging of the Corps navigation channels (excluding the three aforementioned areas containing contaminated sediments) and will be used to create a 10-foot-thick cap of clean materials over the contaminated sediments at the bottom of the CAD. Lastly, a one-half-foot to three-foot-thick layer of gravel will be placed over portions of the cap which are subjected to high levels of propeller wash in order to protect the cap against scouring. Dredging and disposal operations are scheduled to occur between October 2008 and September 2009 on a 24 hours per day, seven days per week schedule.

B. <u>Federal Agency's Consistency Determination</u>. The U.S. Navy and U.S. Army Corps of Engineers have determined the project consistent to the maximum extent practicable with the California Coastal Management Program (CCMP).

II. STAFF RECOMMENDATION.

The staff recommends that the Commission adopt the following motion:

MOTION: I move that the Commission **concur** with consistency determination CD-016-08 that the project described therein is fully consistent, and thus is consistent to the maximum extent practicable, with the enforceable policies of the California Coastal Management Program (CCMP).

Staff Recommendation:

The staff recommends a **YES** vote on the motion. Passage of this motion will result in an agreement with the determination and adoption of the following resolution and findings. An affirmative vote of a majority of the Commissioners present is required to pass the motion.

Resolution to Concur with Consistency Determination:

The Commission hereby **concurs** with the consistency determination by the U.S. Navy and 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.

III. Findings and Declarations:

The Commission finds and declares as follows:

A. Dredging and Filling. Section 30233 of the Coastal Act provides the following:

(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 les feasible environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port energy, and coastal-dependent industrial facilities, including commercial fishing facilities.

(2) Maintaining existing, or restoring previously dredged, depths in existing navigation channels, turning basins, vessel berthing and mooring areas, and boat launching ramps

. . .

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.

The proposed maintenance dredging and disposal project needs to be examined for consistency with Section 30233 of the Coastal Act. Under this section, dredging and filling of open coastal waters, including disposal of dredged materials, is limited to those cases where the proposed project is an allowable use, is the least damaging feasible alternative, and where mitigation measures are provided to minimize environmental impacts. The proposed dredging of sediments from the Port Hueneme Harbor approach, entrance, and navigation channels, the turning basin, wharves, and berths is an allowable use under Section 30233(a)(2). The proposed Hueneme Beach disposal site for the clean sandy sediments is the least damaging feasible alternative and in fact yields significant benefits for public recreation and sand supply. Due to the levels of sediment contamination in several areas of the harbor, nearshore and beach placement of these sediments is not a feasible alternative. Therefore, the Navy and the Corps examined several alternatives for disposal of the contaminated sediments. These alternatives are analyzed in the *Basis of Design Report (November 2007)* for the proposed project:

- Upland Landfill. The contaminated materials meet the qualifications for disposal at a Class III landfill. However, the materials must be dewatered prior to transport (which requires new infrastructure) and must be trucked or shipped via railcar to the landfill. Due to the large volume of dredged material involved and the costs associated with dewatering and transportation, landfill disposal is not considered a viable alternative.

- Reuse. There are processing technologies that can be used to increase the suitability of contaminated dredged materials for reuse in the development of commercial, industrial, agricultural, and other products. These include sand separation, composting, solidification/stabilization, soil washing, and high temperature thermal treatment. However, these technologies require additives and/or treatment of the sediment, at least one rehandling step, and significant amounts of area for processing equipment and sediment stockpiling. The Navy and the Corps determined that reuse of contaminated materials is not a viable alternative.

- Open Ocean Disposal. Sediments must be shown to be sufficiently clean and free of contamination that would adversely affect water quality and marine resources to qualify for an open ocean disposal permit. The Port Hueneme Harbor contaminated sediments do not qualify for this disposal alternative.

- Confined Aquatic Disposal. This is a process where an existing depression or a constructed pit is used to contain contaminated materials. These materials are placed in the pit and covered with a clean layer of capping material. The Port Hueneme Harbor CAD requires no rehandling, clean capping materials are available from maintenance dredging, and three agencies will share the construction costs. (Additional details on the design and operation of the CAD are provided below in Section B of this report.)

The Commission agrees that the proposed CAD is the least damaging feasible alternative for disposal of Port Hueneme Harbor contaminated sediments. Additional analysis of the feasibility of the aforementioned disposal alternatives for contaminated sediments is provided in the Water Quality and Marine Resources section of this report, below. Regarding the mitigation test of Section 30233(a), the following sections of this report discuss the mitigation measures which are incorporated into the project where necessary to protect coastal resources (**Exhibit 4**). Therefore, the Commission finds that the proposed maintenance dredging and disposal project is consistent with the allowable use, alternatives, and mitigation tests contained in the dredge and fill policy of the California Coastal Management Program (CCMP) (Coastal Act Section 30233).

B. Water Quality and 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 30231. *The biological productivity 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. Introduction. The proposed project includes dredging of sediments contaminated with elevated concentrations of chemicals including pesticides, tributyltin (TBT), and polychlorinated biphenyl (PCB) within the Port Hueneme Harbor, their placement and confinement in an engineered subaqueous confined aquatic disposal (CAD) facility, and related beach nourishment accomplished with clean sediments excavated to construct the CAD facility. The engineered CAD facility is a sediment management approach where contaminated sediments are dredged via mechanical means (clamshell buckets), placed within bottom-dump barges, transported to the CAD facility, and then placed within the submerged cell. Once the approximately 327,000 cubic yards of contaminated sediment have been placed within the CAD facility, it will be covered with approximately 183,000 cubic yards of clean sediments to form a cap to prevent migration of contaminants into the water column or the surficial sediment layer. The proposed CAD facility would be located on USN-owned, USACE-maintained property within the federal turning basin. **Exhibit 5** provides information on the sediment characterization efforts undertaken by the Navy, Corps, and OHD.

To date, the Commission has only found a few CAD projects to be consistent with California's Coastal Zone Management Program. These include a CAD facility within the Port of Los Angeles' permanent shallow water habitat area just inside the San Pedro Breakwater (CD-088-94 (Corps of Engineers) and CDP 5-95-179 (Port of Los Angeles)), a CAD facility within the permanent shallow water habitat area outside the Navy Mole in the Port of Long Beach (CDP-5-96-231 (Port of Long Beach)), and a pilot CAD facility in the North Energy Island Borrow Pit near the mouth of the Los Angeles River offshore of Long Beach (CD-028-01 (Corps of Engineers)). The proposed project includes the following characteristics which supported the Navy, Corps, and Oxnard Harbor District's consideration of CAD technology to remedy the current sediment shoaling and contamination problems in Port Hueneme Harbor:

- Moderate levels of contaminants in harbor sediments

- CAD design provides a low risk of failure either by fluid migration or physical exposure
- Sediments primarily contain contaminants from past practices that are not expected to recontaminate the harbor
- Contaminants are currently in equilibrium with aquatic sediment conditions
- CAD developers (Navy, Corps, and Oxnard Harbor District) are committed to a maintenance and monitoring plan that will ensure that the contaminants remain isolated in the CAD facility
- CAD location ensures that it can be adequately maintained by the CAD developers

2. Background. The Oxnard Harbor District (OHD), U.S. Navy (USN), and U.S. Army Corps of Engineers (Corps) are all responsible for maintaining authorized navigation depths in different parts of the Port Hueneme Harbor. These parties have been unable to dredge the Harbor to maintain safe navigability for commercial and military vessels due to the presence of contaminated sediments in the Corps' Federal Channels and at wharf faces managed by the Navy and the OHD. Combined, approximately 327,000 cu.yds. of contaminated sediments need to be dredged from the Harbor by the Navy, Corps, and OHD as part of their maintenance dredging programs.

The options for managing contaminated dredged material are to take it to a disposal facility or find a way to beneficially use ("reuse") the material. The material may be treated prior to disposal or reuse depending on the levels of contamination, level of exposure of the material to the environment during disposal or reuse, and the material properties required for the intended reuse or disposal method. In pilot projects conducted by the Los Angeles Region Contaminated Sediments Task Force (CSTF) in 2002, it was determined that the cost of treatment was between $50 and $80 per cubic meter compared to the cost on the order of $10 per cubic meter of placing clean dredged material at an aquatic disposal site, or $27 per cubic meter of placing clean or moderately contaminated materials in a confined disposal facility. Confined disposal facilities usually are created within harbors as new land and so the dredged sediments provide a benefit as fill materials and avoid the need to import soils from more distant locations. Where there are no opportunities to beneficially reuse contaminated dredged materials they must be taken to disposal facilities.

Dredged sediments that are highly contaminated (e.g., hazardous waste levels) must be treated prior to disposal or reuse since these wastes can be extremely harmful to humans and the environment and since they can contaminate large areas of land or water if they are not adequately isolated. Depending on the volume and location of these materials they may be taken to a Class I landfill that is specifically designed to handle hazardous waste and is constantly monitored to ensure effectiveness. Fortunately only a small percentage of California dredged materials require this level of treatment or isolation. The Port Hueneme Harbor sediments are not classified as highly contaminated.

The maintenance dredging materials in Port Hueneme Harbor have been affected by urban and agricultural runoff, waste from industrial operations at a military base, discharges from a sewage treatment plant and residual bottom paints from commercial and military shipping. These historic activities adversely affected sediments in a flood control channel discharged directly into the harbor, leaving behind with elevated concentrations of chemicals including pesticides, tributyltin (TBT), and polychlorinated biphenyls (PCBs). The levels of contaminants in the harbor are likely to have a long-term chronic impact on organisms living in the harbor. They cannot be discharged to an unconfined aquatic disposal site because of the impacts they would have to the environment. Port officials have been trying to beneficially reuse the material as artificial fill at the Port of Long Beach, but the timing of the fill project has been delayed to the point where the Port of Hueneme harbor officials must take other steps to keep the harbor functional.

Since the harbor has no need or room to create new land (as occasionally occurs in larger ports), the remaining options that will keep the harbor in operation are to haul the contaminated material to a landfill or to permit and create a confined disposal site specifically for the harbor. The harbor evaluated the economic and environmental costs of dredging, offloading, dewatering, rehandling, transporting, and disposing of the dredged material at an upland landfill and found them to be as high as $80 to $100 per cubic meter. The Corps compared those costs to the "federal interest" in the benefits of navigation in the harbor and found them to exceed the standards for maintaining a federal navigation channel. As such, sufficient federal funding to complete the Navy and Corps projects would likely never occur, and the costs for the OHD to maintain the entrance channel and conduct harbor dredging without federal funding would exceed the commercial benefits of the harbor. Furthermore, should sufficient funding be obtained to landfill the contaminated sediments, the volume of sediment being transported would place a potentially significant burden on local transportation networks (approximately 25,000 truck loads), and result in potentially significant air quality impacts, occupation of 327,000 cu.yds. of landfill capacity, and displacement of wastes that are more appropriate for placement in a municipal landfill.

3. <u>Regional Planning Efforts</u>. Maintenance dredging activities in Southern California have been hampered over the last decade because much of the sediment accumulating in ports and harbors does not meet federal criteria for unconfined open-ocean disposal established in the joint U.S. Environmental Protection Agency (USEPA)/Corps testing manual titled "Evaluation of Dredged Material Proposed for Ocean Disposal" and generally known as the Green Book (1991). In addition, acceptable disposal areas for contaminated material have not been permitted. Regional solutions have been the focus of ongoing efforts by the Los Angeles Region Contaminated Sediment Task Force (CSTF) member agencies, including the Corps. The Los Angeles CSTF has worked for the past seven years to develop suitable disposal and reuse alternatives for contaminated sediments in the region, resulting in the CSTF's Long-Term Management Strategy (LTMS).

The CSTF is composed of key agency, port, city, county, and environmental advocacy group stakeholders involved in the management of contaminated sediments in Southern California. The CSTF finalized its LTMS document in May 2005 (CSTF 2005). The LTMS summarizes information on the volume and location of contaminated sediments likely to be dredged within the next 5 to 10 years, potential sources of pollution contributing to sediment contamination, available disposal alternatives, and criteria for use and selection of alternatives appropriate for defining dredging projects.

In addition to the CSTF LTMS, the Corps' Los Angeles District is developing a Regional Dredged Material Management Plan (DMMP) that will serve as a regional management framework, covering multiple ports and harbors, and informing sediment management decisions for both clean and contaminated sediments. The DMMP will be based in part on and will take into consideration the consensus decisions of the CSTF. The DMMP was scheduled to be completed in 2005 but is still in progress due to insufficient federal funds to complete the necessary documentation. The Corps has recently acquired the necessary funding and the staff expects to complete this plan in mid-2008.

The proposed maintenance and remediation dredging of contaminated sediments in Port Hueneme Harbor is representative of scenarios anticipated by the CSTF LTMS, and the disposal alternatives proposed and evaluated for this project are similarly consistent with the CSTF LTMS and the upcoming Los Angeles Regional DMMP. After combining the costs of dredging, offloading, dewatering, and rehandling the dredged material for disposal at an upland landfill, the resulting costs create a scenario where none of the projects could be implemented in a cost-effective manner and would likely continue to be unfunded. This condition has prevented dredging of the Navy wharves since 1965 and the OHD wharves since 1995. Both entities have adjusted to increasing constraints in use of the wharves (e.g., less area along the wharves could be used and only at the higher tides) as sedimentation in the harbor has continued. In order to solve this problem, the OHD began working with the Corps to develop a regional solution for contaminated sediment management that could be implemented within the resource constraints of the three participants. The concept of creating a multi-user CAD cell was a result of this work, and subsequent conceptual design documents were developed along with field validation studies to further define the plan.

4. Project Timing. Overall construction is anticipated to begin in October of 2008 and be completed by September of 2009. Certain project activities will be subject to environmental work windows from the resource agencies. Work may be conducted outside of these windows, but additional consultation and monitoring would likely be required, including potential federal consistency review by the Coastal Commission. Dredging and disposal activities would likely occur on a 24 hours per day, 7 days per week basis to allow for efficient use of the dredging equipment and to complete the project as quickly as possible. Swift completion of this project is a high priority for the Navy, Corps, and OHD, and would help to minimize disturbance to the natural resources, commercial and military navigation, and the public. The following sequence of activities is listed in order of operation:

- Mobilization of construction equipment

- Excavation of CAD cell, utilizing a hydraulic dredge, and pumping the clean sand onto Hueneme Beach

- Mechanically dredge contaminated sediments from the Navy wharves and place dredged material within the CAD cell by bottom-dump barges

- Mechanically dredge contaminated sediments from OHD Wharves 1 and 2 and place dredged material within the CAD cell by bottom-dump barges

- Mechanically dredge contaminated sediments from Corps hotspots 1, 2, and 3 and place dredged material within the CAD area by bottom-dump barges

- Mechanically dredge clean O&M material from Corps Federal Channels and place dredged material within the CAD cell by bottom-dump barges; dredged O&M material would be used as a cap for the CAD cell and could be completed by hydraulic dredge and pumped into the CAD area using a submerged diffuser (or similar method)

- Placement of the gravel layer over the surface of the cap

- Demobilization of construction equipment

5. Sources of Harbor Pollutants and Prevention of Ongoing Contamination. Naval Base Ventura County (NBVC), which includes both upland areas as well as harbor waters, has been part of a Installation Restoration Program (IRP) since 1985. Surface water runoff does not normally enter NBVC Port Hueneme from outside the base boundaries, although surface drainage can enter the base from Victoria Avenue through Victoria Gate during storms or floods. Before creation of Channel Islands Harbor around 1957, the Oxnard power plant discharge canal drained into Port Hueneme Harbor from the NW corner of the harbor. This canal is identified as the Oxnard Drainage District Canal on a 1956 facility map. Effluent from the old sewage treatment plant discharged directly into Port Hueneme Harbor until 1971 (SCS and Landau Associates 1985).

Recent IRP activities have included extensive sampling of surface soils, groundwater, surface runoff, drainage canal sediment, and harbor sediments. Correlation analyses have shown that pollutants in upland media (primarily PAHs, PCBs and DDT) are similar to those detected in canal sediments, which have also been shown to have the potential for transport into the harbor. It is expected that the majority of documented pollutants within the Harbor are likely a result of these historic pathways. The Navy is actively working to control these chemical migration routes into the Harbor and remediate all upland pollutant sources through the IRP. A detailed document is in preparation that will detail the results of the 2007 upland evaluation and remediation efforts, as well as a conceptual site model for the entire facility. NBVC Port Hueneme is on schedule to have remedies in place for all its IRP sites by 2014. NBVC Port Hueneme also has comprehensive programs to reduce pollution throughout the base. These programs include the Spill Prevention, Control and Countermeasures program, the Spill Response program, and the Storm Water Pollution Prevention program.

The source of tributyltin (TBT) to harbor sediments is likely a result of the anti-fouling boat paint on the hulls of commercial vessels that call on the OHD docks multiple times each week. TBT is no longer used in most marine anti-fouling paints, but considering that the OHD wharf areas have not been dredged for the past 20 years, it seems likely that what has been detected in the sediment cores is residual TBT from past discharges as TBT is well known to accumulate in sediments in areas that have had frequent historical inputs.

The OHD is currently designing and implementing a port-wide environmental management (Green Port) program to monitor and eliminate potential source control issues as a result of its facility-wide operations. A storm water protection plan is already in place and baseline air, water, noise, traffic and biological conditions will also be considered. One aspect of the program will include working directly with all of the port tenants to identify and eliminate potential water quality stressors such as TBT and other adverse chemicals typically used in hull paints.

6. Residual Contamination in the Harbor. This project will rely on maintenance dredging to remove 95% of contaminated sediments from the harbor during this project. Efforts described above will be used to minimize the recontamination of the harbor such that another CAD project is not envisioned. Levels of contaminants entering the harbor will be much reduced since the military base is being cleaned up under the Installation Restoration Program, the outfall of the sewage treatment plant no longer enters the harbor, the major flood control channel bringing agricultural wastes has been moved, and use of TBT anti-fouling paint has been banned. The only location of contaminated sediments that will remain in the harbor after this project is completed will be one small area that is not part of the federal channel or active wharves. This area is located just inside the west entrance channel jetty but outside of the actual navigation channel (**Exhibit 2**). The measured levels of contaminants in this area are similar to those encountered in the hot spot located within the entrance channel (primarily limited to PCBs and DDT). There are no current funds to dredge this area and that work would be considered a clean-up effort (regulated by DTSC through the IR program) and not a navigational dredging project. As such, even if funding could be secured, the inclusion of this non-navigational areas would change the regulatory setting and jeopardize completion of the current project. The estimated additional cost to complete this dredging and include the contaminated sediments in the current project could be as much as $1 to $2 million.

7. Environmental Commitments. The Navy, Corps, OHD, and their contractors have committed to avoiding, minimizing, or mitigating for adverse effects during dredging and disposal activities. Based on the information available to the Navy, Corps, and OHD and on recommendations from public agencies, the environmental commitments outlined in Section 6 of the joint NEPA/CEQA project document will be implemented in such a manner to minimize potential environmental impacts (**Exhibit 4**). These environmental commitments will be incorporated into the final project plans and the contract specifications so that if there is evidence that contaminated sediments are not properly placed in the CAD cell, or that water column turbidity exceeds reference site levels by more than 30% (see monitoring program below), the contractor will be required to use one or more of the following best management practices (BMPs) and remediate or mitigate for any errors. Dredging BMPs included in the CSTF Tool Box (LTMS 2005) include but are not limited to:

- Increasing cycle time. Longer cycle time reduces the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket. Limiting the velocity of the descending bucket reduces the volume of sediment that is picked up and requires more total bites to remove the project material. The majority of the sediment resuspension, for a clamshell dredge, occurs when the bucket hits the bottom.

- Eliminating multiple bites. When the clamshell bucket hits the bottom, an impact wave of suspended sediment travels along the bottom away from the dredge bucket. When the clamshell bucket takes multiple bites, the bucket loses sediment as it is reopened for subsequent bites. Sediment is also released higher in the water column as the bucket is raised, opened, and lowered.

- Eliminating bottom stockpiling. Bottom stockpiling of the dredged sediment in silty sediment has a similar effect as multiple bite dredging; an increased volume of sediment is released into the water column from the operation.

- Preventing barge overflow. The contractor will ensure that the barge will not be allowed to overflow.

- Avoiding overdredging. Overdredging in the vertical or horizontal dimensions will be avoided to the maximum extent possible.

The Navy and the Corps have committed to avoid creating adverse effects to marine resources from the project. Where adverse effects cannot be reasonably avoided, the Navy and the Corps have committed to minimize the effects on the environment through careful planning and design and the use of BMPs. The Navy and the Corps will provide the Executive Director a copy of the final project dredging and disposal plans for review and approval prior to the start of construction, including evidence that all project environmental commitments have been incorporated into the project contracts.

8. Operations Management and Monitoring Plan. A *Draft Operations Management and Monitoring Plan (OMMP; March 2008)* for the CAD site has been developed for implementation by the Oxnard Harbor District (OHD). The OMMP describes the management and monitoring objectives for the CAD facility, a communications plan covering the entire CAD construction and sediment disposal process, construction monitoring and post-disposal monitoring plans, contingency plans, annual monitoring plans, and long-term management plans for the CAD once it has been capped.

The OMMP describes objectives of the plan as follows:

> *The primary objective of the Port of Hueneme CAD Site OMMP is to describe the plan for managing the Port of Hueneme CAD facility as a disposal site for contaminated sediments during a single, multi-user project conducted by the OHD, USN, and USACE within the*

> *Harbor. This document discusses the administrative steps and physical process of placing the material into the CAD facility, covering (or capping) it with clean sand to prevent the release of contaminants, and the details of a ongoing and long-term monitoring program to monitor for potential environmental impacts associated with the project.*
>
> *The purpose of the OMMP is to provide the construction and monitoring framework through which OHD, USN, and USACE will conduct the disposal of their dredged material. The OMMP describes the conditions for use of the CAD facility; for example, the OMMP requires that specific, identified best management practices (BMPs) are employed during disposal and capping activities (see 6.2.3 and 6.2.4), and that the OHD employ short- and long-term monitoring activities (see Section 7). The Port of Hueneme CAD facility would be managed by the OHD, under the terms and conditions of the OMMP, and would be permitted by the regulatory and resource agencies as an approved disposal location for a single, multi-user project. In this way, the disposal site would be permitted for use, the conditions for use would be known in advance of dredging, and the OHD would be responsible for ensuring that the framework established by this OMMP is followed. Therefore, this document does not address the regulatory agency decision-making process or environmental analysis that would lead to approval for use of the Port of Hueneme CAD site as an acceptable disposal alternative. The reader is directed to the Draft Environmental Assessment and Initial Study (EA/IS) for the Port of Hueneme Contaminated Sediment Dredging and Confined Aquatic Disposal Site Construction (Anchor 2008) for guidance on that topic.*

The OMMP next describes the legal authority and responsible parties for the CAD construction and long-term management and monitoring:

> *While the Harbor was initially constructed by the OHD in 1939, the USN currently owns the submerged lands underlying the entire Harbor with the exception of the portion known as Slip A. For this project, the USN has entered into a memorandum of understanding (MOU) with the OHD for shared financial responsibility and project liability to construct the CAD facility. Following construction, the OHD has assumed responsibility for the long-term management of the CAD facility, which includes the following components:*
>
> - *Pre- and post-disposal monitoring of the CAD site.*
> - *On-site monitoring of all disposal and capping operations within the CAD site.*
> - *Design of the final isolation cap placed on the surface of the CAD facility at the conclusion of disposal operations.*
> - *Preparation of monitoring reports for the regulatory agencies that document compliance with this OMMP.*

The OMMP next describes the process for future modifications to the OMMP:

> *This OMMP has been developed as a "working document" and may require modification during the operation and monitoring phases of the CAD facility development. Final modification of the plan is at the discretion of the OHD, in consultation and consensus with the USN, USACE, U.S. Environmental Protection Agency (USEPA), California Coastal Commission (CCC), and California Regional Water Quality Control Board (RWQCB).*

The OMMP concludes with a section on "Construction Monitoring and Post-Disposal Requirements" and excerpts are provided below. The Commission staff recommended several modifications to this section of the OMMP and those modifications (in double underline) were accepted by the Navy, Corps, and OHD. This section begins with a review of the development of a pilot CAD project in Long Beach, California:

> *Monitoring of a pilot CAD facility (USACE 2007) completed recently in Long Beach, California demonstrated that contaminated sediment could be placed into a CAD facility and capped with clean sediments without causing significant environmental impacts to the overlying water column or surrounding sediments. The methods and results of the recently completed 5-year monitoring project conducted for the CSTF Aquatic Capping Pilot Study are available upon request. Included in that study were field investigations conducted during disposal, immediately after capping, and consecutively for 5 years after construction. The construction monitoring and post disposal requirements proposed for the Port of Hueneme CAD facility have been informed by the lessons learned during the CSTF study.*

This is followed by the monitoring elements of the OMMP:

> **7.1. Construction Monitoring.** *Using the results of the extensive field monitoring conducted for the CSTF Pilot Capping Study as a general example of successful disposal and capping operations, construction monitoring for contaminated sediment disposal at the Port of Hueneme CAD facility will focus on two main objectives: (1) ensure that significant quantities of contaminated sediments are not deposited outside of the designated CAD facility; and (2) ensure that chemical releases from the sediment do not occur during disposal at levels that pose a potential ecological risk to resident aquatic organisms.*
>
> *To achieve these objectives, the following field and laboratory parameters will be monitored during and immediately after construction:*
>
> - *Field operations will be monitored and documented to ensure proper equipment placement prior to disposal and volumes/depths for all material placed into the CAD facility.*
> - *Water column turbidity monitoring shall be conducted on a routine basis at reference and down-current locations to assess sediment transport during disposal operations.*
> - *Water column samples will be collected periodically and analyzed for dissolved and particulate metals to monitor for chemical release and transport during disposal operations.*
> - *During dredging of the OHD and USN wharves, silt curtains will be used to minimize turbidity by isolating the active dredging site from the rest of the Harbor.*

- *A bathymetric survey of the CAD facility will be conducted prior to initiation of disposal operations to ensure that it has been constructed to meet the design specifications.*
- *A bathymetric survey of the CAD facility will be conducted after the contaminated sediment has been placed within the CAD to ensure that the material has been placed evenly within the CAD facility.*
- *A bathymetric survey of the CAD facility will be conducted after the cap is constructed to ensure that the material has been placed evenly and at the proper depth within the CAD facility.*

7.1.1. Water Column Monitoring. *Water column monitoring will occur at set distances directly down current of the disposal operations. The proposed downstream sampling distances for each operation will include at a minimum 50, 100, and 200 meters and the nearest sample will be collected within 15 minutes of the disposal event.*

At each station, continuous depth profiles will be collected a minimum of three times per week for light transmission, dissolved oxygen, and conventional field sampling measurements (i.e., salinity, temperature, and pH). Three sample depths (1 meter below the water surface, 1 meter above the bottom, and mid-way between these two points) should be monitored for TSS three times per week. Chemical analyses to detect dissolved metals will be conducted a minimum of once per week at each of these three depths concurrent with TSS samples so that a relationship can be derived and processed by the laboratory for a 7-day turnaround. Water column monitoring for PCBs, DDT and TBT concurrent with the TSS samples will be conducted three times per week for the first 2 weeks of disposal operations, and weekly thereafter, if no water quality exceedences are observed. Reference or up-current stations within the Harbor will also be sampled at similar depths and frequency for comparison.

7.1.2. Construction Operations Monitoring. *Proposed monitoring procedures to meet the objectives related to cap design include:*

- *Recording tonnage/volume of sediment dredged and placed within the CAD facility*
- *Tracking location of sediment placement within the CAD facility*
- *Recording tonnage/volume of capping sediment dredged and placed within the CAD facility*
- *Completing progress bathymetric surveys to verify sediment placement location*
- *Obtaining grab samples from along all wharves to ensure only "clean" surfaces remain*
- *Tracking operational information such as dredge production rates, downtime, and barge discharge time*

- *Completing a bathymetric survey of the CAD facility after the cap has been placed over the CAD to ensure that the cap material has been placed evenly over the entire facility*

7.2. Immediate Post-construction Monitoring Description. *Monitoring immediately after construction is completed is required to ensure that placement of the contaminated sediment is successful, which, in this case, is measured by achieving the desired minimum cap thickness over the entire CAD facility while minimizing the incidence of off-site transport of sediment outside of the CAD facility. These parameters will be measured through the use of during- and post-construction bathymetry surveys and post-construction sediment coring of the cap layer. Each parameter is described in greater detail below.*

7.2.1. Bathymetric Surveys. *Bathymetric surveys will be conducted prior to initiation of disposal activities to establish the baseline conditions for the CAD facility and routinely during disposal operations as a way to monitor successful placement of contaminated material into the CAD facility. A post-construction cap bathymetric survey is also required to quantify the final configuration and elevations of the capped site. This information will help determine whether design criteria are met and provide a baseline for comparison to long-term bathymetric surveys of the CAD facility.*

7.2.2. Cap Coring. *Immediate post-construction coring is required to provide information both on the physical characteristics of the cap and the underlying sediment (i.e., cap thickness, horizontal coverage, and extent of mixing between layers) and the chemical characteristics of the cap once it has been placed. Core chemistry data will be collected to establish a baseline profile of chemicals in various layers of the cap and in the underlying sediment. Cap core chemistry information will also help to quantify the extent of mixing between the cap and underlying sediment that occurred during placement.*

This baseline chemistry profile will be compared to long-term monitoring core chemistry data to determine whether any chemicals are migrating from the underlying sediment into the cap sediment. Because diffusion of chemicals through sediment is a time-dependent process, migration from underlying sediments will be observable first in the deepest layers of the cap. If long-term monitoring reveals increases in chemicals only in surface layers of the cap, it would be indicative of chemicals from sources outside the CAD facility being deposited on the cap surface (rather than migration of chemicals from beneath the cap).

7.3. Long-Term Post-Construction Monitoring. *Long-term monitoring after construction is completed is required to verify that the CAD facility has maintained its physical integrity and that the cap is maintaining its ability to sequester underlying contaminants. These parameters will be measured through the use of periodic post-construction bathymetric surveys and sediment coring of the cap layer. Each parameter is described in greater detail below. The key elements addressed by the monitoring program included:*

- *Determining if the CAD facility cap has maintained its physical integrity*
- *Ensuring that fractures, erosion or deposition had not compromised the cap's ability to sequester underlying contaminants*
- *Determining if contaminants are migrating through the cap at an unacceptable rate*

7.3.1. Bathymetric and Fracture Detection Surveys.

Bathymetric surveys will be conducted 3, 6, and 12 months after completion of cap construction to quantify the configuration and elevations of the capped site. Then bathymetric surveys will be taken annually and reported to the responsible state and federal regulatory agencies (CCC, RWQCB, USEPA and USACE). If there is consensus among the regulatory agencies that the cap is performing as predicted after 10 surveys, the applicants may apply to the Executive Director to narrow the focus or modify this aspect of the long-term monitoring program. This information will help determine whether design criteria continue to be met and quantify rates of erosion or deposition at the CAD facility.

As indicated above fractures may form in the cap due to loss of fluids or differential settling. Fracture detection surveys (e.g., side scan sonar, diver observations, box cores on bathymetric anomalies) will be conducted at least every two years after completion of the cap to detect any fractures that are a threat to cap integrity. They will be reported biannually to the responsible state and federal regulatory agencies (CCC, RWQCB, USEPA and USACE). If there is consensus among the regulatory agencies that the cap is performing as predicted and fractures that threaten cap integrity are not forming after five (5) surveys, the applicants may apply to the Executive Director to narrow the focus or modify this aspect of the long-term monitoring program.

7.3.2. Cap Coring. *Twelve months after completion of cap construction, sediment coring will be conducted to provide information both on the physical characteristics of the cap and underlying sediment (i.e., cap thickness, horizontal coverage, and extent of mixing between layers) and the chemical characteristics of the cap for comparison to baseline data collected immediately after cap construction. Core chemistry data will be collected at a minimum of ~~two~~ five (5) locations within the CAD facility to establish a profile of chemicals in various layers of the cap and in the underlying sediment.*

This chemistry data will be compared to the baseline chemistry data to determine whether any chemicals are migrating from the underlying sediment into the cap sediment. Because diffusion of chemicals through sediment is a time-dependent *process, migration from underlying sediments will be observable first in the deepest layers of the cap. As such bulk chemistry and porewater samples will be taken within 1 meter of the interface between the contaminated material and the cap material to determine if there has been significant movement of PCBs, the most persistent and mobile of the contaminants in the CAD site. At least five (5) samples will be taken twelve months after completion of the cap and then every five years thereafter. A report will be submitted to the responsible state and federal regulatory agencies (CCC, RWQCB, USEPA and USACE). If there is consensus among the regulatory agencies that the cap is performing as predicted after the third round of samples, the applicants may apply to the Executive Director to narrow the focus or modify this aspect of the long-term monitoring program. If long-term monitoring reveals increases in chemicals only in surface layers of the cap, it would be indicative of chemicals from sources outside the CAD facility being deposited on the cap surface (rather than migration of chemicals from beneath the cap).*

7.3.3. Adaptive Management. *After the first year of post-construction monitoring has been completed, an adaptive management plan will be developed based on analysis of the data collected during the year. The long-term management plan will be developed based on the existing conditions of the site and current technological developments and will be designed to ensure long-term cap stability and isolation of contaminants. Monitoring requirements, such as timing of the events, will be determined at that time. At a minimum, however, long-term monitoring will include:*

- *Completing bathymetric surveys to rates of erosion and deposition*
- *Coring for chemistry in bulk sediments and porewater*

The exact scope and frequency of the long-term monitoring program will be evaluated and developed after the first year of post-construction monitoring data is available and has been reviewed. This long-term monitoring program will be submitted to the Executive Director of the Coastal Commission for review and approval.

7.3.4. Environmental Monitoring Reports. *The OHD will prepare and submit to the regulatory agencies an annual environmental monitoring report to document and discuss the results of all CAD facility monitoring activities conducted during the previous year. These reports will be completed no later than December 31 of each year and will include a discussion of current and past monitoring data for the site, as well as proposed future monitoring planned for the site.*

On April 23, 2008, the Navy and the Corps submitted their *Updated Cap Modeling Information* document for the proposed CAD facility; this document states that the CAD cell design was developed using "extremely conservative input assumptions" to calculate the chemical diffusion model used in determining how effective the cap layer would function in isolating the contaminated sediments. The document concluded that:

. . . predicted porewater hazard quotients ranged from 0.000001 to 0.61, all well below the minimum risk threshold of 1.0. Steady state concentrations for the most mobile constituent

> *of concern detected in any of the sediments, heptachlor epoxide, will not be achieved for 2,416 years. Keeping in mind that these model results are predicting concentrations assuming a conservative cap layer of three feet vs. the proposed 10 feet, the actual duration to reach steady state at the top of the cap is estimated at 8,053 years.*

Based on the information and analysis contained in the Draft Environmental Analysis, the Sediment Sampling and Analysis Report, and the Draft CAD Design Report, the Navy and Corps' consistency determination concluded that:

> *The proposed dredging project would have no adverse effects on coastal zone marine resources. The proposed project would enhance marine resources by isolating from the marine environment contaminated sediments currently distributed throughout the Harbor (Sections 30230 and 30233). Isolation of these sediments will decrease their biological availability. This isolation will also benefit biological productivity and water quality in the marine environment (Section 30231).*

The Navy, Corps, and OHD have demonstrated that the proposed isolation and capping of contaminated marine sediments in Port Hueneme Harbor is feasible from biologic, engineering, and economic perspectives. Placement of contaminated sediments in a deep-water pit and capping with ten feet of clean sediments will ensure that contaminants will remain permanently isolated from the marine environment. The short-term effects to water quality and marine resources that will occur during dredging and placement of the contaminated sediments in the CAD facility are more than offset by the long-term benefits derived from isolating these materials from the marine environment. The proposed project includes environmental commitments to minimize adverse effects on water quality and marine resources during dredging and disposal of contaminated sediments, construction water quality monitoring, immediate post-construction monitoring of cap characteristics, bathymetry monitoring, cap coring (including sediment profiling, core and sediment surface chemistry data), fracture detection surveys, long-term monitoring, adaptive management, and annual monitoring reports.

The CAD facility would be located on Navy-owned land in the harbor. While the OHD is designated (through a series of Memorandum of Understanding among the Navy, Corps, and OHD) as the responsible entity for management and monitoring of the CAD after construction, the *Operations, Management and Monitoring Plan* includes provisions for continued oversight by the Navy as landowner at the CAD site. However, the Navy and the Corps have committed in this consistency determination that both agencies will continue to be responsible for ensuring that the proposed project, including the maintenance and monitoring of the CAD in perpetuity, will be implemented in a manner fully consistent with the project description and the OMMP contained in this consistency determination and supporting technical documents. Staff from the Regional Water Quality Control Board reviewed the proposed project and concluded that it is a reasonable and technically sound solution to the contaminated sediment problem in the harbor. Staff from the U.S. EPA is reviewing the proposed project and if a recommendation is available from that agency prior to the Commission's May 9, 2008, meeting, it will be provided to the Commission as an addendum to this report. The Coastal Commission is designated as one of the agencies (along with the Navy, the Corps, USEPA, and RWQCB) that would participate in a consultation and consensus process in the event that future modifications to the *Operations, Management and Monitoring Plan* for the CAD facility are determined to be required by the OHD. In addition, the Commission has the authority under the Coastal Zone Management Act federal consistency regulations (15 CFR § 930.45) to review federal agency activities previously determined to be consistent with the California Coastal Management Program (CCMP). Should the CAD facility, during either construction or operation, generate adverse effects on water quality or marine resources substantially different than originally described by the Navy and the Corps in this consistency determination, the Commission can initiate a review to determine whether the project is still consistent with the CCMP.

In conclusion, the Commission determines that the contaminated sediments proposed for dredging and disposal in the proposed CAD facility will remain permanently isolated in the CAD facility and that the project would not adversely affect water quality and marine resources of Port Hueneme Harbor and the adjacent waters of the coastal zone. Therefore, the Commission concludes that the project is consistent with the marine resources and water quality policies of the California Coastal Management Program (Coastal Act Sections 30230, 30231, and 30230).

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

> Section 30210. *In carrying out the requirement of Section 4of 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. *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 30213. *Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided . . . .*
>
> Section 30220. *Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*
>
> Section 30221. *Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.*
>
> Section 30234. *Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded . . . .*
>
> Section 30234.5. *The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.*

The consistency determination examines the existing public access and recreational resources at Port Hueneme Harbor and the potential impacts on these resources from the proposed project:

> *The Harbor is an active commercial and military port, the operation of which requires large vessels and equipment such as cranes, forklifts, and heavy trucks. As a result, Harbor operations incorporate safety plans to comply with local, state, and federal regulations. One part of these requirements is limiting access to the Harbor to ensure public safety. Thus, public access to the coastal zone within the Harbor will remain unchanged as a result of the proposed project.*
>
> *Under the proposed project, the dredging and CAD areas are located entirely within the heavily developed Harbor, where public access is severely limited. Because the work would occur inside the Harbor, dredges, barges, and work vessels have no potential to impact public access to the coastal zone outside the Harbor.*
>
> *Placement of sand on Hueneme Beach during the beach nourishment phase of the project would require use of appropriate, temporary fencing and signage as well as construction safety monitors for the protection of the beach-going public, because the nourishment pipeline and bulldozers would be operating on the western end of Hueneme Beach. The nourishment is expected to require approximately 45 days to complete. Implementation of the existing Harbor and contractor safety plans and appropriate project-specific worker training will ensure that public safety and the safety of construction personnel are considered and that public access to the beach nourishment site is maintained to the maximum extent practicable during the temporary nourishment period. Public access to the proposed beach nourishment site is currently severely limited because of the highly eroded state of the beach. The proposed beach nourishment will greatly enhance public access to the coastal zone by increasing the size of the beach.*
>
> . . .
>
> *Recreational opportunities in the project area are generally limited to Hueneme Beach. The vast majority of the proposed project will occur within the Harbor, an active commercial and military port with limited public access and essentially no recreational value.*
>
> *Temporary restrictions on public beach use at the western end of Hueneme Beach immediately adjacent to the existing rock revetment will occur as a result of the presence of mechanized equipment during the beach nourishment phase of the project. In its current state, the proposed beach nourishment site at the western end of Hueneme Beach is submerged at all but the lowest tides and is therefore currently unavailable to the public for most recreational use. Nourishment of Hueneme Beach is expected to last approximately 45 days. Successful nourishment of the beach is expected to produce long-term benefits to public water-oriented recreation by protecting the beach for such use . . . the proposed dredging of the Harbor will enhance navigation within the Harbor, which will benefit the public's use of the charter fishing vessels that utilize the Harbor.*

The proposed project will remove shoaling within the approach, entrance, and navigation channels and vessels berths at Port Hueneme Harbor and, as a result, will significantly increase the safety of charter fishing vessels at the harbor. While the proposed dredging could interfere with vessel transit in and out of the harbor, any impacts will be temporary and are insignificant when compared to the benefits from removing the existing shoaling hazard. The proposed maintenance dredging project would generate minor adverse effects on public access and recreation, primarily resulting from temporary beach closures during disposal and sand moving operations on the beach, and from the noise associated with bulldozer operations on the beach. However, the proposed project would significantly improve public access and recreational opportunities due to the placement of clean and grain-size compatible sand along the stretch of Hueneme Beach immediately downcoast of the Port Hueneme Harbor east jetty. Therefore, the Commission finds that the proposed maintenance dredging and beach nourishment project is consistent with the public access and recreation policies of the California Coastal Management Program (Coastal Act Sections 30210, 30211, 30213, 30220, 30221, 30234, and 30234.5)

D. <u>Sand Supply</u>. Section 30233(b) of the Coastal Act provides the following:

> *Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.*

The consistency determination included the October 2007 *Results of Sediment Sampling and Analysis* report prepared by the Navy and Corps' consultant, Anchor Environmental, LLC, and which stated that:

> *Sediments below the maintenance type material in the area of the proposed CAD site were clean, light-colored coarse grain sand that should be suitable for beach placement because it consists of virgin material that has not been exposed to sources of contamination. Laboratory testing of composite samples indicated a sand content of 92 to 93 percent by weight, which is very similar to the composition of local beach sands. Use of this sand to nourish a local beach would constitute beneficial reuse of the material because it would benefit beachgoers by increasing the width of the beach for recreational use, provide additional erosion protection for existing infrastructure, and reintroduce sand to the littoral system that is currently sequestered in the Harbor.*

The Navy and the Corps have determined that approximately 572,000 cubic yards of clean sands that would be excavated from the Port Hueneme Harbor turning basin to create the CAD facility are suitable for beach replenishment. These materials will be placed on or in the nearshore waters off Hueneme Beach in order to replenish this severely eroded beach. In conclusion, the Commission finds that the proposed project will transfer sands currently isolated in Port Hueneme Harbor back into the longshore current system off Hueneme Beach, and is therefore consistent with the sand supply policy of the California Coastal Management Program (Coastal Act Section 30233(b)).

<u>SUBSTANTIVE FILE DOCUMENTS</u>:

1. Consistency Determination CD-088-94 (Corps of Engineers, confined aquatic disposal facility within the Port of Los Angeles)
2. CDP 5-95-179 (Port of Los Angeles, confined aquatic disposal facility within the Port of Los Angeles)
3. CDP 5-96-231 (Port of Long Beach, confined aquatic disposal facility within the Port of Long Beach)
4. Consistency Determination CD-028-01 (Corps of Engineers, pilot confined aquatic disposal facility offshore of Long Beach)
5. Consistency determination CD-052-94, Negative Determinations ND-040-00 and ND-048-06 (Corps of Engineers, maintenance dredging of Port Hueneme Harbor and dredged material disposal at Hueneme Beach)

Note: Base map prepared from image from Google Earth Pro, 2007.

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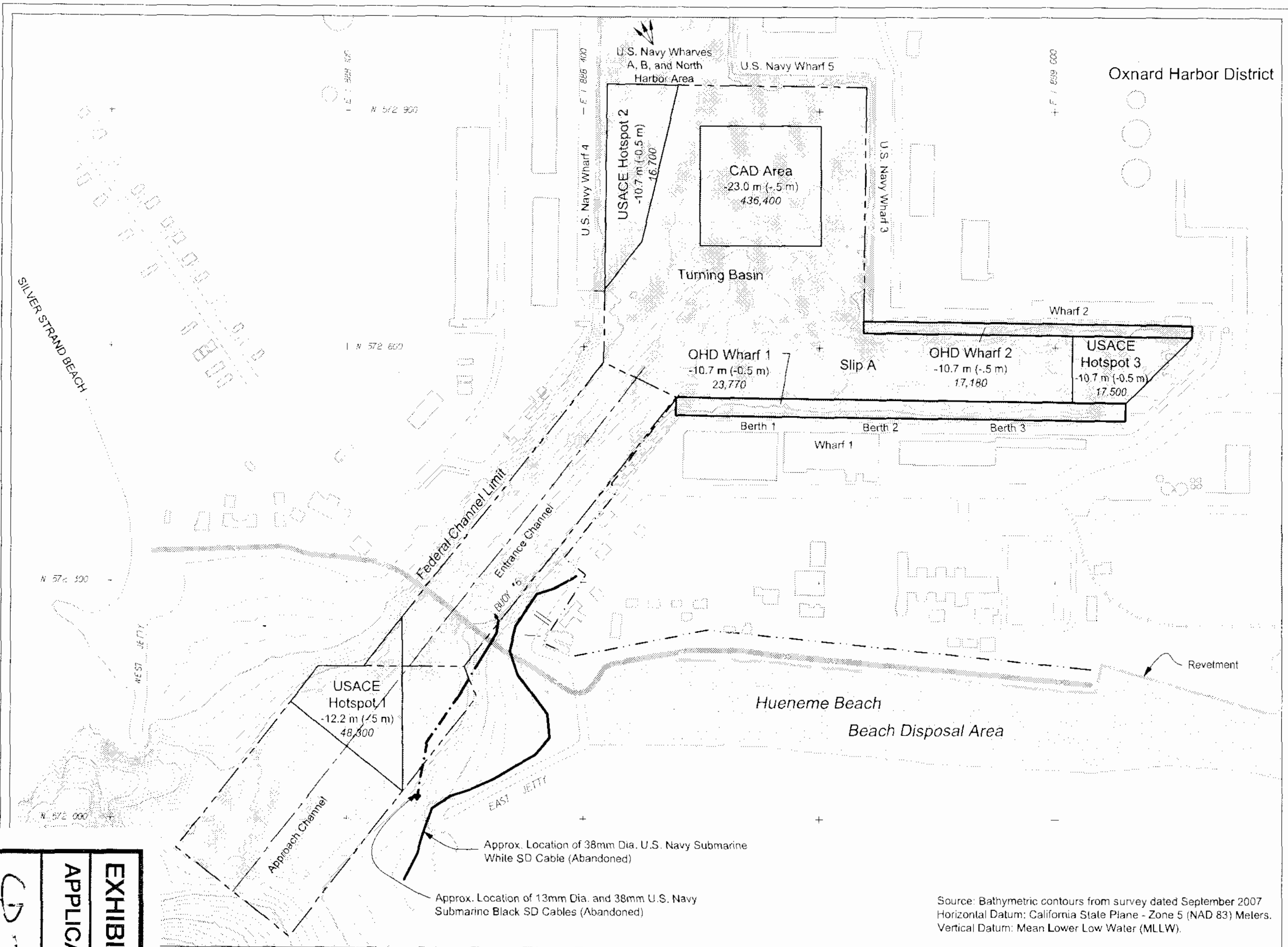
Scale

Oct 10, 2007 1:18pm dholmer C:\ANCHOR WORKSPACE\JOBS\070374-Port Hueneme\07037401-003.dwg F1

EXHIBIT NO. 1
APPLICATION NO.
CD-016-08

ANCHOR ENVIRONMENTAL, L.L.C.



Area to be Dredged

CAD Area — Dredge Area
-23.0 m (-.3 m) — Target Depth (Allowable Overdepth)
436,400 — Volume in Cubic Meters

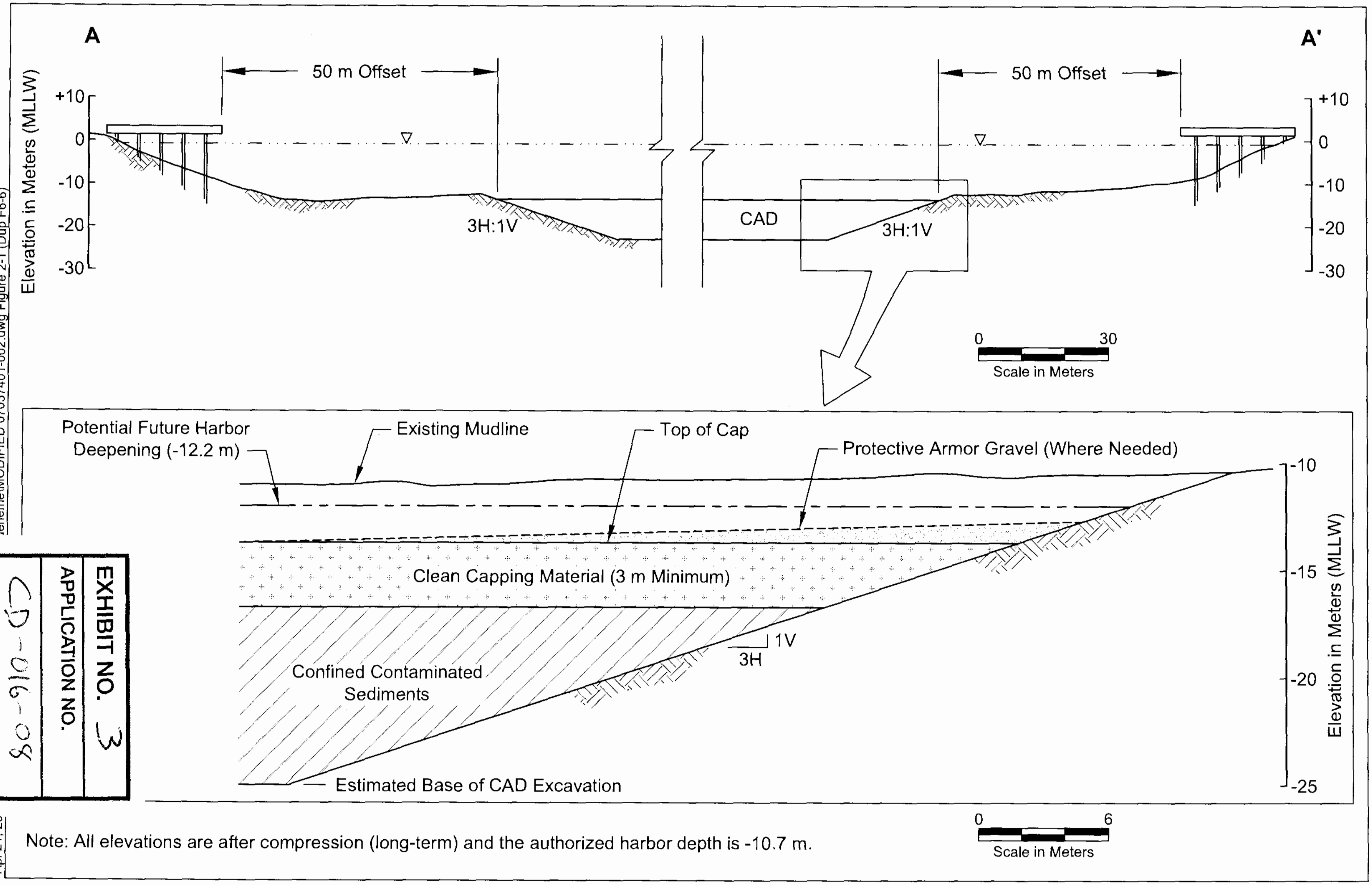
Summary of Estimated Contaminated Sediment Volumes (to be Contained in CAD)

Contaminated Sediment Location	Volume (m^3)
OHD Wharf 1	23,770
OHD Wharf 2	17,180
U.S. Navy Areas	91,800
USACE Hotspot 1	48,300
USACE Hotspot 2	16,700
USACE Hotspot 3	17,500
Approximate Total Contaminated Sediment Volume	215,300

0 100
Scale in Meters

Figure 1-2
Projet Area Site Plan
Port Hueneme

EXHIBIT NO. 2
APPLICATION NO.
CD-016-08



Note: All elevations are after compression (long-term) and the authorized harbor depth is -10.7 m.

EXHIBIT NO. 3
APPLICATION NO.
CD-016-08

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 2-1
Typical Cross-section through CAD Facility
Port of Hueneme

Table 1
Recommended Mitigation Measures

Mitigation Number	Mitigation Measure
BIOLOGICAL RESOURCES	
BR-1	Avoid impacts to grunion: • If beach placement of dredged material on Hueneme Beach occurs after March 15, during grunion season, the zone of activity shall be restricted to a fixed position (clearly marked by flagging) 500 feet in width and extending offshore. • Lateral movement of the outfall shall only occur when seaward extension of the hydraulic pipeline is no longer feasible and only when dredged material would still remain within the 500-foot zone.
BR-2	Avoiding impacts to pismo clams: • Impacts to pismo clams will be avoided by placing dredged material at water depths less than -5 meters mean lower low water (MLLW) at Hueneme Beach.
BR-3	Avoiding impacts to coastal habitat: • The proposed project activities shall not disturb the low-lying bluffs, sand dunes, or existing vegatation that may be present on Hueneme Beach.
BR-4	Avoiding impacts to potential western snowy plover habitat: • If a pipeline is used for placement of dredged material on Heuneme Beach (in order to avoid covering or removing portions of the wrack line along Hueneme Beach that provides potential foraging habitat for birds such as western snowy plover), beach recontouring during and following pipeline removal will be limited to the footprint of the pipeline.
BR-5	Operators of dredging or other heavy equipment shall not harass any marine mammals or avian species in the project area.
HYDROLOGY AND WATER QUALITY	
WQ-1	All trash and debris shall be removed from the Hueneme Beach nourishment site each day.
WQ-2	During sediment disposal, if floating debris is expected, the contractors must provide a boat capable of collecting and transporting debris. If floating debris is observed following sediment disposal, it must be collected and disposed of by the contractors immediately following the disposal event.
WQ-3	During dredging of the wharves, silt curtains will be used to minimize turbidity by isolating the active dredging site from the rest of the Harbor.
WQ-4	As described in the Draft Operations Management and Monitoring Plan, during sediment disposal operations, water quality monitoring will be performed to identify the levels of total suspended solids (TSS) and chemical contaminants in the water surrounding the CAD facility. Based on the results of environmental monitoring, modification of disposal operations may be required.

EXHIBIT NO. 4
APPLICATION NO.
CD-016-08

Mitigation Number	Mitigation Measure
WQ-5	Dredging shall be conducted in a manner to avoid overdredging in the vertical or horizontal dimensions, to the maximum extent practicable.
WQ-6	Disposal operations will be monitored and documented to ensure proper equipment placement prior to disposal of sediment for all material placed into the CAD facility.
WQ-7	As described in the Draft Operations Management and Monitoring Plan, during sediment disposal operations, water quality monitoring will be performed to identify the levels of total suspended solids (TSS) and chemical contaminants in the water surrounding the CAD facility. Based on the results of environmental monitoring, modification of disposal operations may be required.
WQ-8	A pre-project planning meeting will be held at least 1 week prior to initiation of construction and disposal operations to discuss the schedule and logistics of the planned activities. During this time, there will be a review of the environmental monitoring requirements for the project, if applicable, and contact numbers for field sampling staff will be provided to the contractors. In addition, there will be a discussion of the reporting requirements for the project.
WQ-9	Bathymetric surveys will be conducted prior to initiation of disposal activities to establish the baseline conditions for the CAD facility and routinely during disposal operations as a way to monitor successful placement of contaminated material into the CAD facility.
WQ-10	As described in the Draft Operations Management and Monitoring Plan, a post-construction bathymetric survey of the CAD site is required to quantify the final configuration and elevations of the cap. This information will help determine whether design criteria have been met and provide a baseline for comparison to long-term bathymetric surveys of the CAD facility. • Bathymetric surveys will be conducted 3, 6, and 12 months after completion of cap construction to quantify the configuration and elevations of the capped site. This information will help determine whether design criteria continue to be met and quantify rates of erosion or deposition at the CAD facility.

EX-4, 2 of 5

Mitigation Number	Mitigation Measure
WQ-11	As described in the Draft Operations Management and Monitoring Plan, immediate post-construction coring is required to provide information both on the physical characteristics of the cap and the underlying sediment (i.e., cap thickness, horizontal coverage, and extent of mixing between layers) and the chemical characteristics of the cap once it has been placed. Core chemistry data will be collected to establish a baseline profile of chemicals in various layers of the cap and in the underlying sediment. Cap core chemistry information will also help to quantify the extent of mixing between the cap and underlying sediment that occurred during placement. • Twelve months after completion of cap construction, sediment coring will be conducted to provide information both on the physical characteristics of the cap and underlying sediment (i.e., cap thickness, horizontal coverage, and extent of mixing between layers) and the chemical characteristics of the cap for comparison to baseline data collected immediately after cap construction. Core chemistry data will be collected at a minimum of two locations within the CAD facility to establish a profile of chemicals in various layers of the cap and in the underlying sediment. • Twelve-month core chemistry data will be compared to the baseline chemistry data to determine whether any chemicals are migrating from the underlying sediment into the cap sediment. Because diffusion of chemicals through sediment is a time-dependent process, migration from underlying sediments will be observable first in the deepest layers of the cap. If long-term monitoring reveals increases in chemicals only in surface layers of the cap, it would be indicative of chemicals from sources outside the CAD facility being deposited on the cap surface (rather than migration of chemicals from beneath the cap).
WQ-12	As described in the Draft Operations Management and Monitoring Plan, upon completion of the first year of post-construction monitoring, an adaptive management plan will be developed based on analysis of the data collected during the year. The long-term management plan will be developed based on the existing conditions of the site and current technological developments and will be designed to ensure long-term cap stability and isolation of contaminants. Monitoring requirements, such as timing of the events, will be determined at that time. At a minimum, however, long-term monitoring will include completing bathymetric surveys to rates of erosion and deposition, and coring for chemistry in bulk sediments and porewater. The exact scope and frequency of the long-term monitoring program will be evaluated and developed after the first year of post-construction monitoring data is available and has been reviewed.
WQ-13	The OHD will prepare and submit to the regulatory agencies an annual environmental monitoring report to document and discuss the results of all CAD facility monitoring activities conducted during the previous year. These reports will be completed no later than December 31 of each year and will include a discussion of current and past monitoring data for the site, as well as proposed future monitoring planned for the site.

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Table 2
Environmental Commitments

Environmental Commitment Number	Environmental Commitment
BIOLOGICAL RESOURCES	
BR-1C	Prior to the initial dredging surveillance level surveys for *Caulerpa taxifolia*, an invasive species of green seaweed, will be performed. Surveys shall be completed no earlier than 90 days prior to the commencement of dredging and no later than 30 days prior to the onset of work. The *Caulerpa* survey will be performed by qualified biologists prior to the commencement of the dredging. During the pre-construction *Caulerpa* survey, surveyors will note sensitive habitats if observed. If sensitive habitats are observed, precautions will be employed in order to avoid and minimize impacts to sensitive habitats in coordination with NMFS and CDFG.
HYDROLOGY AND WATER QUALITY	
WQ-1C	If water quality monitoring detects excessive turbidity levels, the following measures may be employed: Increasing cycle time: • Longer cycle time reduces the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket. • Limiting the velocity of the descending bucket reduces the volume of sediment that is picked up and requires more total bites to remove the project material. The majority of the sediment resuspension, for a clamshell dredge, occurs when the bucket hits the bottom. Eliminating multiple bites: • When the clamshell bucket hits the bottom, an impact wave of suspended sediment travels along the bottom away from the dredge bucket. When the clamshell bucket takes multiple bites, the bucket loses sediment as it is reopened for subsequent bites. • Sediment is also released higher in the water column as the bucket is raised, opened, and lowered. Eliminating bottom stockpiling: • Bottom stockpiling of the dredged sediment in silty sediment has a similar effect as multiple bite dredging. • An increased volume of sediment is released into the water column from the operation. Preventing barge overflow: • Instructing the contractor will ensure that the barge will not be allowed to overflow.

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Environmental Commitment Number	Environmental Commitment
WQ-2C	Cap placement at the site shall occur either via split-hull dump scow or hydraulic pump. If a dump scow is used, care must be taken to ensure that the material is released in a controlled manner and that the cap is placed as evenly as possible over the site. This best management practices (BMPs) is recommended to allow for increased bearing capacity of the contaminant surface layer and to minimize the potential for mixing at the interface layer. In the event that sediment is hydraulically dredged and transported via pipeline to the CAD cell, a submerged pipeline and diffuser will be employed to minimize off-site transport of material and to provide the greatest potential for an even cap surface. This can be achieved by using global positioning system (GPS) equipment and depth sounders to monitor the physical location and depth of the diffuser pipe.

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RESULTS OF SEDIMENT SAMPLING AND ANALYSIS

Prepared for

Oxnard Harbor District

333 Ponoma Street

Port Hueneme, California 93041

Prepared by

Anchor Environmental CA, L.P.

28202 Cabot Road, Suite 620

Laguna Niguel, California 92677

November 2007

EXHIBIT NO. 5	
APPLICATION NO.	
CD-016-08	

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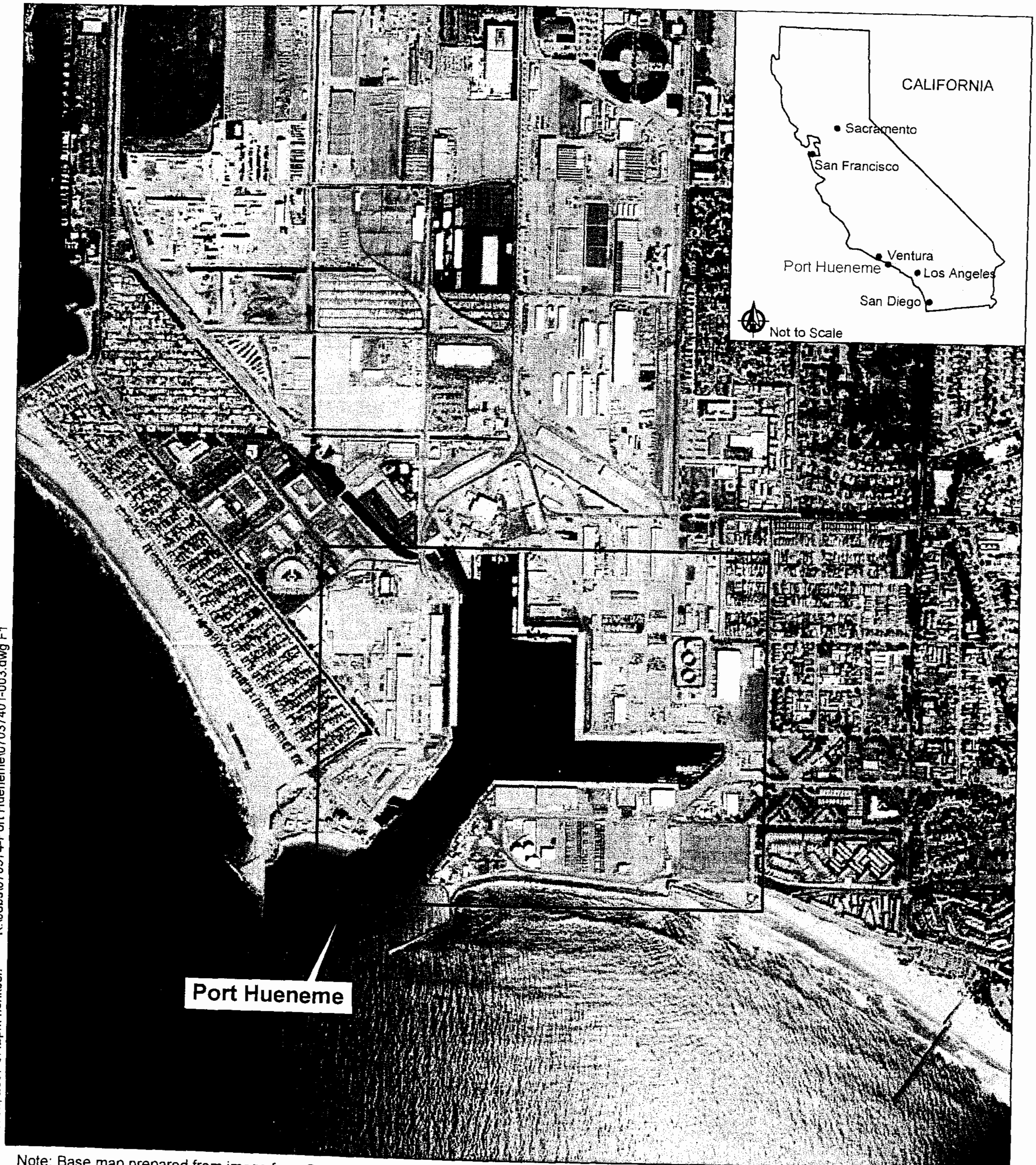
1 INTRODUCTION

This document presents a summary of chemical and conventional sediment data collected by the U.S. Army Corps of Engineers (USACE), U.S. Navy, and the Oxnard Harbor District (OHD) in anticipation of potential dredging projects including maintenance and harbor deepening. The data set includes information from periodic sampling conducted from 1996 until 2007 and includes the Federal Channel, U.S. Navy, and OHD property.

The general project goals for the dredging are to restore full navigational access to Port Hueneme and its infrastructure and to achieve long-term containment of contaminated sediment. The general scope of work for the sampling efforts included collection of physical and chemical data from surface and subsurface sediment core samples to characterize the composition of material within the proposed dredge cuts, evaluate disposal site suitability, and delineate the spatial limits of contamination.

1.1 Project History and Overview

Located approximately 60 miles northwest of Los Angeles along the California coast (Figure 1), the Harbor at Port Hueneme (the Harbor) was constructed between 1939 and 1940 primarily to serve as a point of export for the growing agriculture business in Ventura County. Shortly thereafter in 1942, the U.S. Navy began joint operations in the Harbor. Originally constructed as a temporary depot in the early days of World War II, the Naval Construction Battalion Center at Port Hueneme is a veteran of World War II, the Korean War, the Vietnam War, and Operation Desert Shield/Storm.



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Note: Base map prepared from image from Google Earth Pro, 2007.

0 1/2
Scale in Miles

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Figure 1
Site Location Map
Port Hueneme

Today Port Hueneme (managed by OHD) is the only deep water harbor between Los Angeles and the San Francisco Bay and is the U.S. Port of Entry for California's central coast region. It serves international businesses and ocean carriers from the Pacific Rim and Europe. Port Hueneme ranks among the top seaports in California for general cargo throughput. Its niche markets include the import and export of automobiles, fresh fruit and produce, and forest products. Port Hueneme is the top seaport in the United States for citrus export and ranks among the top 10 ports in the country for automobile and banana imports. In addition, the Port serves a crucial role in ensuring national security as a result of its use by the U.S. Navy.

Maintaining active operation of the Port requires full use of the berth areas, which necessitates maintenance dredging to remove sediments that accumulate over time as a result of natural coastal processes. The berths at the Port were last dredged more than 10 years ago and have since accumulated between 2 and 12 feet of sediment along the wharf faces. This "maintenance material" was chemically characterized and found to be unsuitable for open-ocean or beach disposal due to elevated concentrations of pesticides and polychlorinated biphenyls (PCBs).

The U.S. Navy is experiencing similar issues related to sedimentation along its berth faces with significant accumulations of contaminated sediments that have begun to affect vessel operations. The contaminated sediments along the U.S. Navy's berths extend from the wharf face outward to the edge of the Federal Channel. The U.S. Navy recently conducted an intensive sediment sampling and characterization effort to determine the nature and extent of contaminants within their areas of responsibility.

USACE is responsible for maintaining safe navigable depths within the Federal Channel in Port Hueneme, which includes the Approach Channel, Entrance Channel, and Turning Basin. Investigations conducted between 1996 and 2002 identified three areas of contaminated sediment within the Federal Channel.

After many years of sediment chemistry data collection by the U.S. Navy, OHD, and USACE, the surface and subsurface sediment within the Harbor has been very thoroughly characterized. Figure 2 depicts the locations of the combined 110 individual locations where sediment samples have been collected and analyzed between 1996 and 2007. Once the nature and extent of sediment contamination had been thoroughly established, the OHD began working to develop a regional solution for contaminated sediment management. The concept of creating a confined aquatic disposal (CAD) cell in Port Hueneme was initially proposed by USACE over 2 years ago but was not developed further until now. Geotechnical field data was collected to allow evaluation of the subsurface conditions and soil types within the Harbor to determine whether development of a CAD would be feasible. Collectively, the contaminated sediments from all three areas of Port Hueneme total approximately 215,300 cubic meters (Figure 3).

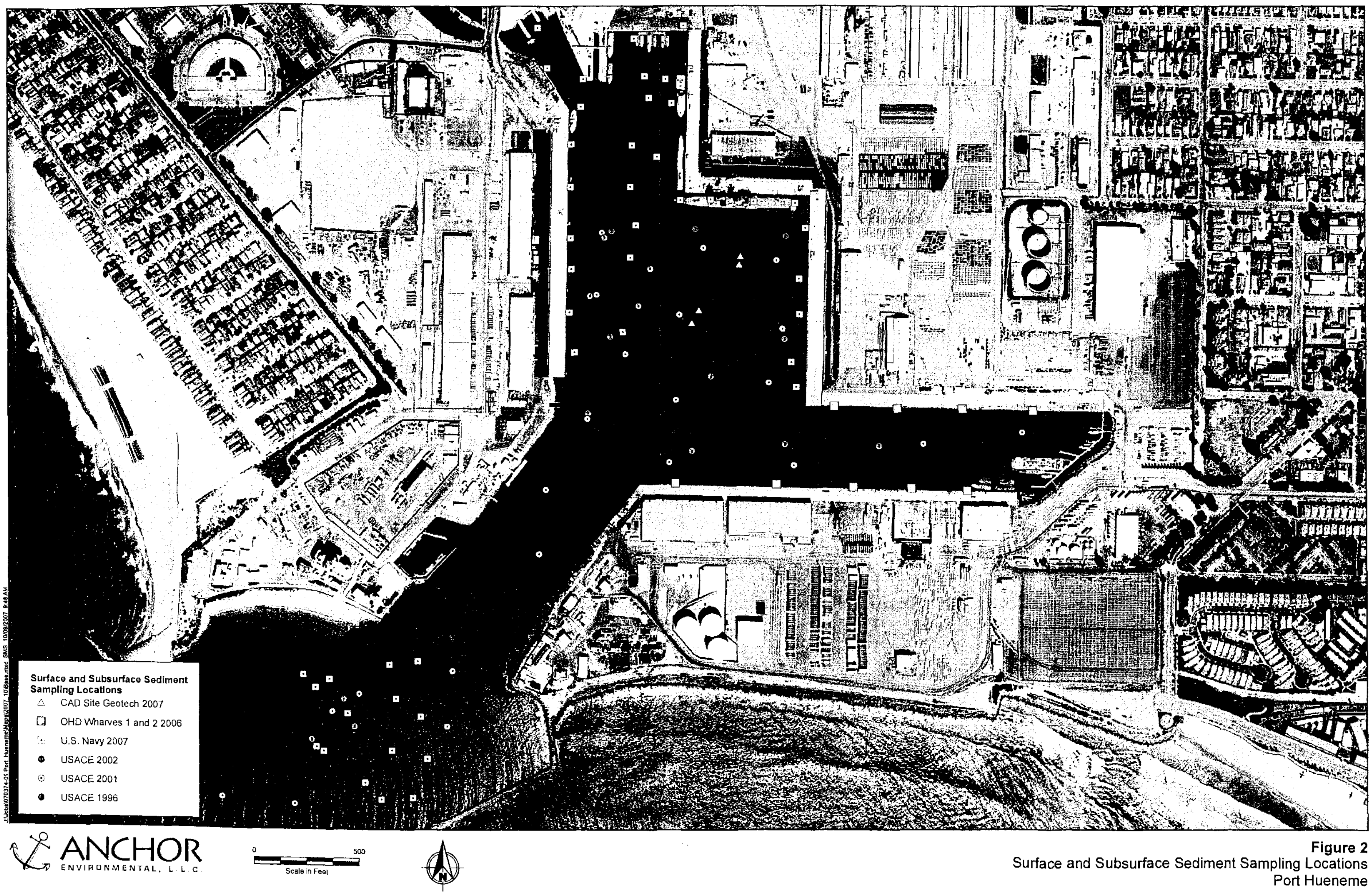

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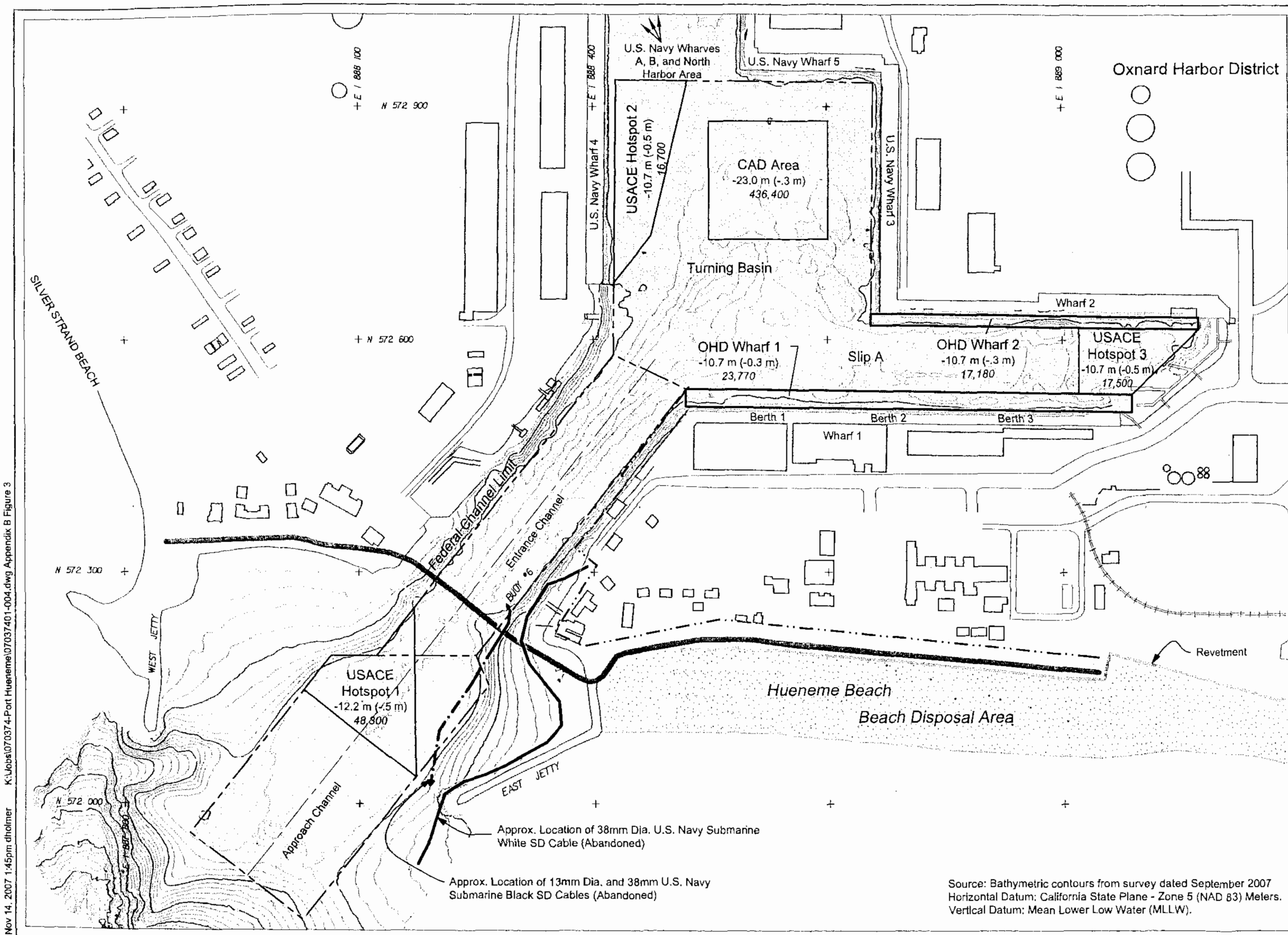
Figure 2
Surface and Subsurface Sediment Sampling Locations
Port Hueneme



Area to be Dredged

CAD Area — Dredge Area
-23.0 m (-.3 m) — Target Depth (Allowable Overdepth)
436,400 — Volume in Cubic Meters

Summary of Estimated Contaminated Sediment Volumes (to be Contained in CAD)

Contaminated Sediment Location	Volume (m³)
OHD Wharf 1	23,770
OHD Wharf 2	17,180
U.S. Navy Areas	91,800
USACE Hotspot 1	48,300
USACE Hotspot 2	16,700
USACE Hotspot 3	17,500
Approximate Total Contaminated Sediment Volume	215,300

0 100
Scale in Meters

Nov 14, 2007 1:45pm dholmer K:\Jobs\070374-Port Hueneme\07037401-004.dwg Appendix B Figure 3

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Figure 3
Projet Area Site Plan
Port Hueneme

2 SEDIMENT CHARACTERIZATION RESULTS

2.1 Geotechnical Field Investigation

In order to evaluate subsurface conditions in the area of the proposed CAD, the OHD commissioned five additional geotechnical explorations in 2007 around and within the projected CAD footprint. These five explorations indicated subsurface conditions similar to those indicated by borings along the eastern side of the Harbor's entrance in 1965. Subsurface materials in the proposed CAD area consist largely of dense, slightly silty to silty, medium to fine sand within occasional thin (less than 1 foot thick) clay layers.

Selected samples were submitted to a geotechnical testing laboratory for testing of grain-size distribution and Atterberg Limits. Laboratory testing of composite samples indicated a sand content of 92 to 93 percent by weight, which is very similar to the composition of local beach sands. Testing of samples from Hueneme Beach conducted in 2001 indicated a median sand content of 90 percent (Moffat and Nichol 2001).

Chemical analyses were not conducted on this sediment because it is virgin material not exposed to external sources of pollutants such as anthropogenic discharges or groundwater upwelling that could cause contamination (United Water 2001 and 2003). This determination is consistent with the U.S. Environmental Protection Agency's (EPA's) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 California Federal Regulation [CFR] Part 230), generally known as the 404(b)(1) Guidelines. These guidelines state that material composed primarily of sand is likely to be free of pollutants and may be determined suitable for discharge without additional testing. This material is therefore considered to be suitable for placement on local beaches for sand nourishment.

2.2 OHD Wharves 1 and 2

Table 1 summarizes the chemical and conventional analytical results for OHD Wharves 1 and 2 area composites. Only compounds for which target analytes were detected above the reporting limits in the Sampling and Analysis Plan are listed in the table.

Arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc were detected in the composited samples at reportable levels. Of those, only copper minimally exceeded the individual effects range low (ER-L) at the Wharf 2 deepening composite.

No pesticides were detected other than DDT and its derivatives (reported as Total DDT). Both maintenance composites exceeded the ER-L for Total DDTs, and the Wharf 1 deepening composite exceeded the effects range median (ER-M) and the bioaccumulation trigger value. Tributyltin (TBT) exceeding the bioaccumulation trigger value established by Meador et al. (2002) was reported at both maintenance composites and again at the Wharf 1 deepening composite. Total PCBs at Wharf 2 maintenance exceeded the ER-L; Total PCBs at Wharf 1 Deepening exceeded the ER-L and bioaccumulation trigger value. Total polyaromatic hydrocarbon (PAH) concentrations exceeded the ER-L at both maintenance composites and the Wharf 1 deepening composite.

The presence of impacted sediment in the Wharf 1 deepening composite, and the most elevated PCB, TBT, and DDT values, is likely due to the presence of some maintenance type material below the -37 feet mean lower low water (MLLW) differentiation between maintenance and deepening. Material below -37 feet MLLW that based on physical and visual inspection was clearly maintenance type would represent the oldest, and inherently most impacted, sediments in the proposed dredging areas.

Table 2 explains the ER-L, ER-M, and bioaccumulation trigger values used for evaluation of suitability for the results. Bioaccumulation trigger values (i.e., the value above which tissue residue accumulation is expected to occur and lead to food web effects) were derived from the USACE's Trophic Trace model for dichlorodiphenyltrichloroethane (DDT) and PCBs. The bioaccumulation trigger value for TBT was derived from Meador et al. (2002).

Table 1
Summary of Chemical and Conventional Analytical Results for Sediment Samples

Site Name	Wharf 1 Maintenance	Wharf 1 Deepening	Wharf 2 Maintenance	Wharf 2 Deepening	Receiver Beach
Composite ID	PH-CS-01-M	PH-CS-01-D	PH-CS-02-M	PH-CS-02-D	PH-RB
Sample Date	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006
Total Organic Carbon (%)	0.4	0.55	0.77	0.22	0.02
Grain Size (%)					
Gravel	0.00	0.00	0.00	0.00	0.00
Sand	61.23	48.04	40.28	36.25	100.00
Silt	30.88	41.46	46.98	45.89	0.00
Clay	7.88	10.50	12.74	17.85	0.00
Fines (Silt and Clay)	38.77	51.96	59.72	63.75	0.00
Metals (mg/kg)					
Arsenic	3.5	5.1	6.4	4.3 1	1.5
Cadmium					
Chromium	16.7	19.8	20.8	11.4	4.5
Copper	28	28.6	10	**47.5**	1.6
Lead	19.1	16.7	22.4	4	2
Mercury	0.07	0.09	0.12	0.02	0
Nickel	11.2	14	13.8	9.7	3.1
Selenium					
Silver	0.35	0.5	0.5	0.5	0.3
Zinc	59	69	31	94.4	8.6
TBT (µg/kg)	**398** 2	**592** 2	**536** 2	2	
Total PAHs (µg/kg)	**17,015** 1	**7,086** 1	**15,680** 1	249	15
Total DDT (µg/kg)	**4.4** 1	**48.6** 4	**18.6** 1	0	0
Total PCBs (µg/kg)	18.2	**128.8** 3	**90.45** 1	0	0

Notes:

1	Exceeds ER-L Screening Value
2	Exceeds Bioaccumulation Trigger Value
3	Exceeds both ER-L and Bioaccumulation Trigger Value
4	Exceeds both ER-M and Bioaccumulation Trigger Value

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram

Table 2
Bioaccumulation Trigger, ER-L, and ER-M Used for Evaluation of Suitability

Analyte	Units	Bioaccumulation Trigger Value (ppb)	Sediment Quality Guidelines	
			ER-L	ER-M
Chromium	mg/kg	–	81	370
Copper	mg/kg	–	34	270
Lead	mg/kg	–	46.7	218
Mercury	mg/kg	–	0.15	0.71
Nickel	mg/kg	–	20.9	51.6
Silver	mg/kg	–	1	3.7
Zinc	mg/kg	–	150	410
Total DDT	µg/kg	38.9	1.58	46.1
TBT	µg/kg	36.0		
Total PCBs	µg/kg	89.6	22.7	180
Total PAHs	µg/kg		4,022	44,792

Notes:
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
ppb = parts per billion

Results of the sampling indicate that proposed maintenance dredging material is not suitable for unconfined placement either in water or on the beach due primarily to elevated TBT levels. Maintenance dredging material should be placed either in a confined nearshore application (CAD) or transported to a permitted upland fill. This material is not considered hazardous waste under Title 22 requirements.

Wharf 1 deepening elevation analyses were skewed by the presence of maintenance type material below the -37 feet MLLW differentiation between maintenance and deepening. In fact, maintenance type sediments below -37 feet MLLW would inherently be the oldest materials to settle in the Harbor since original construction at Wharf 1, and therefore are likely the most impacted by pollutants based on improvements over time in best management practices (BMPs) and increasingly stringent regulations. Sediments below the maintenance type material were clean, light-colored coarse grain sand with the appearance of virgin material that should be suitable for beach placement. Wharf 2 deepening materials were determined to be uncontaminated and high in clay content, and thus suitable for unconfined aquatic disposal. For purposes of further planning, all materials of the maintenance type, whether above or below -37 feet MLLW, should be treated as a single dredging unit and treated accordingly. This would result in removal of material below -37 feet MLLW at Wharf 1.

2.3 USACE Federal Channel

Sediment chemistry data collected by the USACE in 1996, 2001, and 2002 is presented in Tables 3 through 5. In 1996, mercury exceeded the ER-L at one sample point and TBT exceeded the bioaccumulation trigger value discussed on the previous section at multiple sample locations. Arsenic, chromium, copper, lead, nickel, silver, and zinc were detected in the samples at reportable levels that did not exceed the ER-L. In 2001, cadmium was detected at levels exceeding the ER-L at two locations while TBT concentrations exceeded the bioaccumulation value at one of the sample points. DDT was detected at levels above the ER-L at all but one sample point while PAHs exceeded the ER-L at only one sample point. Total PCBs exceeded the ER-L at all sample points and in one case exceeded the ER-M and bioaccumulation trigger value. Samples collected in 2002 revealed levels of DDT exceeding the ER-L at seven of 14 sample points. PCBs were detected at levels exceeding the ER-M and bioaccumulation trigger value at five points. PCBs exceeded the ER-L and bioaccumulation trigger value at one point.

Results of the USACE sampling indicate that proposed maintenance dredging material is not suitable for unconfined placement either in water or on the beach due primarily to elevated TBT, DDT, and PCB levels. Maintenance dredging material should be placed either in a confined nearshore application (CAD) or transported to a permitted upland fill. This material is not considered hazardous waste under Title 22 requirements.

Table 3
1996 USACE Sediment Data

Analyte	Units	Sediment Quality Guidelines (SQGs) ERL	ERM	SL	ML	DCH96-01 Diver Core Sample	DCH96-02 Diver Core Sample	DCH96-03 Diver Core Sample	DCH96-04 Diver Core Sample	DCH96-05 Diver Core Sample	DCH96-06 Diver Core Sample	DCH96-07 Diver Core Sample	DCH96-08 Diver Core Sample	DCH96-09 Diver Core Sample	DCH96-10 Diver Core Sample	DCH96-11 Diver Core Sample	DCH96-12 Diver Core Sample
		(Long et al. 1990)		(PSDDA 1998)													
Total Organic Carbon (dry weight)	%					6.4	0.727	0.619		0.4	7.93	4.52	4.51	5.91	0.5	3.73	6.47
Metals																	
Antimony (Sb)	µg/kg			150,000	200,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Arsenic (As)	µg/kg	8,200	70,000	57,000	700,000	3,000	960	2,100	960	5,200	2,500	1,800	1,400	2,500	2,300	1,800	2,600
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	340	140	340	340	870	300	260	180	270	270	250	470
Chromium (Cr)	µg/kg	81,000	370,000			13,500	5,600	12,300		21,600	10,300	8,900	7,000	11,700	9,000	8,400	12,100
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	6,900	3,100	12,300		31,300	14,300	8,100	5,500	13,100	15,100	9,300	15,600
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	120	90	140		80	120	3,700	2,400	4,400	7,300	6,200	9,300
Mercury (Hg)	µg/kg	150	710	410	2,300	1,200	90	140		310	120	110	100	100	100	100	150
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	9,300	4,000	6,900		12,900	6,100	5,100	4,000	7,100	5,400	5,300	7,400
Selenium (Se)	µg/kg					0	0	0	0	0	0	0	0	0	0	0	0
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400	0	0	0	0	0	130	0	0	0	0	0	0
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	29,200	11,200	30,500		71,500	30,300	22,900	16,200	30,700	22,300	24,900	3,800
Tributyltin*	µg/kg			36		[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	ND	[redacted]	ND	[redacted]	[redacted]	[redacted]
Total PAHs	µg/kg	4,022	44,792			0	0	0	0	94	86	0	72	75	21	0	210
Total DDT	µg/kg	1.58	46.1	6.9	69	5	5	5	5	5	5	5	5	5	5	5	5
Total PCB Congeners	µg/kg	22.7	180	130	3,100	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND

Notes:

µg/kg = micrograms per kilogram (dry weight unless noted)

ND = not detected at or above lowest MRL value for the particular compound(s) of interest

NT = not tested

Total DDT = sum of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Total PCB Congeners = sum of mono- through decachlorobiphenyl compounds

Total PAHs = sum of sixteen named compounds

*Tributyltin (interstitial water)

Exceeds ER-L Screening Value

[redacted]

INTERPRETATION GUIDE:

Mercury exceeds the ER-L Screening Value in DCH96-01 Diver Core Sample

Tributyltin exceeds the Bioaccumulation Trigger Value in all Diver Core Samples except for DCH96-04, DCH96-07, and DCH96-09

Table 4
2001 USACE Sediment Data

Analyte	Units	Sediment Quality Guidelines (SQGs) ERL	ERM	SL	ML	DCPH01-01 Diver Core Sample	DCPH01-02 Diver Core Sample	DCPH01-03 Diver Core Sample	DCPH01-04 Diver Core Sample	DCPH01-05 Diver Core Sample	DCPH01-06 Diver Core Sample	DCPH01-07 Diver Core Sample	DCPH01-08 Diver Core Sample	DCPH01-09 Diver Core Sample	DCPH01-10 Diver Core Sample	DCPH01-11 Diver Core Sample	DCPH01-12 Diver Core Sample
		(Long et al. 1999)		(PSDDA 1998)													
Total Organic Carbon (dry weight)	%					0.75	0.49	0.36	0.48	0.13	0.16	0.8	0.43	0.44	0.39	0.17	0.19
Metals																	
Antimony (Sb)	µg/kg			150,000	200,000	ND	ND	ND	3 UN	3.21 UN	3.18 UN	3.54 UN	3.2 UN	3.5 UN	3.2 UN	3.64 UN	3.15 UN
Arsenic (As)	µg/kg	8,200	70,000	57,000	700,000	5,600	2,800	4,000	2,900	2,800	2,200	3,100	3,400	1,200	3,700	1,500	1,500
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	1,100	500	500	700	850	790	1,510	1,130	1,110	960	880	1,220
Chromium (Cr)	µg/kg	81,000	370,000			22,500	9,900	13,800	11,400	8,800	9,900	18,000	16,200	5,800	14,300	9,700	11,700
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	23,600	9,600	16,000	10,700	6,600	7,800	15,100	16,400	4,400	14,600	5,600	8,100
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	12,600	5,200	7,700	6,500	5,200	7,500	15,000	14,500	4,700	12,900	6,400	6,200
Mercury (Hg)	µg/kg	150	710	410	2,300	60	30	40	40	20	30	20	50	30	50	20	30
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	17,900	10,600	13,300	26,800	10,400	9,020	16,700	14,000	5,600	11,800	8,470	10,100
Selenium (Se)	µg/kg																
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400	600 U	500 U	500 U	500 U	540 U	530 U	590 U	530 U	580 U	530 U	610 U	530 U
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	67,100	30,300	44,500	34,400	25,100	27,200	48,200	51,200	16,600	43,900	24,400	30,100
Tributyltin*	µg/kg			36		4.1	1.6	1.3	1.9	1.3	1.5	1.2	0.8	2.7	28	1.2	12
Total PAHs	µg/kg	4,022	44,792			1,996	804	437	39,798	290	241	79	785	158	799	122	692
Total DDT	µg/kg	1.58	46.1	6.9	69	14.8	7.1	3.1	12.6	3.1	2.8	2.8	9.6	2.6	9.9	1.5	4.1
Total PCB Congeners	µg/kg	22.7	180	130	3,100	[illegible]	70.7	32.9	77.4	12.9	24.7	11.9	64.1	18.9	66.3	18.5	24.1

Notes:
µg/kg = micrograms per kilogram (dry weight nless noted)
ND = not detected at or above lowest MRL vale for the particlar compond(s) of interest
NT = not tested
Total PCB Congeners = sm of mono- throgh decachlorobiphenyl componds
Total PAHs = sm of sixteen named componds
*Tribtyltin (interstitial water)
Total DDT = sm of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT
Bulk Sediment Chemistry results for DCPH01-21 through DCPH01-25 are not part of area to be dredged for year 2001.
Exceeds ER-L Screening Value
[illegible]

INTERPRETATION GUIDE:

Cadmium exceeds the ER-L Screening Value in DCPH01-07 and DCPH01-12 Diver Core Samples

Total PAHs exceed the ER-L Screening Value in DCPH01-04 Diver Core Sample

Total DDT exceeds the ER-L Screening Value in all Diver Core Samples except DCPH01-11 Diver Core Sample

Total PCB Congeners exceed both the ER-L and Bioaccumulation Trigger Values in DCPH01-01 Diver Core Sample

Total PCB Congeners exceed the ER-L Screening Value in all Diver Core Samples

Table 4
2001 USACE Sediment Data

Analyte	Units	DCPH01-13 Diver Core Sample	DCPH01-14 Diver Core Sample	DCPH01-15 Diver Core Sample	DCPH01-16 Diver Core Sample	DCPH01-17 Diver Core Sample	DCPH01-18 Diver Core Sample	DCPH01-19 Diver Core Sample	DCPH01-20 Diver Core Sample
Total Organic Carbon (dry weight)	%	0.5	0.44	0.31	0.66	0.79	0.26	0.64	0.39
Metals									
Antimony (Sb)	µg/kg	3 UN	3 UN	3 UN	3.13 UN	3.25 UN	3.1 UN	3.34 UN	3.12 UN
Arsenic (As)	µg/kg	3,700	4,200	4,000	1,700	2,800	2,600	4,000	2,900
Cadmium (Cd)	µg/kg	600	500	700	1,070	740	520	1,030	520
Chromium (Cr)	µg/kg	13,300	17,300	14,000	10,000	10,800	11,300	20,400	12,000
Copper (Cu)	µg/kg	14,900	23,100	10,400	6,300	5,300	4,800	11,900	5,700
Lead (Pb)	µg/kg	10,000	7,800	6,400	6,600	6,700	6,300	12,300	7,400
Mercury (Hg)	µg/kg	50	30	30	30	20	20	30	20
Nickel (Ni)	µg/kg	11,300	13,800	12,700	9,130	9,150	9,330	15,700	10,700
Selenium (Se)	µg/kg								
Silver (Ag)	µg/kg	500 U	500 U	500 U	520 U	540 U	520 U	560 U	520 U
Zinc (Zn)	µg/kg	43,600	52,800	37,600	27,900	25,000	24,300	49,900	30,400
Tributyltin*	µg/kg	21	[redacted]	3.9	2.4	2	0.8	3	1.3
Total PAHs	µg/kg	2,047	1,957	648	257	94	102	512	106
Total DDT	µg/kg	10.7	6.4	9.8	8	9	4.4	38	6
Total PCB Congeners	µg/kg	62.5	29.7	78.89	81.3	43	16.2	[redacted]	18.7

INTERPRETATION GUIDE:

Tributyltin exceeds the Bioaccumulation Trigger Value in DCPH01-14 Diver Core Sample

Total DDT exceeds the ER-L Screening Value in all Diver Core Samples

Total PCB Congeners exceeds both the ER-M and Bioaccumulation Trigger Value in DCPH01-19 Diver Core Sample

Total PCB Congeners exceeds the ER-L Screening Value in all Diver Core Samples

Table 5
2002 USACE Sediment Data

Analyte		Sediment Quality Guidelines (SQGs) ERL	ERM	SL	ML	DCPH-02-1A Diver Core Sample	DCPH-02-1B Diver Core Sample	DCPH-02-2A Diver Core Sample	DCPH-02-2B Diver Core Sample	DCPH-02-3A Diver Core Sample	DCPH-02-3B Diver Core Sample	DCPH-02-4A Diver Core Sample	DCPH-02-4B Diver Core Sample	DCPH-02-5A Diver Core Sample	DCPH-02-5B Diver Core Sample	DCPH-02-6A Diver Core Sample	DCPH-02-6B Diver Core Sample	DCPH-02-7A Diver Core Sample	DCPH-02-7B Diver Core Sample
		(Long et al. 1999)		(PSDDA 1998)															
Total Organic Carbon (dry weight)	%					0.57	0.29	0.23	0.08	0.42	0.17	0.15	0.06	0.51	0.27	0.62	0.42	0.26	0.17
Metals																			
Antimony (Sb)	µg/kg			150,000	200,000	3,400 UN	3,600 UN	3,100 UN	3,700 UN	3,400 UN	3,600 UN	3,200 UN	3,100 UN	3,300 UN	3,600 BN	3,100 UN	3,500 UN	3,300 UN	3,100 UN
Arsenic (As)	µg/kg	8,200	70,000	57,000	700,000	4,100	1,600 B	2,700	700 B	4,100	1,200 B	700 B	700 B	3,200	3,200	4,200	3,700	2,100 B	1,600 B
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	600 B	600 U	900 B	600 U	600 U	600 U	500 U	500 U	500 U	500 U	500 U	600 U	500 U	500 U
Chromium (Cr)	µg/kg	81,000	370,000			16,500	5,200	12,100	7,500	17,300	5,700	5,600	5,300	13,600	10,300	20,000	15,300	11,200	8,100
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	27,000	5,500	13,300	7,400	25,900	5,200	6,800	3,000	11,300	8,500	17,600	11,500	7,400	5,400
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	16,600	5,000 U	6,000 B	5,000 U	13,500	5,000 U	4,000 U	4,000 U	600 B	9,000 B	11,300	9,000 B	5,000 B	4,000 U
Mercury (Hg)	µg/kg	150	710	410	2,300	110	20 B	50	20 B	100	50	20 B	20	30	20	60	30	20	20
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	13,600	5,800	8,900	6,900	15,600	4,500 B	6,500	5,100	11,300	9,700	17,800	14,900	8,100	7,400
Selenium (Se)	µg/kg					600 U	600 U	500 U	600 U	600 U	600 U	500 U	500 U	500 U	500 U	500 U	600 U	600 U	500 U
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400	1,200 B	600 U	1,100 B	700 B	700 B	600 U	500 U	600 B	700 B	900 B	900 B	600 B	700 B	900 B
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	69,800	20,100	39,900	24,300	84,100	17,800	22,100	13,700	42,100	36,000	57,600	47,200	32,100	24,700
Tributyltin*	µg/kg			36		9.7 P	1.3 U	4.2	1.3 U	5.1 UI	1.2 U	3.2	1.3 U	1.1 J	2.7	5.0	4.8	1.2 JP	1.3 U
Total PAHs	µg/kg	4,022	44,792			2,247	0	932	17	1,858	0	278	0	1,594	416	784	420	0	0
Total DDT and derivatives	µg/kg	1.58	46.1	6.9	69	17.5	0.0	9.2	0.6	15.9	0.58	1.6	0.0	0.0	0.0	24.5	0.0	8.1	12.5
Total PCB Congeners	µg/kg	22.7	180	130	3,100	[redacted]	0	95	9.6	[illegible]	0	15.9	0	[redacted]	[redacted]	[redacted]	[redacted]	42.9	57

Notes:

µg/kg = micrograms per kilogram (dry weight nless noted)

ND = not detected at or above lowest MRL vale for the partiular compond(s) of interest

NT = not tested

Total PCB Congeners = sum of mono- throgh decachlorobiphenyl componds

Total PAHs = sum of sixteen named componds

*Tributyltin (interstitial water)

Total DDT = sum of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Exceeds ER-L Screening Value

[redacted]

INTERPRETATION GUIDE:

Silver exceeds the ER-L Screening Value in DCPH-02-1A and DCPH-02-2A Diver Core Samples

Total DDT and derivatives exceeds the ER-L Screening Value in DCPH-02-1A, 02-2A. 02-3A, 02-4A, 02-6A, 02-7A, and 02-7B Diver Core Samples

Total PCB Congeners exceed the ER-L Screening Value in DCPH-02-2A, 02-7A, and 02-7B Diver Core Samples; exceed both the ER-L and Bioaccumulation Trigger Value in DCPH-02-3A Diver Core Sample; and exceed both the ER-M and Bioaccumulation Trigger Value in DCPH-02-1A, 02-5A, 02-5B, 02-6A, and 02-6B Diver Core Samples.

2.4 U.S. Navy

In 2007 the U.S. Navy collected sediment chemistry data from 46 sample locations within the Harbor. Subsurface sediment cores were collected and subsampled at two depths within each sediment core. For ease of presentation in this summary report, the chemistry data within each sample core were averaged to obtain "mathematical composite" data for each sample location. Thus, the data presented in Table 6 represents the integration of contaminant levels between subsurface depths at each sample location.

The U.S. Navy's sampling revealed the presence of TBT and PAHs exceeding screening values at several sample locations. DDT was detected at levels exceeding the ER-L and bioaccumulation trigger values at a majority of sample locations and exceeding the ER-M and bioaccumulation trigger value at almost 25 percent of the locations. Concentrations of PCBs were also found to exceed the ER-M and bioaccumulation trigger values at 25 percent of the sites. Levels of PCBs exceeded the ER-L or bioaccumulation trigger values at almost half the sites. Cadmium, copper, mercury, lead, nickel, and zinc exceeded ER-L values at several locations as well.

Results of the U.S. Navy's sampling indicate that proposed maintenance dredging material is not suitable for unconfined placement either in water or on the beach due primarily to elevated TBT, DDT, and PCB levels. Maintenance dredging material should be placed either in a confined nearshore application (CAD) or transported to a permitted upland fill. This material is not considered hazardous waste under Title 22 requirements.

Table 6
2007 U.S. Navy Sediment Data

Analyte	Units	ERL (Long et al. 1990)	ERM (Long et al. 1990)	SL (PSDDA 1998)	ML (PSDDA 1998)	HSS19-02	HSS19-03	HSS19-04	HSS19-06	HSS19-07	HSS19-08	HSS19-09	HSS19-11	HSS19-12	HSS19-13	HSS19-14	HSS19-15	HSS19-16	HSS19-17	HSS19-18
		Sediment Quality Guidelines (SQGs)				Sample Points														
Metals																				
Antimony (Sb)	µg/kg			150,000	200,000	510	90	905	180	105	115	230	100	195	305	290	345	385	295	260
Arsenic (As)	µg/kg	8,200	7,000	57,000	700,000	4750	1700	1950	1050	975	1915	3850	2525	4715	6030	7550	4990	9035	8300	3750
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	1765	204	263	228.5	204.5	298	394	346	858	525.5	773.5	501	893.5	922.5	414.5
Chromium (Cr)	µg/kg	81,000	370,000			20050	5355	6920	6225	6580	9640	17610	11000	21300	23200	27950	18950	33100	28400	15570
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	56500	6205	22900	5370	400	350	39400	400	13550	54150	68200	29100	137550	72700	71500
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	54200	27200	9620	3970	5950	6340	15030	4465	16000	20935	26300	14885	32250	37500	10525
Mercury (Hg)	µg/kg	150	710	410	2,300.0	[illegible]	34.5	31.5	20	20	32.5	77.5	25	84.5	77	124.5	63	137.5	333	51
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	15000	5630	6740	6665	6625	9475	13395	9980	19300	18300	23800	15750	25550	21900	14405
Selenium (Se)	µg/kg					310	450	245	230	195	165	85	265	525	355	370	350	405	390	315
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400.0	236.5	41	55.5	29.5	36	57.5	120.5	41.5	121	155.5	205	123	244	246	99.5
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	147500	28150	103200	19150	23750	31450	79500	26400	69400	107800	144600	80500	232500	171000	62250
Tributyltin*	µg/kg			36		[illegible]	3.355	9.8	1.3	1.025	1.3	19.35	1.3	0.95	19.25	19.75	10.05	28	[illegible]	8.94
Total PAHs	µg/kg	4,022	44,792			8,323.55	245.165	205.775	13.6	497.285	1,219.18	1,118.78	13.545	1,455.20	1,916.32	3,856.75	1,118.64	2,898.70	7,591.45	942.655
Total DDT	µg/kg	1.58	46.1	6.9	69	[illegible]	5.725	1.47	3.39	[illegible]	6.25	[illegible]	6	2619	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	26
Total PCB Congeners	µg/kg	22.7	180	130	3,100	[illegible]	23.96	11.72	14.57	39.4	14.91	[illegible]	18	67.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	80.09
Total Organic Carbon (dry weight)						16,600	4,200	3,050	2,350	3,350	3,850	9,750	4,150	10,300	13,650	15,150	8,650	18,700	16,600	6,900

Notes:

µg/kg = micrograms per kilogram (dry weight unless noted)

ND = not detected at or above lowest MRL value for the particular compound(s) of interest

*Tributyltin (interstitial water)

Total DDT = sum of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Total PCB Congeners = sum of mono- through decachlorobiphenyl compounds

Total PAHs = sum of sixteen named compounds

Concentrations of analytes were derived by mathematically compositing results from samples taken at different depths within each core.

Exceeds ER-L Screening Value

[illegible]

INTERPRETATION GUIDE:

Cadmium exceeds the ER-L Screening Value in HSS19-02

Copper exceeds the ER-L Screening Value in HSS19-02, 19-13, 19-14, 19-16, 19-17, and 19-18

Lead exceeds the ER-L Screening Value in HSS19-02

Mercury exceeds the Bioaccumulation Trigger Value in HSS19-02 and the ER-L in HSS19-17

Nickel exceeds the ER-L Screening Value in HSS19-16 and 19-17

Zinc exceeds the ER-L Screening Value in HSS19-19 and 19-17

Tributyltin exceeds the Bioaccumulation Trigger Value in HSS19-02 and 19-17

Total PAHs exceed the ER-L Screening Value in HSS19-02 and 19-17

Total DDT exceeds the ER-L Screening Value in HSS19-03, 19-06, 19-08, and 19-11; exceeds the ER-L and Bioaccumulation Trigger Value in HSS19-07, 19-09, 19-12, and 19-18; and exceeds the ER-M and Bioaccumulation Trigger Value in HSS19-02 and HSS19-13 through 19-17

Total PCB Congeners exceed the ER-L Screening Value in HSS19-03, 19-07, 19-12, and 19-18; Exceed the Bioaccumulation Trigger Value in HSS19-09 and 19-13; and exceeds the ER-M and Bioaccumulation Trigger Value in HSS19-02 and HSS19-14 through 19-17

Table 6
2007 U.S. Navy Sediment Data

Analyte	Units	HSS19-19	HSS19-20	HSS19-21	HSS19-22	HSS19-23	HSS19-24	HSS19-25	HSS19-26	HSS19-27	HSS19-28
Metals											
Antimony (Sb)	µg/kg	310	230	290	225	285	260	340	335	245	255
Arsenic (As)	µg/kg	6300	2450	5100	3400	17200	4960	9240	7850	2955	5590
Cadmium (Cd)	µg/kg	536.5	726.5	649.5	820.5	487.5	626.5	693.5	811.5	354.5	717
Chromium (Cr)	µg/kg	25900	14380	22450	11950	20570	20250	21400	30150	13050	15700
Copper (Cu)	µg/kg	121250	18835	42000	16970	123700	37250	57500	91850	17050	53000
Lead (Pb)	µg/kg	19800	52180	44900	9705	20685	19250	24250	27850	8290	18800
Mercury (Hg)	µg/kg	69	87	147	63.5	82	154	114.5	173.5	47.5	125
Nickel (Ni)	µg/kg	19400	10835	17250	10350	15940	18400	17500	23200	12385	13850
Selenium (Se)	µg/kg	535	85	85	80	285	355	175	420	280	105
Silver (Ag)	µg/kg	149.5	96	167	68	142.5	212.5	141.5	222.5	88	133.5
Zinc (Zn)	µg/kg	116150	58800	112600	56550	108500	108000	109850	137500	53650	73700
Tributyltin*	µg/kg	24	2.85	12.23	1.3	18.55	9.1	10.2	16.05	29.2	21.15
Total PAHs	µg/kg	2,767.65	1,371.72	2,363.70	899.18	6,105.37	3,168.35	2,898.75	10,355.35	480.235	2,344.95
Total DDT	µg/kg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total PCB Congeners	µg/kg	[illegible]	[illegible]	[illegible]	70.75	[illegible]	[illegible]	[illegible]	[illegible]	59.85	[illegible]
Total Organic Carbon (dry weight)		14,450	7,000	11,950	8,200	10,850	11,600	13,300	13,050	8,850	8,700

Analyte	Units	HSS19-29	HSS19-30	HSS19-31	HSS19-32	HSS19-33	HSS19-34	HSS19-35	HSS19-36	HSS19-37	HSS19-38
Metals											
Antimony (Sb)	µg/kg	290	180	215	340	235	195	60	85	115	155
Arsenic (As)	µg/kg	7200	4325	6660	5850	5515	3500	2400	1800	2600	2850
Cadmium (Cd)	µg/kg	936.5	379	586.5	726	536.5	348	112	225.5	231.5	368
Chromium (Cr)	µg/kg	28900	13050	20150	31300	17000	16100	6960	10950	10150	12530
Copper (Cu)	µg/kg	58800	13550	40700	42450	37950	25200	2800	5300	6550	9800
Lead (Pb)	µg/kg	36250	9400	23500	113700	36050	15820	2300	4740	4825	5455
Mercury (Hg)	µg/kg	163	48.5	94	149	111	83.5	11	20	14	17.5
Nickel (Ni)	µg/kg	22600	12400	16500	20650	13950	12600	8570	10850	10195	13415
Selenium (Se)	µg/kg	685	215	210	355	305	220	110	140	210	375
Silver (Ag)	µg/kg	203	89.5	143	216	139	104.5	12	40	39	58
Zinc (Zn)	µg/kg	129500	56700	110500	114500	99950	56700	14400	26500	27250	38300
Tributyltin*	µg/kg	26.5	[illegible]	[illegible]	[illegible]	26.95	[illegible]	1.2	1.3	1.01	1.2
Total PAHs	µg/kg	2,764.65	927.6	3,016.50	3,584.35	1,368.65	914.75	5.28	89.985	66.735	229.835
Total DDT	µg/kg	[illegible]	[illegible]	[illegible]	[illegible]	27.505	20.18	2.06	8.64	12.85	24.2
Total PCB Congeners	µg/kg	[illegible]	94.72	[illegible]	[illegible]	[illegible]	81.88	11.46	2.31	69.62	42.99
Total Organic Carbon (dry weight)		17,200	8,350	12,300	13,400	10,200	5,650	2,900	3,400	4,600	5,450

INTERPRETATION GUIDE:

Copper exceeds the ER-L in HSS19-19, 19-21, 19-23 through 19-26, 19-28, 19-29, and 19-31 through 19-33

Lead exceeds the ER-L in HSS19-20

Mercury exceeds the ER-L in HSS19-21, 19-24, 19-26, 19-29, and 19-32

Nickel exceeds the ER-L in HSS19-26 and 19-29

Tributlytin exceeds both the Bioaccumulation Trigger Value in HSS19-30 through 19-32, and 19-34

Total PAHs exceed the ER-L in HSS19-23 and 19-26

Total DDT exceeds the ER-L in HSS19-35; exceeds both the ER-L and Bioaccumulation Value in HSS19-19 through 19-23, 19-25 through 19-34, and 19-36 through 19-38; and exceeds both the ER-M and Bioaccumulation Value in HSS19-24

Total PCB Congeners exceed the ER-L in HSS19-22, 19-27, 19-30, 19-34, 19-37, and 19-38

Table 6
2007 U.S. Navy Sediment Data

Analyte	Units	HSS19-39	HSS19-40	HSS19-41	HSS19-42	HSS19-43	HSS19-44	HSS19-45	HSS19-46	HSS19-47	HSS19-48	HSS19-49
Metals												
Antimony (Sb)	µg/kg	85	120	155	130	165	175	135	85	155	225	85
Arsenic (As)	µg/kg	2035	3585	4920	3600	6075	5780	4970	2600	4890	7015	2000
Cadmium (Cd)	µg/kg	135	395.5	632.5	421	727	636.5	534.5	234.5	709.5	727	169
Chromium (Cr)	µg/kg	8575	18200	23450	18150	24750	26150	19900	10635	23700	20700	7810
Copper (Cu)	µg/kg	4400	13100	17750	15200	19700	19650	14900	6300	17250	17150	4500
Lead (Pb)	µg/kg	4430	8830	12000	8170	11500	11500	10330	4470	10060	15455	3505
Mercury (Hg)	µg/kg	16	50	43.5	30.5	47.5	47.5	38.5	19	37	97.5	21.5
Nickel (Ni)	µg/kg	7015	15400	19300	16700	22350	22000	17200	10160	21050	18400	8080
Selenium (Se)	µg/kg	95	235	335	320	385	335	140	150	380	165	115
Silver (Ag)	µg/kg	23	82	143.5	80.5	132	130.5	96.5	42.5	120	114.5	37
Zinc (Zn)	µg/kg	23400	58300	66350	53150	77600	75050	57600	29750	65550	64400	21900
Tributyltin*	µg/kg	7.7	3.15	2.5	4.45	1.6	2.3	3.035	0.96	1.35	2.5	0.765
Total PAHs	µg/kg	23.16	352.075	278.92	217.36	274.44	158.235	198.95	57.705	147.805	148.025	27
Total DDT	µg/kg	[redacted]	[redacted]	[redacted]	82.7	110.5	88.86	95.85	7.45	88.25	24.2	5.015
Total PCB Congeners	µg/kg	[redacted]	[redacted]	93.47	119.78	95.54	75.7	119.11	23.48	51.61	31.52	4.95
Total Organic Carbon (dry weight)		2,950	8,300	14,350	9,300	18,500	15,700	15,800	2,650	12,650	27,150	1,950

INTERPRETATION GUIDE:

Nickel exceeds the ER-L in HSS19-43, 19-44, 19-47

Total DDT exceeds the ER=L in HSS19-49; exceeds both the ER-L and Bioaccumulation Value in HSS19-42 through 19-48; and exceeds both the ER-M and Bioaccumulation Value in HSS19-39 through 19-41

Total PCB Congeners exceed the ER-L in HSS19-41 through 19-48; and exceeds both the ER-M and Bioaccumulation Value in HSS19-39 and 19-40

3 CONCLUSIONS

Results of sampling efforts by OHD, USACE, and U.S. Navy indicate that a portion of the proposed maintenance dredging material in each entity's area of responsibility is not suitable for unconfined placement either in water or on the beach due primarily to elevated levels of TBT, PCBs, DDT, PAHs, and some metals. Maintenance dredging material should be placed either in a confined nearshore application (CAD) or transported to a permitted upland fill. This material is not considered hazardous waste under Title 22 requirements.

Sediments below the maintenance type material in the area of the proposed CAD site were clean, light-colored coarse grain sand that should be suitable for beach placement because it consists of virgin material that has not been exposed to sources of contamination. Laboratory testing of composite samples indicated a sand content of 92 to 93 percent by weight, which is very similar to the composition of local beach sands. Use of this sand to nourish a local beach would constitute beneficial reuse of the material because it would benefit beachgoers by increasing the width of the beach for recreational use, provide additional erosion protection for existing infrastructure, and reintroduce sand to the littoral system that is currently sequestered in the Harbor.

Table 3
1996 USACE Sediment Data

		Sediment Quality Guidelines (SQGs)				DCH96-01	DCH96-02	DCH96-03	DCH96-04	DCH96-05	DCH96-06	DCH96-07	DCH96-08	DCH96-09	DCH96-10	DCH96-11	DCH96-12
		ERL	ERM	SL	ML	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core
Analyte	**Units**	(Long et al. 1990)		(PSDDA 1998)		Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample
Total Organic Carbon (dry weight)	%					6.4	0.727	0.619		0.4	7.93	4.52	4.51	5.91	0.5	3.73	6.47
Metals																	
Antimony (Sb)	µg/kg			150,000	200,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Arsenic (As)	µg/kg	8,200	70,000	57,000	700,000	3,000	960	2,100	960	5,200	2,500	1,800	1,400	2,500	2,300	1,800	2,600
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	340	140	340	340	870	300	260	180	270	270	250	470
Chromium (Cr)	µg/kg	81,000	370,000			13,500	5,600	12,300		21,600	10,300	8,900	7,000	11,700	9,000	8,400	12,100
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	6,900	3,100	12,300		31,300	14,300	8,100	5,500	13,100	15,100	9,300	15,600
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	120	90	140		80	120	3,700	2,400	4,400	7,300	6,200	9,300
Mercury (Hg)	µg/kg	150	710	410	2,300	1,200	90	140		310	120	110	100	100	100	100	150
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	9,300	4,000	6,900		12,900	6,100	5,100	4,000	7,100	5,400	5,300	7,400
Selenium (Se)	µg/kg					0	0	0	0	0	0	0	0	0	0	0	0
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400	0	0	0	0	0	130	0	0	0	0	0	0
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	29,200	11,200	30,500		71,500	30,300	22,900	16,200	30,700	22,300	24,900	3,800
Tributyltin*	µg/kg			36		21,000	16,000	30,000		8,000	6,000	ND	13,000	ND	39,000	4,000	2,000
Total PAHs	µg/kg	4,022	44,792			0	0	0	0	94	86	0	72	75	21	0	210
Total DDT	µg/kg	1.58	46.1	6.9	69	5	5	5	5	5	5	5	5	5	5	5	5
Total PCB Congeners	µg/kg	22.7	180	130	3,100	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND

Notes:

µg/kg = micrograms per kilogram (dry weight unless noted)

ND = not detected at or above lowest MRL value for the particular compound(s) of interest

NT = not tested

Total DDT = sum of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Total PCB Congeners = sum of mono- through decachlorobiphenyl compounds

Total PAHs = sum of sixteen named compounds

*Tributyltin (interstitial water)

Exceeds ER-L Screening Value

Exceeds Bioaccumulation Trigger Value

Table 4
2001 USACE Sediment Data

Analyte	Units	Sediment Quality Guidelines (SQGs) ERL	ERM	SL	ML	DCPH01-01	DCPH01-02	DCPH01-03	DCPH01-04	DCPH01-05	DCPH01-06	DCPH01-07	DCPH01-08	DCPH01-09	DCPH01-10	DCPH01-11	DCPH01-12
		(Long et al. 1999)		(PSDDA 1998)		Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample	Diver Core Sample
Total Organic Carbon (dry weight)	%					0.75	0.49	0.36	0.48	0.13	0.16	0.8	0.43	0.44	0.39	0.17	0.19
Metals																	
Antimony (Sb)	µg/kg			150,000	200,000	ND	ND	ND	3 UN	3.21 UN	3.18 UN	3.54 UN	3.2 UN	3.5 UN	3.2 UN	3.64 UN	3.15 UN
Arsenic (As)	µg/kg	8,200	70,000	57,000	700,000	5,600	2,800	4,000	2,900	2,800	2,200	3,100	3,400	1,200	3,700	1,500	1,500
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	1,100	500	500	700	850	790	1,510	1,130	1,110	960	880	1,220
Chromium (Cr)	µg/kg	81,000	370,000			22,500	9,900	13,800	11,400	8,800	9,900	18,000	16,200	5,800	14,300	9,700	11,700
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	23,600	9,600	16,000	10,700	6,600	7,800	15,100	16,400	4,400	14,600	5,600	8,100
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	12,600	5,200	7,700	6,500	5,200	7,500	15,000	14,500	4,700	12,900	6,400	6,200
Mercury (Hg)	µg/kg	150	710	410	2,300	60	30	40	40	20	30	20	50	30	50	20	30
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	17,900	10,600	13,300	26,800	10,400	9,020	16,700	14,000	5,600	11,800	8,470	10,100
Selenium (Se)	µg/kg																
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400	600 U	500 U	500 U	500 U	540 U	530 U	590 U	530 U	580 U	530 U	610 U	530 U
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	67,100	30,300	44,500	34,400	25,100	27,200	48,200	51,200	16,600	43,900	24,400	30,100
Tributyltin*	µg/kg			36		4.1	1.6	1.3	1.9	1.3	1.5	1.2	0.8	2.7	28	1.2	12
Total PAHs	µg/kg	4,022	44,792			1,996	804	437	39,798	290	241	79	785	158	799	122	692
Total DDT	µg/kg	1.58	46.1	6.9	69	14.8	7.1	3.1	12.6	3.1	2.8	2.8	9.6	2.6	9.9	1.5	4.1
Total PCB Congeners	µg/kg	22.7	180	130	3,100	130.2	70.7	32.9	77.4	12.9	24.7	11.9	64.1	18.9	66.3	18.5	24.1

Notes:

µg/kg = micrograms per kilogram (dry weight nless noted)

ND = not detected at or above lowest MRL vale for the particlar compond(s) of interest

NT = not tested

Total PCB Congeners = sm of mono- throgh decachlorobiphenyl componds

Total PAHs = sm of sixteen named componds

*Tribtyltin (interstitial water)

Total DDT = sm of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Bulk Sediment Chemistry results for DCPH01-21 through DCPH01-25 are not part of area to be dredged for year 2001.

Exceeds ER-L Screening Value

Exceeds Bioaccumulation Trigger Value

Exceeds both ER-L and Bioaccumulation Trigger Value

Exceeds both ER-M and Bioaccumulation Trigger Value

Table 4
2001 USACE Sediment Data

Analyte	Units	DCPH01-13 Diver Core Sample	DCPH01-14 Diver Core Sample	DCPH01-15 Diver Core Sample	DCPH01-16 Diver Core Sample	DCPH01-17 Diver Core Sample	DCPH01-18 Diver Core Sample	DCPH01-19 Diver Core Sample	DCPH01-20 Diver Core Sample
Total Organic Carbon (dry weight)	%	0.5	0.44	0.31	0.66	0.79	0.26	0.64	0.39
Metals									
Antimony (Sb)	µg/kg	3 UN	3 UN	3 UN	3.13 UN	3.25 UN	3.1 UN	3.34 UN	3.12 UN
Arsenic (As)	µg/kg	3,700	4,200	4,000	1,700	2,800	2,600	4,000	2,900
Cadmium (Cd)	µg/kg	600	500	700	1,070	740	520	1,030	520
Chromium (Cr)	µg/kg	13,300	17,300	14,000	10,000	10,800	11,300	20,400	12,000
Copper (Cu)	µg/kg	14,900	23,100	10,400	6,300	5,300	4,800	11,900	5,700
Lead (Pb)	µg/kg	10,000	7,800	6,400	6,600	6,700	6,300	12,300	7,400
Mercury (Hg)	µg/kg	50	30	30	30	20	20	30	20
Nickel (Ni)	µg/kg	11,300	13,800	12,700	9,130	9,150	9,330	15,700	10,700
Selenium (Se)	µg/kg								
Silver (Ag)	µg/kg	500 U	500 U	500 U	520 U	540 U	520 U	560 U	520 U
Zinc (Zn)	µg/kg	43,600	52,800	37,600	27,900	25,000	24,300	49,900	30,400
Tributyltin*	µg/kg	21	67	3.9	2.4	2	0.8	3	1.3
Total PAHs	µg/kg	2,047	1,957	648	257	94	102	512	106
Total DDT	µg/kg	10.7	6.4	9.8	8	9	4.4	38	6
Total PCB Congeners	µg/kg	62.5	29.7	78.89	81.3	43	16.2	509	18.7

Table 5
2002 USACE Sediment Data

		Sediment Quality Guidelines (SQGs)				DCPH-02-1A	DCPH-02-1B	DCPH-02-2A	DCPH-02-2B	DCPH-02-3A	DCPH-02-3B	DCPH-02-4A	DCPH-02-4B	DCPH-02-5A	DCPH-02-5B	DCPH-02-6A	DCPH-02-6B	DCPH-02-7A	DCPH-02-7B
		ERL	ERM	SL	ML	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core	Diver Core
Analyte		(Long et al. 1999)		(PSDDA 1998)		Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample
Total Organic Carbon (dry weight)	%					0.57	0.29	0.23	0.08	0.42	0.17	0.15	0.06	0.51	0.27	0.62	0.42	0.26	0.17
Metals																			
Antimony (Sb)	µg/kg			150,000	200,000	3,400 UN	3,600 UN	3,100 UN	3,700 UN	3,400 UN	3,600 UN	3,200 UN	3,100 UN	3,300 UN	3,600 BN	3,100 UN	3,500 UN	3,300 UN	3,100 UN
Arsenic (As)	µg/kg	8,200	70,000	57,000	700,000	4,100	1,600 B	2,700	700 B	4,100	1,200 B	700 B	700 B	3,200	3,200	4,200	3,700	2,100 B	1,600 B
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	600 B	600 U	900 B	600 U	600 U	600 U	500 U	500 U	500 U	500 U	500 U	600 U	500 U	500 U
Chromium (Cr)	µg/kg	81,000	370,000			16,500	5,200	12,100	7,500	17,300	5,700	5,600	5,300	13,600	10,300	20,000	15,300	11,200	8,100
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	27,000	5,500	13,300	7,400	25,900	5,200	6,800	3,000	11,300	8,500	17,600	11,500	7,400	5,400
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	16,600	5,000 U	6,000 B	5,000 U	13,500	5,000 U	4,000 U	4,000 U	600 B	9,000 B	11,300	9,000 B	5,000 B	4,000 U
Mercury (Hg)	µg/kg	150	710	410	2,300	110	20 B	50	20 B	100	50	20 B	20	30	20	60	30	20	20
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	13,600	5,800	8,900	6,900	15,600	4,500 B	6,500	5,100	11,300	9,700	17,800	14,900	8,100	7,400
Selenium (Se)	µg/kg					600 U	600 U	500 U	600 U	600 U	600 U	500 U	500 U	500 U	500 U	500 U	600 U	600 U	500 U
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400	1,200 B	600 U	1,100 B	700 B	700 B	600 U	500 U	600 B	700 B	900 B	900 B	600 B	700 B	900 B
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	69,800	20,100	39,900	24,300	84,100	17,800	22,100	13,700	42,100	36,000	57,600	47,200	32,100	24,700
Tributyltin*	µg/kg			36		9.7 P	1.3 U	4.2	1.3 U	5.1 UI	1.2 U	3.2	1.3 U	1.1 J	2.7	5.0	4.8	1.2 JP	1.3 U
Total PAHs	µg/kg	4,022	44,792			2,247	0	932	17	1,858	0	278	0	1,594	416	784	420	0	0
Total DDT and derivatives	µg/kg	1.58	46.1	6.9	69	17.5	0.0	9.2	0.6	15.9	0.58	1.6	0.0	0.0	0.0	24.5	0.0	8.1	12.5
Total PCB Congeners	µg/kg	22.7	180	130	3,100	240	0	95	9.6	179	0	15.9	0	1,300	325	261	448	42.9	57

Notes:

µg/kg = micrograms per kilogram (dry weight nless noted)

ND = not detected at or above lowest MRL vale for the particlar compond(s) of interest

NT = not tested

Total PCB Congeners = sum of mono- throgh decachlorobiphenyl componds

Total PAHs = sum of sixteen named componds

*Tributyltin (interstital water)

Total DDT = sum of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Exceeds ER-L Screening Value

Exceeds Bioaccumulation Trigger Value

Exceeds both ER-L and Bioaccumulation Trigger Value

Exceeds both ER-M and Bioaccumulation Trigger Value

Table 6
2007 U.S. Navy Sediment Data

Analyte	Units	Sediment Quality Guidelines (SQGs)				Sample Points														
		ERL	ERM	SL	ML															
		(Long et al. 1990)		(PSDDA 1998)		HSS19-02	HSS19-03	HSS19-04	HSS19-06	HSS19-07	HSS19-08	HSS19-09	HSS19-11	HSS19-12	HSS19-13	HSS19-14	HSS19-15	HSS19-16	HSS19-17	HSS19-18
Metals																				
Antimony (Sb)	µg/kg			150,000	200,000	510	90	905	180	105	115	230	100	195	305	290	345	385	295	260
Arsenic (As)	µg/kg	8,200	7,000	57,000	700,000	4750	1700	1950	1050	975	1915	3850	2525	4715	6030	7550	4990	9035	8300	3750
Cadmium (Cd)	µg/kg	1,200	9,600	5,100	14,000	1765	204	263	228.5	204.5	298	394	346	858	525.5	773.5	501	893.5	922.5	414.5
Chromium (Cr)	µg/kg	81,000	370,000			20050	5355	6920	6225	6580	9640	17610	11000	21300	23200	27950	18950	33100	28400	15570
Copper (Cu)	µg/kg	34,000	270,000	390,000	1,300,000	56500	6205	22900	5370	400	350	39400	400	13550	54150	68200	29100	137550	72700	71500
Lead (Pb)	µg/kg	46,700	218,000	450,000	1,200,000	54200	27200	9620	3970	5950	6340	15030	4465	16000	20935	26300	14885	32250	37500	10525
Mercury (Hg)	µg/kg	150	710	410	2,300.0	1287.5	34.5	31.5	20	20	32.5	77.5	25	84.5	77	124.5	63	137.5	333	51
Nickel (Ni)	µg/kg	20,900	51,600	140,000	370,000	15000	5630	6740	6665	6625	9475	13395	9980	19300	18300	23800	15750	25550	21900	14405
Selenium (Se)	µg/kg					310	450	245	230	195	165	85	265	525	355	370	350	405	390	315
Silver (Ag)	µg/kg	1,000	3,700	6,100	8,400.0	236.5	41	55.5	29.5	36	57.5	120.5	41.5	121	155.5	205	123	244	246	99.5
Zinc (Zn)	µg/kg	150,000	410,000	410,000	3,800,000	147500	28150	103200	19150	23750	31450	79500	26400	69400	107800	144600	80500	232500	171000	62250
Tributyltin*	µg/kg			36		42.5	3.355	9.8	1.3	1.025	1.3	19.35	1.3	0.95	19.25	19.75	10.05	28	92	8.94
Total PAHs	µg/kg	4,022	44,792			8,323.55	245.165	205.775	13.6	497.285	1,219.18	1,118.78	13.545	1,455.20	1,916.32	3,856.75	1,118.64	2,898.70	7,591.45	942.655
Total DDT	µg/kg	1.58	46.1	6.9	69	282.5	5.725	1.47	3.39	9.25	6.25	29.1	6	26.9	50.6	50.65	53	96.45	64.5	26
Total PCB Congeners	µg/kg	22.7	180	130	3,100	709.05	23.96	11.72	14.57	39.4	14.91	138.87	18	67.44	159.94	230.99	146.11	353.31	362.4	80.09
Total Organic Carbon (dry weight)						16,600	4,200	3,050	2,350	3,350	3,850	9,750	4,150	10,300	13,650	15,150	8,650	18,700	16,600	6,900

Notes:

µg/kg = micrograms per kilogram (dry weight unless noted)

ND = not detected at or above lowest MRL value for the particular compound(s) of interest

*Tributyltin (interstitial water)

Total DDT = sum of 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT

Total PCB Congeners = sum of mono- through decachlorobiphenyl compounds

Total PAHs = sum of sixteen named compounds

Concentrations of analytes were derived by mathematically compositing results from samples taken at different depths within each core.

Exceeds ER-L Screening Value

Exceeds Bioaccumulation Trigger Value

Exceeds both ER-L and Bioaccumulation Trigger Value

Exceeds both ER-M and Bioaccumulation Trigger Value

Table 6
2007 U.S. Navy Sediment Data

Analyte	Units	HSS19-19	HSS19-20	HSS19-21	HSS19-22	HSS19-23	HSS19-24	HSS19-25	HSS19-26	HSS19-27	HSS19-28	HSS19-29	HSS19-30	HSS19-31	HSS19-32	HSS19-33	HSS19-34	HSS19-35	HSS19-36	HSS19-37	HSS19-38
Metals																					
Antimony (Sb)	µg/kg	310	230	290	225	285	260	340	335	245	255	290	180	215	340	235	195	60	85	115	155
Arsenic (As)	µg/kg	6300	2450	5100	3400	17200	4960	9240	7850	2955	5590	7200	4325	6660	5850	5515	3500	2400	1800	2600	2850
Cadmium (Cd)	µg/kg	536.5	726.5	649.5	820.5	487.5	626.5	693.5	811.5	354.5	717	936.5	379	586.5	726	536.5	348	112	225.5	231.5	368
Chromium (Cr)	µg/kg	25900	14380	22450	11950	20570	20250	21400	30150	13050	15700	28900	13050	20150	31300	17000	16100	6960	10950	10150	12530
Copper (Cu)	µg/kg	121250	18835	42000	16970	123700	37250	57500	91850	17050	53000	58800	13550	40700	42450	37950	25200	2800	5300	6550	9800
Lead (Pb)	µg/kg	19800	52180	44900	9705	20685	19250	24250	27850	8290	18800	36250	9400	23500	113700	36050	15820	2300	4740	4825	5455
Mercury (Hg)	µg/kg	69	87	147	63.5	82	154	114.5	173.5	47.5	125	163	48.5	94	149	111	83.5	11	20	14	17.5
Nickel (Ni)	µg/kg	19400	10835	17250	10350	15940	18400	17500	23200	12385	13850	22600	12400	16500	20650	13950	12600	8570	10850	10195	13415
Selenium (Se)	µg/kg	535	85	85	80	285	355	175	420	280	105	685	215	210	355	305	220	110	140	210	375
Silver (Ag)	µg/kg	149.5	96	167	68	142.5	212.5	141.5	222.5	88	133.5	203	89.5	143	216	139	104.5	12	40	39	58
Zinc (Zn)	µg/kg	116150	58800	112600	56550	108500	108000	109850	137500	53650	73700	129500	56700	110500	114500	99950	56700	14400	26500	27250	38300
Tributyltin*	µg/kg	24	2.85	12.23	1.3	18.55	9.1	10.2	16.05	29.2	21.15	26.5	479.8	40	36.5	26.95	86.5	1.2	1.3	1.01	1.2
Total PAHs	µg/kg	2,767.65	1,371.72	2,363.70	899.18	6,105.37	3,168.35	2,898.75	10,355.35	480.235	2,344.95	2,764.65	927.6	3,016.50	3,584.35	1,368.65	914.75	5.28	89.985	66.735	229.835
Total DDT	µg/kg	40.9	30.45	29.55	15.62	25.83	113.2	30.05	39.225	19.8	28.15	43.6	20.7	30.25	36.65	27.505	20.15	2.06	8.64	12.85	24.2
Total PCB Congeners	µg/kg	160.08	209.95	156.15	70.75	137.92	497.91	163.13	266.32	59.85	138.5	241.2	94.72	168.15	232.06	167.55	81.88	11.46	2.31	69.62	42.99
Total Organic Carbon (dry weight)		14,450	7,000	11,950	8,200	10,850	11,600	13,300	13,050	8,850	8,700	17,200	8,350	12,300	13,400	10,200	5,650	2,900	3,400	4,600	5,450

Table 6
2007 U.S. Navy Sediment Data

Analyte	Units	HSS19-39	HSS19-40	HSS19-41	HSS19-42	HSS19-43	HSS19-44	HSS19-45	HSS19-46	HSS19-47	HSS19-48	HSS19-49
Metals												
Antimony (Sb)	µg/kg	85	120	155	130	165	175	135	85	155	225	85
Arsenic (As)	µg/kg	2035	3585	4920	3600	6075	5780	4970	2600	4890	7015	2000
Cadmium (Cd)	µg/kg	135	395.5	632.5	421	727	636.5	534.5	234.5	709.5	727	169
Chromium (Cr)	µg/kg	8575	18200	23450	18150	24750	26150	19900	10635	23700	20700	7810
Copper (Cu)	µg/kg	4400	13100	17750	15200	19700	19650	14900	6300	17250	17150	4500
Lead (Pb)	µg/kg	4430	8830	12000	8170	11500	11500	10330	4470	10060	15455	3505
Mercury (Hg)	µg/kg	16	50	43.5	30.5	47.5	47.5	38.5	19	37	97.5	21.5
Nickel (Ni)	µg/kg	7015	15400	19300	16700	22350	22000	17200	10160	21050	18400	8080
Selenium (Se)	µg/kg	95	235	335	320	385	335	140	150	380	165	115
Silver (Ag)	µg/kg	23	82	143.5	80.5	132	130.5	96.5	42.5	120	114.5	37
Zinc (Zn)	µg/kg	23400	58300	66350	53150	77600	75050	57600	29750	65550	64400	21900
Tributyltin*	µg/kg	7.7	3.15	2.5	4.45	1.6	2.3	3.035	0.96	1.35	2.5	0.765
Total PAHs	µg/kg	23.16	352.075	278.92	217.36	274.44	158.235	198.95	57.705	147.805	148.025	27
Total DDT	µg/kg	51.3	78.75	56.2	32.7	41.05	33.85	35.35	7.45	38.25	24.2	5.015
Total PCB Congeners	µg/kg	261.01	357.66	93.47	119.78	95.54	75.7	119.11	23.48	51.61	31.52	4.95
Total Organic Carbon (dry weight)		2,950	8,300	14,350	9,300	18,500	15,700	15,800	2,650	12,650	27,150	1,950