

**California Regional Water Quality Control Board
San Diego Region**

**Staff Report on the
Establishment of Shipyard Sediment Cleanup Levels
for
National Steel and Shipbuilding Company
and Southwest Marine, Inc.
February 17,1999**

Issue

There are elevated levels of pollutants in the bay bottom sediment adjacent to several shipyards in San Diego Bay. The concentration of these pollutants causes or threatens to cause a condition of pollution in San Diego Bay by impairing the benthic organisms which are protected by the Marine Habitat Beneficial Use. National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. (Southwest Marine) are engaged in a process of assessment and removal of sediments which have high concentrations of pollutants adjacent to their facilities. The Regional Board must establish cleanup levels for NASSCO and Southwest Marine which protect the beneficial uses and abate the threat of pollution in San Diego Bay.

Conclusion

The Regional Board should adopt tentative Resolution No. 99-12, *A Resolution Establishing Shipyard Sediment Cleanup Levels for Southwest Marine, Inc., San Diego County* and tentative Resolution No. 99-20, *A Resolution Establishing Shipyard Sediment Cleanup Levels for National Steel and Shipbuilding Company, San Diego County*. These resolutions designate the following cleanup levels and indicator chemicals for cleanup of bay bottom sediments at NASSCO and Southwest Marine as indicated below:

CONSTITUENT	CLEANUP LEVEL FOR BAY SEDIMENT (mg/kg) Dry Weight	NASSCO CLEANUP INDICATOR CHEMICALS	SOUTHWEST MARINE CLEANUP INDICATOR CHEMICALS
Copper	810	X	X
Zinc	820	X	X

CONSTITUENT	CLEANUP LEVEL FOR BAY SEDIMENT (mg/kg) Dry Weight	NASSCO CLEANUP INDICATOR CHEMICALS	SOUTHWEST MARINE CLEANUP INDICATOR CHEMICALS
Lead	231		X
Mercury	4.2	X	X
PCBs	0.95		X

These cleanup levels for NASSCO and Southwest Marine are based on cleanup levels for Campbell Industries Marine Construction and Design Company (Campbell Industries) and the mercury cleanup level for Shelter Island Boatyard. These cleanup levels are appropriate for NASSCO and Southwest Marine because the wastes at NASSCO and Southwest Marine are similar to the wastes at Campbell Industries and Shelter Island Boatyard and the cleanup levels will protect the beneficial uses and abate the threat of pollution in San Diego Bay.

Background

The Regional Board has been working, since October, 1994, on a project for assessing the chemical quality of sediments in San Diego Bay immediately off-shore of two shipyards - Southwest Marine, and National Steel and Shipbuilding Company (NASSCO). This project was initiated because of data dating to the late 1980's indicating elevated levels of contaminants in sediments immediately offshore of the shipyards. These contaminants are consistent with those produced as a result of shipyard operations. Since 1994 NASSCO and Southwest Marine began actively working on a voluntary, cooperative basis with the Regional Board to expedite the assessment and cleanup of the polluted sediments. The shipyards have worked cooperatively to perform a sediment study and a remedial action alternatives analysis report in accordance with Regional Board guidelines. It has not been necessary to issue cleanup and abatement orders to the shipyards because of the good faith shown by the shipyards and the excellent progress that has been made to date.

By letter dated February 14, 1997, the Regional Board issued sediment investigation requirements to NASSCO for elevated concentrations of copper and zinc in the San Diego Bay sediment. At a meeting on March 11, 1998, the Regional Board directed NASSCO to also investigate mercury at a small area of NASSCO's leasehold just east of the floating drydock near shore. A similar sediment investigation letter was issued to Southwest Marine on October 22, 1997 for elevated concentrations of copper, zinc, lead, and mercury. By letter dated April 27, 1998, the Regional Board directed Southwest Marine to also investigate PCBs in the sediment. For both shipyards, sediment investigations were required to determine the areal extent and location of sediments

containing chemical concentrations in excess of the Campbell Industries shipyard cleanup levels or the Shelter Island Boatyard mercury apparent effects threshold level.

NASSCO submitted a Site Characterization and Remedial Action Plan in November, 1997 as required. This report contains the results of NASSCO's site characterization sampling. Four remediation areas are identified which contain elevated sediment metal concentrations. Based on Regional Board comments, additional sampling for copper and zinc was conducted in one area outside NASSCO's leasehold which could be influenced by NASSCO's work. Mercury samples were also be collected from an area identified from recent NPDES sediment sampling results. The results of the supplemental, sampling, dated September 14, 1998, confirmed that the original four remediation areas are satisfactory.

Southwest Marine submitted a Preliminary Report Sediment Characterization Study and Remediation Plan on July 30, 1997 as required. This report contains the results of Southwest Marine's site characterization sampling and also recommends some additional characterization work. Additional samples were collected and analyzed as necessary to fully delineate the pollution. Some archived samples were also reanalyzed. Southwest Marine submitted a Report of Waste Discharge for dredging dated November 19, 1998 and the Final Report Sediment Characterization Study and Remediation Plan dated December 1998. Five remediation areas are identified in the reports for Southwest Marine.

NASSCO and Southwest Marine have concluded their sediment characterization studies and are now proposing removal of polluted sediment.

Basis for NASSCO and Southwest Marine Shipyard Cleanup Levels

The proposed cleanup levels for NASSCO and Southwest Marine are based on the previously established cleanup levels for Campbell Industries and the mercury cleanup level for Shelter Island Boatyard.

Campbell Cleanup Levels

On June 8, 1995, the Regional Board issued Cleanup and Abatement Order No. 95-21 to Campbell Industries Marine Construction and Design Company (Campbell). Order No. 95-21 established sediment cleanup levels for Campbell Industries as specified below:

CONSTITUENT	BAY SEDIMENT (mg/kg) Dry Weight
Copper	810
Zinc	820
Lead	231
PCB's	0.95

These cleanup levels were developed in a report by PTI Environmental Services titled "Campbell Shipyards Remedial Action Alternatives Analysis Report" (Campbell RAAAR) dated October 1993. These Campbell cleanup levels were derived as site-specific sediment quality objectives using the Apparent Effects Threshold (AET) approach. An AET is defined as the sediment concentration of a given chemical above which statistically significant biological effects (e.g., depressions in the abundance of local benthic infauna) are always observed in the data used to generate AET values. If any chemical exceeds its AET for a particular biological indicator, a measurable (although potentially minor) adverse biological effect is predicted for that indicator. The AET approach uses observed relationships between biological data and chemical data. Biological data for 15 stations were evaluated using the following tests: amphipod mortality, polychaete growth, total benthic infauna abundance (in situ), and amphipod abundance (in situ). The 10-day amphipod survival, avoidance, and reburial test used the species Rhepoxynius abronius following the test procedures described in Swartz et al. (1985), ASTM (1990), and PSEP (1991). The 20-day juvenile polychaete test use the species Neanthes arenaceodentata following the test procedures described in PSEP (1991).

It is appropriate to apply cleanup levels developed for the Campbell site to the NASSCO and Southwest Marine sites. This is based on similarities between physical, biological, and chemical conditions at the Campbell, NASSCO, and Southwest Marine shipyards and the fact that Campbell shipyard is physically located in San Diego Bay just north of the NASSCO and Southwest Marine facilities. Particularly important similarities include the following:

- Campbell, NASSCO, and Southwest Marine are comparable in terms of site activities, waste materials, and matrices (i.e. paint)
- Campbell, NASSCO, and Southwest Marine are in the same hydrodynamic and biogeographic zones
- Campbell, NASSCO, and Southwest Marine are influenced by a similar suite of pollutants from off-site.

Shelter Island Boatyard Mercury Cleanup Level

Because there is no cleanup level for mercury at Campbell, the mercury level from Shelter Island Boatyard is proposed for NASSCO and Southwest Marine. Shelter Island Boatyard is located in America's Cup Harbor in San Diego Bay. Shelter Island Boatyard submitted a Remedial Action Alternatives Analysis Report (RAAAR) by PTI Environmental Services dated June 30, 1989 and a supplement dated January 1990. PTI performed a sediment biological effects study similar to the biological effects study performed for Campbell Industries. PTI's study included eleven sample stations. A benthic infaunal count, and an amphipod sediment toxicity test were performed for each station. The 10-day survival, avoidance, and reburial test used the species Rhepoxynius abronius following the test procedures described in Swartz et al. (1985) as amended by Chapman and Becker (1986). PTI reported that high amphipod survival and no depression in infaunal assemblage were found in the sediment from the area adjacent to Shelter Island Boatyard with the sediment mercury concentration of 4.2 mg/kg (dry weight). This established a 4.2 mg/kg (dry weight) AET mercury level for Shelter Island Boatyard. This Shelter Island Boatyard mercury level was not adopted as a cleanup level in the Shelter Island Boatyard cleanup and abatement order. However, the Regional Board decided that no cleanup was necessary for Shelter Island Boatyard's sediment which contained mercury at this 4.2 mg/kg level in Order No. 91-91, "Rescinding Cleanup and Abatement Order No. 88-70 for Shelter Island Boatyard, San Diego County," which was adopted on October 28, 1991. It is appropriate to apply the Shelter Island Boatyard mercury cleanup level of 4.2 mg/kg to the NASSCO and Southwest Marine shipyards because:

- The boatyards are similar to the shipyards in terms of site activities, waste materials, and matrices (i.e. paint).
- The boatyards and shipyards are both in San Diego Bay.
- Data from eleven stations was used to derive the Shelter Island Boatyard mercury level which is comparable to the fifteen stations used to derive the Campbell cleanup levels.

Background Sediment Levels in San Diego Bay

The NPDES permits for the shipyards in San Diego Bay require semiannual sediment monitoring. As part of this NPDES sediment monitoring program; three reference stations in San Diego Bay are monitored. Reference Station REF-O1 is located at the west side of San Diego Bay off the Naval Ocean Systems Center pier. Reference Station REF-O2 is located at the north side of San Diego Bay at the Marina Cortez Marina in Harbor Island's west basin. Reference Station REF-O3 is located at the north east side of San Diego Bay at the end of the Broadway Pier. The results of eleven rounds of sediment

sampling at these reference stations were used to calculate the average background sediment levels shown in the table below. The proposed cleanup levels for NASSCO and Southwest Marine allow residual concentrations of pollutants to remain in the sediment which are above the background levels shown in the table below. Requiring cleanup to background levels would be overly protective of bay beneficial uses: The proposed cleanup levels while allowing pollutants to remain in bay sediments above background levels are sufficient to protect beneficial uses in San Diego Bay.

Average Background Sediment Levels (mg/kg Dry Weight)			
	REF-01	REF-02	REF-03
Copper	36	196	91
Zinc	78	225	148
Lead	15	46	42
PCBs	0.041	0.049	0.041
Mercury	0.18	0.53	0.61

Other Cleanup Levels Considered

Cleanup levels from several other sources were considered before selecting the proposed cleanup levels.

Boatyard Cleanup Levels

Bay City Marine, Eichenlaub Marine, Kettenburg Marine, and Mauricio & Sons are boatyards in the America's Cup Harbor in San Diego Bay. The sediment in San Diego Bay adjacent to these boatyards contained elevated levels of copper, mercury, and tributyl tin. Woodward-Clyde Consultants submitted a R.AA.AR dated October 12, 1990 for these four boatyards. The Woodward-Clyde RAAAR contained a sediment biological effects study prepared by Kinnetic Laboratories, Inc. One sediment station at each client boatyard (Bay City Marine, Kettenburg Marine, Eichenlaub Marine, and Mauricio and Sons Marine) and one reference station in the center of the basin for a total of five sampling stations were used in this study. Benthic infaunal counts, an amphipod sediment toxicity test, and a bivalve larvae sediment elutriate test were performed for each station. The amphipod 10-day survival and reburial test used the species Grandidierella japonica following the test procedures described in Swartz et al. (1985). The 48-hour bivalve larvae survival and shell abnormality test used a 1:4 sediment to water elutriate mixture as described in ASTM Test Method E-724-80. Woodward-Clyde concluded that there were no significant adverse biological effects associated with sediment containing 530 mg/kg (dry weight) of copper and 4.8 mg/kg (dry weight) of mercury. This established a 530 mg/kg (dry weight) copper AET and 4.8 mg/kg (dry weight) mercury AET.

These boatyard cleanup levels were not used for the shipyards mainly because data from only five stations were used to derive the boatyard cleanup levels instead of the fifteen stations used to derive the Campbell cleanup levels and the eleven stations used to derive the Shelter Island Boatyard mercury cleanup level. The greater number of sample stations used at the Shelter Island Boatyard and Campbell Industries sites provide a more sound technical basis for more precisely defining the "cleanup" sediment concentrations needed to protect San Diego Bay beneficial uses (i.e the "no effects" sediment concentration level above which statistically significant biological effects could be expected to occur).

Paco Terminals Copper Cleanup Level

Cleanup and Abatement Order No. 85-91 was issued to Paco Terminals for elevated copper levels in the sediment in San Diego Bay adjacent to the facility. Paco Terminals was found to have discharged copper ore from their facility to San Diego Bay. Paco Terminals submitted a report prepared by Westec Services, Inc. entitled "Evaluation of Copper in Interstitial Water from Sediments at Paco Terminals, San Diego Bay, Phase II" on March 24, 1987. Interstitial water samples were collected and analyzed for copper from 36 sediment core samples. Linear regression was performed on the results to determine if there was a statistically significant relationship between copper concentrations in the interstitial water and sediment. Based on this linear regression, Westec Services, Inc. concluded that a sediment concentration of 7,050 mg/kg would result in an interstitial water concentration of 50 ug/l. The "Water Quality Control Plan, Ocean Waters of California, 1983" (1983 Ocean Plan) contains a 5 ug/l six-month median copper water quality objective. Although the available data did not provide a clearly defined relationship between the six-month median copper concentration of 5 ug/l and a particular sediment copper concentration, the Regional Board found in Addendum No. 1 to Cleanup and Abatement Order No. 85-91 that the data indicates that the sediment copper concentration of less than 1,000 mg/kg would likely result in water quality which meets the 1983 Ocean Plan six-month median water quality objective. Cleanup and Abatement Order No. 85-91, as amended, established a copper cleanup level of 1,000 mg/kg for Paco Terminals, Inc.

On August 1, 1991, a report entitled "Remedial Action Alternatives for National City Marine Terminal" prepared by Woodward-Clyde Consultants on behalf of the San Diego Unified Port District was submitted to the Regional Board. This report contained the results of toxicity tests conducted on the sediment adjacent to Paco Terminal. Nine different standard organism types were used including shrimp, flat fish, sea urchin eggs and embryos, clams, worms, two different amphipods, fish larvae, and oyster larvae. Eight of the nine organism types tested exhibited no toxicity under standardized toxicity, test conditions. The organism Rhepoxynius abronius exhibited a toxic response which was found to be unrelated to the copper concentration.

Toxicity tests indicate that the copper in the shipyards sediment is more bioavailable than the copper in Paco Terminals sediment. The Paco Terminals copper cleanup level was not used for the shipyards mainly because the relatively insoluble chalcocite copper ore discharged by Paco Terminals is not similar to the wastes generated by the shipyards.

Teledyne Ryan Aeronautical PCB Cleanup Level

Cleanup and Abatement Order No. 86-92 was issued to Teledyne Ryan Aeronautical (Teledyne Ryan) for elevated PCB levels in the Convair Lagoon portion of San Diego Bay. Teledyne Ryan submitted a report entitled, "Recommendations for PCB Action Levels in Sediments: Convair Lagoon, San Diego Bay, March 1990. Many factors were evaluated in this report including protection of benthic species, historic regulatory precedent, engineering/ economic feasibility, and background concentrations. Based on this report, a PCB cleanup level of 4.6 mg/kg will protect against chronic effects to the typical benthic species and other species in Convair Lagoon. The cleanup level is also expected to reduce the mussel tissue PCB concentrations to below the US Food and Drug Administration tolerance level of 2.0 mg/kg. Cleanup and Abatement Order No. 86-92, as amended, established a PCB cleanup level of 4.6 mg/kg.

On January 22, 1997, Teledyne Ryan Aeronautical submitted a report titled, "Baseline Sediment Toxicity Testing, Convair Lagoon Capping Project." This report presents the results of baseline sediment toxicity tests conducted for the Convair Lagoon Capping Project. Six sediment samples were collected; three in Convair Lagoon and three at reference stations outside of Convair Lagoon. Amphipod 10-day survival and reburial toxicity tests were conducted on each sediment sample using the amphipod Grandidierella japonica. Sediment samples from Convair Lagoon contained 39, 42, and 46 mg/kg PCBs (dry weight). Reference sediment samples contained 0.17, 0.18, and 3.8 mg/kg PCBs (dry weight). The average survival rate of 85 percent for the three Convair Lagoon sites is only slightly lower than the average survival rate of 86.3 percent for the three reference sites. The results of the toxicity tests do not indicate a significant relative toxicity of the Convair Lagoon sediment in comparison with the reference site sediment.

The results of sediment toxicity tests in Convair Lagoon and at Campbell Industries show that amphipod toxicity occurs at a lower PCB level (above 0.95 mg/kg) at shipyards compared to the elevated PCB level (above 46 mg/kg) in Convair Lagoon. These toxicity tests indicate that the PCBs in the sediment at Campbell Industries are more bioavailable than the PCBs at Convair Lagoon. The Teledyne Ryan PCB cleanup level was not used for the shipyards because the wastes in Convair Lagoon are not similar to the wastes adjacent to the shipyards.

Bay Protection and Toxic Cleanup Program Screening Values

Sediment samples were collected from approximately 160 stations in San Diego Bay as part of the Bay Protection and Toxic Cleanup Program (BPTCP) between October, 1992 and May, 1994. These BPTCP samples were analyzed for chemicals, toxicity, and/or benthic community structure. The results of the BPTCP samples were published in a report titled "Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. Final Report. September 1996." (1996 BPTCP Report). Additional BPTCP data were published in a report titled "Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. Addendum Report. 1998."

This 1996 BPTCP Report used two types of screening values to provide guidance for evaluating the degree to which sediment chemical pollutant levels are responsible for effects observed in a toxicity test. These screening values are the Probable Effects Level (PEL) developed by the State of Florida and the Effects Range - Median (ERM) developed by the National Oceanic and Atmospheric Administration (NOAA). The ERM was developed using a large national database of biological effects. The PEL was developed using a large database which is dominated by data collected in the southeast part of the nation. The report containing the PEL documentation states that the PEL numbers are broadly applicable in the southeast, and that care should be exercised in applying the PEL elsewhere in North America.

In order to better relate the original PEL and ERM numbers to San Diego Bay, the 1996 BPTCP Report uses adjustment factors of four times (4x) the ERM and 5.9 times (5.9x) the PEL. These San Diego Bay adjustment factors were derived using a qualitative examination of the BPTCP data set which indicated that only in the top 10th percentile of chemical measurements do the values exceed 4x the ERM or 5.9x the PEL. The table below shows the original and adjusted PEL and ERM for selected chemicals.

	Units (Dry Weight)	PEL	5.9 x PEL	ERM	4 x ERM
Copper	mg/kg	108	638	270	1080
Lead	mg/kg	112	662	218	872
Mercury	mg/kg	0.7	4.1	0.7	2.8
Zinc	mg/kg	271	1599	410	1640
PCBs	mg/kg	0.189	1.114	0.180	0.720

The original and adjusted PEL and ERM values were not used for shipyard cleanup levels because the PEL and ERM are more appropriately used as a screening tool rather than site specific cleanup levels. The site specific Campbell cleanup levels more accurately represent the relationship between shipyard chemical concentrations in the sediment and potential adverse biological effects

Regional Toxic Hot Spot Cleanup Plan

The Regional Toxic Hot Spot Cleanup Plan (Cleanup Plan) was adopted by the San Diego Regional Board on December 16, 1998. This Cleanup Plan, a result of the BPTCP, identifies and ranks candidate toxic hot spots. The Cleanup Plan includes a characterization of high priority toxic hot spots and a description of preliminary assessment of actions to address the problems. The Cleanup Plan also identifies one high priority and four medium priority candidate toxic hot spots in San Diego Bay. The high priority site is at Seventh Street Channel/ Paleta Creek near the Naval Station. The moderate priority sites are 1) between "B" Street and Broadway piers, 2) Switzer Creek, 3) Foot of Evans and Sampson Streets, and 4) Chollas Creek. The Chollas Creek site, at the south boundary of NASSCO, is the only candidate toxic hot spot which is near NASSCO and Southwest Marine. Three BPTCP stations, located in the mouth of Chollas Creek, had degraded benthic communities and elevated pollutant levels which qualified the site for a medium priority ranking. The impairment at Chollas Creek could be caused by sources other than shipyards such as urban runoff. Investigation of this Chollas Creek site is expected to be addressed during the Total Maximum Daily Load (TMDL) process for the Chollas Creek watershed.

Indicator Chemicals

Indicator chemicals are used to predict the most likely location of elevated levels of pollutants in the sediment. Indicator chemicals are chosen by identifying chemicals which are commonly elevated and which co-occur with other elevated chemicals. The goal is for cleanup of sediment containing elevated levels of the indicator chemicals to also result in cleanup of areas with elevated levels of any other pollutants. Sediment data from several sources was evaluated in determining indicator chemicals for NASSCO and Southwest Marine.

The NPDES permits for NASSCO (Order No. 85-OS) and Southwest Marine (Order No. 83-11) required biannual sediment sampling at seventeen and fifteen stations respectively. Sediment samples from each NPDES station were analyzed for metals or metals plus organics. The results from nine rounds of biannual sampling from 1992 through 1996 were evaluated in determining the indicator chemicals.

As part of the BPTCP, sediment samples were collected from approximately 160 stations in San Diego Bay between October, 1992 and May, 1994. These BPTCP samples were analyzed for chemicals, toxicity, and/or benthic community structure. The results from the chemical analysis of BPTCP samples were evaluated in determining indicator chemicals.

Sediment quality data from the NPDES biannual monitoring program and from the BPTCP were evaluated for each shipyard to determine appropriate indicator chemicals for each shipyard. Copper and zinc were identified as indicator chemicals for NASSCO. Mercury was also added later for a small area of NASSCO. Copper, zinc, lead, mercury, and PCBs were identified as indicator chemicals for Southwest Marine. Although only the indicator chemicals will be analyzed for, it is expected that any other pollutants at elevated concentrations will be removed with the indicator chemicals.

Cleanup Levels for NASSCO and Southwest Marine

In setting cleanup levels at any site, the Regional Board must consider the terms and conditions of State Board Resolution No. 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges). These conditions include 1) site-specific characteristics, 2) applicable state and federal statutes and regulations, 3) the Basin Plan, and 4) State Board Resolution 68-16 (statement of Policy with Respect to Maintaining High Quality Waters in California). Section ILA.9 of Resolution 92-49 directs Regional Boards to "prescribe cleanup levels which are consistent with appropriate levels set by the Regional Board for analogous discharges that involve similar wastes, site characteristics, and water quality considerations." The proposed shipyard cleanup levels for NASSCO and Southwest Marine are in conformance with Resolution No. 92-49.

Site-specific characteristics were considered by selecting cleanup levels which were established for San Diego Bay at similar facilities that involve similar wastes, site characteristics, and water quality conditions. The BPTCP, as discussed above, is an applicable state statute which was considered in establishing these cleanup levels.

The *Water Quality Control Plan, San Diego Basin (9)* (Basin Plan) was adopted by this Regional Board on September 8, 1994 and subsequently approved by the State Water Resources Control Board (State Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board. The Basin Plan designates beneficial uses and narrative and numerical water quality objective, and prohibitions which are applicable to the discharges regulated under this Order. The Basin Plan identifies the following beneficial uses of the waters of San Diego Bay: industrial service supply; navigation; water contact recreation; non-contact water recreation; ocean commercial and sport fishing; estuarine habitat; preservation of biological habitats of special significance; wildlife habitat; preservation of rare and endangered species; marine habitat; fish migration; and shellfish harvesting.

Beneficial uses established in the Basin Plan will be protected by these cleanup levels. The sediment adjacent to NASSCO and Southwest Marine contains pollutant concentrations which have been shown to be harmful to the benthic organisms in San Diego Bay. The Marine Habitat Beneficial Use (MAR) which has been designated for San Diego Bay includes uses of water that support marine ecosystems. These benthic

organisms are part of the marine ecosystem which is protected by the MAR use. The proposed cleanup levels will be protective of the benthic organisms and the MAR use because the cleanup levels were derived using biological studies involving benthic organisms.

State Board Resolution 68-16 provides that existing high water quality be maintained when it is reasonable to do so. This policy further provides that any adverse change in water quality 1) be consistent with the maximum public benefit, 2) will not unreasonably affect beneficial uses, and 3) will not result in water quality less than that prescribed in the policies. The proposed cleanup levels are consistent with the maximum public benefit and will not unreasonably affect beneficial uses because the cleanup levels were derived to protect beneficial uses for the public benefit. Water quality is not expected to be less than that prescribed in the policies as a result of these cleanup levels.

Based on all of the information discussed above, the proposed cleanup levels shown below are appropriate for NASSCO and Southwest Marine.

CONSTITUENT	CLEANUP LEVEL FOR BAY SEDIMENT (mg/kg) Dry Weight	NASSCO CLEANUP INDICATOR CHEMICALS	SOUTHWEST MARINE CLEANUP INDICATOR CHEMICALS
Copper	810	X	X
Zinc	820	X	X
Lead	231		X
Mercury	4.2	X	X
PCBs	0.95		X