

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

RESPONSE TO COMMENTS
REGIONAL BOARD REPORT
SHIPYARD SEDIMENT CLEANUP LEVELS
NASSCO & SOUTHWEST MARINE SHIPYARDS
SAN DIEGO BAY

February 16, 2001

Background

At the October 11, 2000 Regional Board meeting, the Regional Board received public comments and testimony regarding the selection of sediment cleanup levels at NASSCO and Southwest Marine shipyards. Staff presented a draft staff report dated October 6, 2000, with six (6) cleanup options at NASSCO and Southwest Marine for consideration by the Regional Board. These options are summarized in Tables 1 and 2 of the final staff report dated February 16, 2001. Options 1 through 4 entail Regional Board adoption of specific cleanup levels. Under Option 5 the Regional Board would require a detailed site-specific analysis to determine cleanup levels at a future date. Option 6 is a no-action alternative where the contaminated sediments would be left in place.

Final Recommendation

Staff recommends that the Regional Board direct the Executive Officer to issue Water Code Section 13267 letters to NASSCO and Southwest Marine requiring the submission of a site-specific study to develop sediment cleanup levels and identify sediment cleanup alternatives. The Site Specific Study should include at a minimum the information described below.

- Site Specific Study to Develop Cleanup Levels
 1. NASSCO and Southwest Marine shall submit a work plan and time schedule to complete a site assessment; develop sediment cleanup levels, including an adequate margin of safety, for constituents of concern identified through on-site chemical screening
 2. NASSCO and Southwest Marine shall develop cleanup alternatives with projected cleanup costs.
 3. NASSCO and Southwest Marine shall determine cleanup level(s) through scientifically defensible methods and designed to provide adequate protection for the most sensitive beneficial use of San Diego Bay. This requires that an extremely broad group of organisms that are affected by water quality conditions be considered. These include benthic (living in sediments) and epibenthic (living on the surface of sediments) organisms, organisms living in the water, waterfowl and shorebirds, and terrestrial animals (including humans) which eat aquatic organisms.
 4. NASSCO and Southwest Marine shall determine cleanup levels for each constituent of concern by several complimentary methods as determined by Regional Board staff. There is no single method that measures the effects of contaminated sediments at all times and to all organisms. The selection of complementary allow for the integration of empirical data developed for Apparent Effects Thresholds (AET), theoretical information used in Equilibrium Partitioning (EqP), and cause and effect relationships

established by spiked bioassays. The methods used to determine cleanup levels shall at minimum include the following:

- a) Equilibrium Partitioning (EqP) Approach – Cleanup levels will be established at chemical concentrations in sediment that ensure interstitial water concentrations do not exceed adopted water quality objectives or USEPA water quality criteria (in the absence of adopted water quality objectives)
 - b) Apparent Effects Threshold - The Apparent Effects Threshold (AET) approach is the sediment concentration of a contaminant above which statistically significant biological effects (e.g. amphipod mortality in bioassays, depressions in the abundance of benthic infauna) would always be expected. The method applies the triad of chemical, toxicological, and benthic community field survey measures to determine a concentration in sediments above which adverse effects are always expected.
 - c) Spiked Sediment Toxicity – Dose response measurements are established by exposing test organisms to sediments that have been spiked with known amounts of chemicals or mixtures of chemicals.
4. NASSCO and Southwest Marine shall assess the potential health risk to humans from exposure to pollutants through the food chain attributable to the contaminated sediment. If preliminary screening indicates an unacceptable risk to human health, a detailed human health risk assessment shall be conducted.
 5. NASSCO and Southwest Marine shall submit other additional information on cleanup costs, alternatives and methods as determined by Regional board staff. In determining this information staff will review and update the August 3, 1995 letter from the Regional Board to NASSCO and Southwest Marine describing the minimum criteria for contaminated sediment assessment.

Based on the information provided by NASSCO and Southwest Marine staff will develop specific cleanup recommendations for sediment cleanup levels at NASSCO and Southwest Marine and bring the matter back for Regional Board consideration at a future date.

Written Comments

Staff received a considerable volume of written comments on the staff report from interested persons by the November 8 deadline. Staff requests that Regional Board members refer to the comment letters on this item distributed by staff to Board members in special binders at the December 13, 2000, Regional Board meeting.

Response to Comments

This document is organized by the written documents received from the date of the October 11, 2000, Regional Board Meeting to the November 8, 2000, deadline. Each document is numbered and each comment is identified with the same number as the document.

No. Document

- 1.0 Robert N. Tasto**, Supervisor, Department of Fish and Game, October 13, 2000.
- 2.0 Brett Betts**, Washington Department of Ecology, November 6, 2000.
- 3.0 Russell Fairey**, Moss Landing Marine Laboratories, November 6, 2000.
- 4.0 Bruce Reznik**, Executive Director, San Diego Bay Keeper, November 8, 2000
- 5.0 Nicole Capretz**, Clean Bay Campaign Associate, Environmental Health Coalition, November 8, 2000.
- 6.0 H. Allen Fernstrom**, Campbell Shipyards, November 8, 2000.
- 7.0 David L. Mulliken**, Counsel for NASSCO and Southwest Marine, Latham & Watkins, November 8, 2000.

Comment from Robert N. Tasto at Department of Fish and Game.

Number 1.1:

Although Option 4 includes additional monitoring, it is our continued opinion that sediment cleanup levels established at 810 parts of million (ppm) for copper, 820 ppm for zinc, 231 ppm for lead, 4.2 ppm for mercury, and 0.95 ppm for polychlorinated biphenyls (PCBs) are not sufficiently protective of fish and wildlife resources found in San Diego Bay.

Response:

See response to Comment 5.2

Comment from Robert N. Tasto at Department of Fish and Game.

Number 1.2:

Option 3 is also problematic because it utilizes the Campbell Shipyard AETs as a baseline, then builds in an arbitrary 20% safety factor to reduce the cleanup levels. No scientific justification for the 20% safety factor is given in the report.

Response:

The 20% safety factor was an arbitrary safety factor designed to account for uncertainties, real or imagined, in the data set used to determine the Apparent Effects Threshold (AET) at Campbell Shipyards. The purpose was to provide some assurances that other discharges in the vicinity (e.g. urban storm water discharges from municipal storm drains) do not cause the AET sediment values to be exceeded following the cleanup.

It should be noted that the 20% was an add-on safety factor proposed by staff over and above at least two other safety factors already built into the development of the Campbell Shipyard AET values:

1. The Campbell Shipyard AET values were derived for 8 chemicals - copper, lead, zinc, tributyltin, High molecular weight polycyclic hydrocarbons (HPAH), benzo (a) pyrene, polychlorinated biphenyls (PCBs) and Total petroleum hydrocarbons. Developing AETs for multiple chemicals at Campbell Shipyards accounted for a high percentage of all stations with biological effects.

2. Four biological indicators were used to develop AET values at Campbell Shipyard for each chemical (amphipod mortality, polychaete growth depression, depression in total benthic infauna abundance, and depression in amphipod abundance). The lowest of the four different AET values calculated for each chemical (commonly referred to as the LAET) was selected as the LAET value for that chemical. For example the copper AET values for the four biological indicators were as follows:

- a) amphipod mortality (copper concentrations 810 - 1450 mg/kg)

- b) polychaete growth depression (copper concentrations: 1450 - 2500 mg/kg)

c) depression in total benthic infauna abundance (copper concentrations: 1450 - 2500 mg/kg)

d) depression in amphipod abundance (copper concentrations: 1450 - 2500 mg/kg)

The selected LAET copper concentration was 810 mg/kg which was the lowest of the four AETs developed for copper. This last value is protective of a wide range of potential adverse biological effects.

Comment from Robert N. Tasto at Department of Fish and Game.

Number 1.3:

According to the provisions of Cleanup and Abatement Order No. 95-21, issued for the Campbell Shipyards, the AETs identified for Campbell were to be used only at the Campbell site, and Order No. 95-21 strictly prohibited their use anywhere else in San Diego Bay.

Response:

CAO 95-21 Provision No. 2, quoted below sets cleanup levels for the Campbell Shipyards site and not another site. "The cleanup levels in this order are applicable for cleanup at the Campbell Shipyards site and shall not be construed to be applicable or transferable to any other location". The purpose of this provision was to recite the Regional Board's intent that the Campbell Shipyards cleanup levels not be used at other locations as cleanup levels without technical justification.

CAO 95-21 does not prohibit use of the Campbell Shipyards cleanup levels at other locations. The Regional Board has provided technical justification in the 1999 Staff Report addressing the reasons the Campbell Shipyards AET cleanup levels could be used as cleanup levels at the NASSCO and Southwest Marine shipyard sites. (The Regional Board's preferred alternative is to conduct a site-specific study at NASSCO and Southwest Marine to develop the cleanup levels.)

Comment from Robert N. Tasto at Department of Fish and Game.

Number 1.4:

The BPTHS data indicate that several sites around California had concentrations of copper above 400 ppm, zinc above 630 ppm, lead above 171 ppm, mercury above 1.54, and PCBs above 0.865 ppm. Sites that had sediment at these concentrations were classified as being in the top 5% worst sites in the State and were associated with acute toxicity. It should be noted that the same amphipod test was utilized to determine toxicity for both the Campbell study and the BPTHS study. Most importantly, the cleanup levels proposed in Option 3 and Option 4 are significantly higher than the top 5% worst sites in California and would be acutely toxic to benthic organisms.

Response:

The chemical concentrations that set the AET values for the Campbell Shipyards were shown to be non-toxic to amphipods in site-specific sediment toxicity tests. By definition of an AET, Campbell Shipyard cleanup levels (Options 3 and 4) represent concentrations that are "not" toxic to benthic organisms studied at Campbell Shipyard. Accordingly, these cleanup levels cannot be ranked as being in the top 5% worst sites in California. Additionally, the analysis of the data to determine the top 5% worst sites did not consider that more than one chemical may be responsible for the observed toxicity. By identifying a given sample as being toxic, all of the chemicals present in that sample, regardless of concentration, should be suspected as causing the toxicity.

Comment from Robert N. Tasto at Department of Fish and Game.

Number 1.5:

Additional justification for our concerns can be found in screening guidelines produced by the National Oceanic and Atmospheric Agency (NOAA). These guidelines identify AETs for copper (390 ppm), zinc (410 ppm), mercury (0.41 ppm) and PCBs (0.130 ppm). We note that the NOAA AETs for these constituents are also well below those that would be established by implementing Options 3 or 4.

Response:

NOAA has not developed AET values. The data cited are AET values developed by the State of Washington, Department of Ecology, for Puget Sound. Staff disagrees with the underlying premise of this comment that the Puget Sound AETs would necessarily have more validity than the Campbell AET values at NASSCO and Southwest Marine. It is important to note that Puget Sound AET values have not been validated for San Diego Bay. Although these values have been shown to have a high level of accuracy in predicting adverse effects in Puget Sound, their accuracy has not been determined for other regions. Differences in wave current and wave conditions between San Diego Bay and Puget Sound may lead to very different bottom sediment compositions. The density, size distribution, salinity and degree of flocculation of sediments may also be quite different. This point is especially important because Puget Sound AET values are based on empirical relationships between chemical concentrations and biological effects observed in Puget Sound. Because of these uncertainties, Puget Sound AET values should be viewed only as a screening-level tool when applied to areas outside of Puget Sound.

It should also be noted that not only have the Puget Sound AETs not been validated at NASSCO and Southwest Marine but neither has Campbell's AETs. Based on this consideration it would be inappropriate and improper to apply the Campbell AET values at NASSCO and Southwest Marine.

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Comment from Robert N. Tasto at Department of Fish and Game.

Number 1.6:

All of the Puget Sound AETs are well below those identified in Options 3 and 4.

Response:

Staff agrees that the levels established by options 3 and 4 are above Puget Sound AETs. Staff's initial premise with Options 3 and 4 is that the Campbell Shipyard AET numbers were valid at the Campbell Shipyard site and also potentially valid for other shipyard sites in San Diego Bay due to similarities between physical, biological and chemical conditions at Campbell, NASSCO and Southwest Marine shipyards. See response to Comment 1.5 regarding the applicability of Puget Sound AET values to San Diego Bay.

There are a variety of complimentary approaches available to derive cleanup levels (e.g. Apparent Effects Threshold (AET), Equilibrium Partitioning, Spiked Sediment Toxicity, human health risk assessment) which taken together, can provide a firm foundation for a site specific cleanup level at NASSCO and Southwest Marine that would be fully protective of beneficial uses. Staff is recommending that the Regional Board require NASSCO and Southwest Marine to develop site specific cleanup levels based on this approach.

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.01:

In my review, I didn't see much information on relating human health risk to sediment concentrations. This routinely requires development of a site-specific biota to sediment accumulation factor (BSAF) to relate tissue concentrations that represent the range of acceptable risk to humans with a sediment concentration for the chemical(s) of concern.

Response:

The Regional Board staff report does address the potential human health risk from exposure to pollutants through the food chain attributable to the contaminated sediment. The sediments at NASSCO and Southwest Marine contain varying concentrations of copper, lead, zinc, mercury, and PCBs. Copper, lead, and zinc do not bioaccumulate in significant concentrations that present a human health risk through fish consumption. Mercury and PCBs are significantly bioaccumulative, however, and the health risk to humans from exposure to pollutants through the food chain attributable to the contaminated sediment needs to be addressed in the development of the cleanup levels for NASSCO and Southwest Marine. Staff is recommending that the Regional Board require that this issue be addressed by NASSCO and Southwest Marine in developing the technical information to support site specific cleanup levels.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.02:

There is no documentation provided on your development activities regarding AETs in the past, and so its difficult to provide any comment on their strength and usability.

Response:

There are technical reports available at the Regional Board office for public reviewdiscussing the development of AET values at Campbell Shipyard. It should be noted, however, that dredging activities at Campbell Shipyard have not commenced.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.03:

Recontamination Potential. In the pros and cons discussion on each alternative, there was little information on recontamination potential and only a brief analysis of natural recovery via SEDCAM. For your information, Ecology views this model as simplistic and generally unacceptable for final recontamination potential evaluations. Ecology recommends use of the Water Quality Analysis Simulation Program (WASP5) to evaluate recontamination potential.

Response:

The Regional Board did not consider recontamination potential in the staff report. The Regional Board will look into acquiring the Water Quality Analysis Simulation Program (WASP5) to evaluate recontamination potential.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.04:

Ecology uses larval sediment bioassays for sediment biological testing including the following oyster, mussel, sand dollar and sea urchin species: *Crassostrea gigas*, *Mytilus edulis*, *Dendraster excentricus* and *Stronglyocentrotus purpuratus* and *S. droebachiensis*, respectively.

Response:

The Regional Board is requiring the addition of a bivalve sediment toxicity test for the development AET values at the NASSCO and Southwest Marine Shipyard sites. The addition of the bivalve sediment toxicity test provides a bioassay with greater sensitivity to toxicity than the amphipod or polychaete test. The bivalve sediment toxicity test, using mussels (*Mytilus* sp), is a biologically relevant test species because mussels are found throughout San Diego Bay attached to pier piling, boat docks, and hard substrate (jetty rocks). The alternate bivalve species to mussel will be the Pacific oyster (*Crassostrea gigas*).

Comment from Brett Betts at Washington Department of Ecology.

Number 2.06:

Benthos. From the report, it appears total benthic infaunal abundance has been used to define impacts. Were additional benthic endpoints considered/evaluated? Currently, Ecology's recommended endpoints for discriminating low contaminant level benthic impacts are Schwarz Dominance Index, enhanced polychaete abundance, Mollusca abundance, Crustacea abundance, and total richness.

Response:

Total benthic infauna abundance was the only endpoint used to assess the benthic community at Campbell Shipyard. Staff will evaluate and consider Ecology's recommended endpoints, as well as the benthic endpoints used in the 1996 Bay Protection and Toxic Cleanup Program, to evaluate the benthic communities at NASSCO and Southwest Marine.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.07:

It wasn't clear whether Cambell Shipyards and Shelter Island Boatyard had completed cleanup or whether only cleanup levels had been developed and accepted.

Response:

Shelter Island Boatyard is located in the Commercial Basin portion of San Diego Bay. In 1988 the Regional Board issued Cleanup and Abatement Order (CAO) No. 88-70 due to illicit waste discharges to San Diego Bay. Based on the results of a site assessment, the Regional Board decided that sediment remediation was not necessary and rescinded the cleanup and abatement order in 1991.

On May 24, 1995, the Regional Board issued Cleanup and Abatement Order No. 95-21 to Campbell Industries and Marine Construction and Design Company Holding, Inc. (MARCO). The order requires the cleanup of approximately 17,000 cubic yards of contaminated bay sediment containing elevated concentrations of metals and other contaminants that have accumulated in San Diego Bay sediments over the years. The order also requires the cleanup of soil and ground water located at the Campbell Shipyards site.

To date, Campbell Industries and MARCO have not begun cleanup activities at the site. On August 24, 2000, the Executive Officer issued Notice of Violation No. 2000-137 for violation of Cleanup and Abatement Order No. 95-21. The Notice of Violation asserts that Campbell Industries and MARCO have violated Directives 3, 4, 5, 6, and 7 thereof. These directives require complete cleanup of soil containing wastes, polluted groundwater, and bay sediment containing wastes at the Campbell Shipyard site by June 1, 2000.

On August 8, 2000, the Port of San Diego elected to perform all remaining remediation and demolition actions required under the terms of the Lease Termination Agreement between the Port of San Diego and Campbell Industries. A remedial action workplan has been submitted by the Port for soil and groundwater cleanup at the site. Regional Board staff is currently reviewing this workplan. A remedial action workplan for bay sediment cleanup will be submitted to Regional Board staff at a later date.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.08:

Page 7, Regional Board Peer Review Follow-up, Sentence 2. I assume this was a typo, that you did actually disagree with some peer comments as identified later in the analyses you provided.

Response:

The sentence should read as follows: "There are some statements in the peer review reports that staff agrees with and other that staff disagrees with."

Comment from Brett Betts at Washington Department of Ecology.

Number 2.09:

Page 15, Timeline. I was pretty surprised and dismayed to see your documentation of ten years of effort for the subject sites. Did sediment investigations proceed?

Response:

In March, 1999 the Regional Board adopted Resolutions 99-12 and 99-20. These resolutions established, on an interim basis, the use of cleanup levels derived from studies conducted at Campbell Shipyards and Shelter Island Boatyard at NASSCO and Southwest Marine. The Resolutions were adopted on an interim basis to encourage the process of removing contaminated sediments at NASSCO and Southwest Marine to get underway. The Board also directed staff to send out the staff report on the interim cleanup levels for peer review to assist in determining if the cleanup levels should be adopted as final cleanup levels.

The removal of sediments under the March, 1999 interim cleanup levels has not occurred. The shipyards do not want to duplicate an effort of mobilizing resources for an interim cleanup and then again for a final cleanup.

Earlier this year the Regional Board received three reports from the peer review panel discussing the use of interim levels as final cleanup levels. There are some statements in the peer review reports that staff agrees with and others that staff do not disagree with. The peer review comments are addressed in detail in the staff report.

The Regional Board is currently evaluating the pros and cons of alternative sediment cleanup levels at the two shipyards.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.10:

Page 19, last paragraph, page 20, first and fourth paragraphs. I recommend some reconsideration of whether San Diego Bay tissue levels are at levels that represent a threat to human health. The mercury levels AET recommended in the Shelter Island Boatyard discussion strike me as extremely high and potentially insensitive to tissue accumulation/human health risk issues.

Response:

See response to Comment 2.1

Comment from Brett Betts at Washington Department of Ecology.

Number 2.11:

Page 21, Peer Review Panel and comments. While the peer review panel was apparently chosen on the basis of “professional experience and reputation concerning bay sediment analysis, and benthic chemistry and toxicity,” their experience and knowledge on development and use of the AET methodology was not identified. I am not aware that any of these individuals would be considered an AET expert, much less supportive of the development and use of AETs.

Response:

Steve Bay is a Principal Scientist with Southern California Coastal Water Research Project Authority (SCCWRP) and specializes in the physiology and developmental biology of invertebrates. Russell Fairey is a marine biologist with the Department of Fish and Game at the Moss Landing Marine Laboratories, San Jose State University. Todd Thornburg is a Senior Associate Oceanographer with Hart Crowser, Inc., Lake Oswego, Oregon. All three members were selected due their professional experience and reputation concerning bay sediment chemistry and toxicity issues.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.12:

Steve Bay Southern California Coastal Water Research Project (one of the peer reviewers selcted by the Regional Board) stated that contamination patterns are different therefore use of the AETs are not appropriate. While I strongly support your efforts to develop and use AET values for sediment management, Ecology has not used AETs based on less than 50 stations to regulate site-specific cleanup. This does not mean you can't use your 15 station AET values, but that you must accept that there is higher uncertainty with their use. This means that not only could the AETs you have developed change significantly, but also that additional AETs, e.g., mussel, could be substantially more sensitive and drive potential cleanup values to far more stringent levels.

Response:

In responding to this comment, it is important to draw a distinction between the minimum stations needed to establish a waterbody-wide AET value vs. the minimum stations needed to establish a site specific AET value at a shipyard. The Campbell Shipyard AET values were developed for a specific shipyard site and the Regional Board is not proposing to use them indiscriminately as San Diego Bay-wide sediment quality objectives.

The State of Washington, Department of Ecology develops AET values for Puget Sound based on a data set encompassing a minimum of 50 stations. The Department of Ecology does not require a data set of 50 samples or greater to develop site specific AET values at specific sediment contamination sites in Puget Sound. If a single site specific value exhibits no toxicity at chemical concentrations exceeding the State's Puget Sound AET value, the site specific value overrides the AET value for purposes of sediment cleanup.

The Regional Board agrees with the Department of Ecology's observation that there is greater uncertainty associated with applying Campbell's site specific AET value based on 15 stations at other sites such as NASSCO and Southwest Marine vs. the Department of Ecology applying a Puget Sound AET based on a minimum of 50 stations to a site in Puget Sound. The Regional Board also agrees with the Department of Ecology's observation that additional AET values for other biological indicators, such as the bivalve sediment toxicity test, could drive cleanup levels in a more stringent direction.

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.13:

Steve Bay, Southern California Coastal Water Research Project (one of the peer reviewers selected by the Regional Board) stated that the insufficient data support the AET values' reliability. See my general comment regarding your AET development activities. Were reliability analyses completed?

Response:

The sampling and station locations conducted at Campbell Shipyards to develop AET values was in conformance with accepted practices for developing site specific AET values. The stations were located so that chemical concentrations spanned a wide range. A diversity of chemicals were measured for use in developing AET values. Matched chemical and biological effects data were collected from 14 stations in the Campbell leasehold. The details on the sampling and station locations are well documented in the report entitled Campbell Shipyards Sediment Characterization (PTI, June 1991) and is available for public review in the Regional Board office.

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.14:

Russell Fairey, California Department of Fish and Game, (one of the peer reviewers selected by the Regional Board) , commented in the peer review that cleanup levels using an AET approach do not provide the level of environmental protection for the management area. I assume Mr. Fairey is commenting on the sensitivity of the AETs that were developed at Campbell Shipyard, and I would agree that more sensitive AETs may be developed.

Response:

Russell Fairey is commenting not on the sensitivity of the AET but on the AET process itself. Even the most sensitive test provides no added protection for organisms equally as sensitive. Staff agrees with that statement. But the AET approach is not the only approach available. There are a variety of complimentary approaches available to derive cleanup levels (e.g. Apparent Effects Threshold (AET), Equilibrium Partitioning, Spiked Sediment Toxicity, human health risk assessment) which taken together, can provide a firm foundation for a site specific cleanup level at NASSCO and Southwest Marine that would be fully protective of beneficial uses. Staff is recommending that the Regional Board require NASSCO and Southwest Marine to develop site specific cleanup levels based on this approach.

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.15:

Todd Thornburg (one of the peer reviewers selcted by the Regional Board) commented that sediments exhibit low toxicity. This could really speak to the need for additional biological tests, e.g., larval species that may be more sensitive to the chemicals of concern. It also appears none of the peer reviewers commented on human health issues?

Response:

The Regional Board is requiring the addition of a bivalve sediment toxicity test for the development of site specific AET values at NASSCO and Southwest Marine shipyards. The addition of the bivalve sediment toxicity test will provide a bioassay with greater sensitivity to toxicity than the amphipod or polychaete test. The bivalve sediment toxicity test, using mussels (*Mytilus* sp), is a biologically relevant test species because mussels are found throughout San Diego Bay attached to pier piling, boat docks, and hard substrate (jetty rocks). The alternate bivalve species to mussel will be the Pacific oyster. Also see response to Comment 4.11.

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.16:

Todd Thornburg one of the peer reviewers selected by the Regional Board) commented that Campbell Shipyards AETs are consistent with sediment management standards. I am interested in whose sediment management standards Mr. Thornburg is referring to, as there are some differences from Ecology's sediment management standards, e.g., mercury and PCBs.

Response:

Mr. Thornburg is referring to Washington Department of Ecology's Sediment Management Standards in his May 9, 2000 peer review document. Mr. Thornburg indicated that the Cambell AET values were within a factor or two of the State of Washington's Sediment Management Standards. In order to set the record straight on this point the AET values proposed as cleanup levels at NASSCO and Southwest Marine and the State of Washington's corresponding Sediment Management Objectives are listed below for comparison purposes:

Constituent	AET values proposed as cleanup levels at NASSCO and Southwest Marine from Campbell Shipyard AETs	Washington Sediment Management Standards
Copper	810 mg/kg	390 mg/kg
Zinc	820 mg/kg	410 mg/kg
Lead	231 mg/kg	450 mg/kg
PCBs	0.95 mg/kg	1.00 mg/kg

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.17:

Page 23, last paragraph. I understand why you recommend the need for an additional biological test, but recommend caution regarding your language "A less desirable alternative is to rely on a total benthic infauna abundance study as the additional test." In any case, recommend you word this response carefully to distinguish the issue and your rationale clearly.

Response:

Staff is deleting the following paragraph from the staff report: "A less desirable alternative is to rely only on a total benthic infauna abundance study as the additional test, such as the one provided by the Campbell Shipyard study. Benthic organisms live on or within the sediments of the sea floor and are directly exposed to chemicals in the sediment. This study will give a direct real time relationship between the chemicals in the sediment and the impacts on benthic organisms." The Regional Board will require the bivalve sediment toxicity test in the development of AETs values at NASSCO and Southwest Marine.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.18:

Page 24, Grain size. The discussion here could be improved by some reference to actual ranges of grain size and TOC evaluated, rather than just referring to the statistical test results, i.e., let the reader evaluate the ranges.

Response:

The Regional Board has modified Appendix C in the final version of the staff report to include tables with means, standard deviations, maximum, and minimum values.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.19:

Page 25/26, Tables 3 and 4. These kind of comparisons make me wonder about what the range of contaminant levels were in the separate locations and which values were used in the statistical evaluations, i.e., means, median, geometric mean. These type analyses often say more about the statistical methods used, than the actual data compared. Some review and discussion of the individual and composite datasets for normality/homogeneity would help the reader too.

Response:

Staff agrees and will include additional summary tables in Appendix C.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.20:

Page 27, Paragraph 1. Assume you meant "quantity of acid volatile sulfides."

Response:

The Regional Board has corrected the final version of the staff report to state "quantity of acid volatile sulfides".

Comment from Brett Betts at Washington Department of Ecology.

Number 2.21:

Page 27, Paragraph 2. The last sentence suggests diversity measures were analyzed. Are results from diversity endpoint measurements available?

Response:

Benthic macroinvertebrate comparisons were conducted in the development of the Campbell Shipyard AET. Major taxa abundance and total abundance were used in the comparison of the 15 stations in the Campbell Shipyard. For total abundance and polychaete abundance, only Station SS-34 was significantly different than the reference station. Differences in amphipod abundance was noted at Stations SS-29, SS-34, SS-39, and SS-42. No differences were observed in gastropod or bivalve abundance.

The Campbell study concluded "The overall abundances of the benthic macroinvertebrates are generally high, not only in comparison to the reference station used for this study but also relative to sampling performed elsewhere in San Diego Bay." It also stated "With the exception of Station SS-34, abundances found at Campbell Shipyards exceed those found at Commercial Basin reference locations." It appeared as if the sediment chemicals effects were localized to the near shore activity shipyard areas. From the stations that showed significant effects, the number of individuals were still relatively high and the types of species found were not indicative of a highly contaminated area.

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Comment from Brett Betts at Washington Department of Ecology.

Number 2.22:

Page 27, Last paragraph. "The AET approach has been used throughout the country..." I'd be interested in your information supporting this claim for strictly selfish reasons. You also recommend cleanup levels can be set at more stringent levels to block for "uncertainties in the data" later on in this paragraph. Which uncertainties are your referring to and why are they important?

Response:

The Regional Board understands the State of Washington adopted Sediment Mangement Standards in April 1991. These regulations include standards for a large number of chemicals that commonly occur in sediments. The numerical values were developed using the Apparent Effects Threshold (AET) methodology. The State of Washington and the U.S. Environmental Protection Agency (EPA) Region 10 have adopted the use of the AET methodology for identifying and prioritizing sediment cleanup sites and for determining the site specific sediment cleanup standards at various sites in the State of Washington, including Commencement Bay Superfund Site, Harbor Island Superfund Site, Whatcom Waterway and Eagle Harbor Superfund Site. The AET approach was also adopted by state and federal resources agencies including the Army Corps of Engineers, for use in dredged material management programs in Washington and Oregon. We also understand that AET values are currently being used or considered for determining sediment cleanup criteria in Oregon, Hawaii and the northeast United States. Other efforts to develop sediment quality values using the AET approach are under way in the countries of Canada, New Zealand, and Australia.

The Regional Board also understands that US Fish and Wildlife Service is using an approach similar to the AET approach to develop sediment quality values for the Great Lakes. The freshwater sediment quality values are referred to as "No Effects Concentrations" (NECs) and include values for sediment as well as pore water.

See response to Comment 1.2 regarding the 20% safety factor.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.23:

Page 28, Evaluation of Most Sensitive Beneficial Use, paragraph 2. This states the overt assumption that the benthic community represents the most sensitive beneficial use needing protection from contaminated sediments. In Washington State, human health often sets the most sensitive beneficial use for sediment contamination from PCBs and PAH compounds. Is consideration of human health included in this stated assumption?

Response:

Yes. This assumption is based on the data gathered at the Campbell Shipyard site that showed bioaccumulation was below that of reference site. See response to comment 2.1.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.24:

Page 30, Evaluation of Most Sensitive Beneficial Use, last paragraph. Although site-specific bioaccumulation testing is wise, I assume this just addresses laboratory bioaccumulation tests, not field collected tissue samples. Will field tissue samples be collected? Has any consideration been given to development of BSAF values? How will sediment cleanup values be identified to protect for human health risks?

Response:

Field tissue samples from fishes and crustaceans will not be recommended for collection because it will be difficult to draw a direct correlation between contaminated sediment and tissue bioaccumulation for migratory and mobile animals such as fish and lobsters. Stronger arguments can be made for bioaccumulation tests conducted under laboratory conditions. If the results of the bioaccumulation study determine that risks to human health exist, a model will be used to calculate sediment cleanup levels for the chemicals of concern. Also see response to Comment 2.1.

Comment from Brett Betts at Washington Department of Ecology.

Number 2.25:

Page 32, Background Reference Stations. The discussion in the staff report was pretty hard to understand without having the supporting analyses in Appendix E. Ecology defines background differently from reference. We use background as essentially a localized ambient sediment quality condition often used in the context of sediment quality conditions upcurrent/upstream from a particular discharge. Ecology uses reference stations primarily for bioassay testing and they represent a pristine, non-anthropogenically contaminated sediment quality condition which is characteristic of a site-specific sediment quality for grain size, TOC and other chemical and physical attributes.

Response:

The State of California's definition of "background" in the context of waste discharge cleanup does differ from the State of Washington. The State of California's authority to require cleanup of the contaminated sediment at NASSCO and Southwest Marine is contained in California Water Code Section 13304. This section authorizes the Regional Board to require complete cleanup of all waste discharged by Southwest Marine and NASSCO and restoration of affected water quality to background conditions (i.e. , the water quality that existed before the discharge). Resolution 92-49 is a state policy that establishes policies and procedures for investigation and cleanup of discharges under California Water Code Section 13304. Background condition is defined in the policy at Finding 4 Page 1 to mean ..."the water quality that existed before the discharge". It should also be noted that Provision III.F.1. of the policy on Page 10 stipulates that under no circumstances shall Regional Boards require cleanup to levels more stringent than background - the water quality that existed before the discharge. Dischargers are required to cleanup only the waste that they caused or permitted to be discharged to waters of the state.

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Comment from Russell Fairey at Moss Landing.

Number 3.1:

What review of these databases demonstrate is that sediments with chemical concentrations at the levels at or above those proposed in Option 3 are predicted to be statistically toxic to amphipods for roughly 58-91% of the samples. This is based on a very large number of samples around the US and the state of California (including San Diego Bay).

Response:

Staff disagrees with the underlying premise that the databases developed by NOAA or the BPTCP database somehow supercede the site specific data collected at Campbell Shipyard to develop AET values. See Response to Comment 3.5.

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Comment from Russell Fairey at Moss Landing.

Number 3.2:

It also becomes quite clear that even the most stringent of the cleanup options (Option 1 - Background Reference) may not provide an adequate level of protection to meet the Board's objectives. This is particularly significant in my view because the most stringent of the proposed cleanup options only cleans up sediments to a concentration that is predicted to be acutely toxic to amphipods half the time. Do these chemical concentrations provide the predictive levels of protection to meet management objectives for beneficial uses?

Response:

The sediment concentrations identified in Option 1 (Background Reference Station) were determined by staff to represent the sediment quality in terms of chemical constituent concentrations that existed before the discharge of waste by NASSCO and Southwest Marine. Pursuant to Provision III. F.1. of Resolution 92-49 , the Regional Board cannot

require NASSCO and Southwest Marine to cleanup waste to levels more stringent than background.

The sediment concentrations identified for Option 1 do provide predictive levels of protection to meet management objectives for San Diego Bay beneficial uses. As part of the 1996 Bay Protection and Toxic Cleanup Program (BPTCP), three locations (Stations 90003, 93205, and 93206) were sampled at Broadway Pier (where reference station REF-03 is located). Based on the BPTCP study, the percent amphipod survival for the three stations ranged from 70%-95% at concentrations nearly equivalent to the cleanup levels proposed in Option 1. The BPTCP study also identified degraded benthic communities at each of the three stations. Staff believes that the degraded benthic communities are not caused by the copper, zinc, lead, mercury, and PCB concentrations present in the Broadway Pier sediment. Benthic community degradation is likely attributed to the combination of high PAH concentrations present in the sediment (identified in the three stations) and propeller wash from ship activity at Broadway Pier. To support this assumption, the BPTCP study identified data across the bay from the shipyards (Glorietta Bay) at stations 93194 and 93195 that resulted in undegraded benthic communities and high amphipod survival rates (81%-89%). The benthic communities at Glorietta Bay were exposed to virtually the same copper, zinc, lead, mercury, and PCB concentrations present at Broadway Pier. However, the PAH concentrations were significantly lower at Glorietta Bay than at Broadway Pier.

The range of chemical concentrations for the Broadway Pier stations are as follows:
Copper = 88-110 ppm, Zinc = 180-210 ppm, Lead = 22.7-41.8 ppm, Mercury = 0.454-1.36 ppm, Total PCBs = 0.063-0.069 ppm, and Total PAHs = 5.98-48.4 ppm.

The range of chemical concentrations for the Glorietta Bay stations are as follows:
Copper = 86-93 ppm, Zinc = 200-220 ppm, Lead = 33-34 ppm, Mercury = 0.653-0.669 ppm, Total PCBs = 0.051-0.058 ppm, and Total PAHs = 0.946-1.2 ppm.

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Comment from Russell Fairey at Moss Landing.

Number 3.3:

When this information is put together it becomes clear that sediment cleanup only to the Option 3 levels at the shipyards will leave sediments in place with chemical concentrations that are quite elevated with respect to sediments around California and the U.S. and that have a high probability of being toxic to sensitive benthic organisms. Sediments with chemical concentrations higher than those proposed in Option 3 have even higher probabilities of being toxic.

Response:

Staff does not agree that the databases cited in the comment provide reliable data for assessing the probability that a given chemical concentration will be toxic to marine amphipods at NASSCO and Southwest Marine. For example, the NOAA database is intended for use as a very conservative sediment chemistry screening tool in order to identify the need for further site specific biological and sediment chemistry site

assessment studies. It is also important to note that although the sediment chemical concentrations at Campbell Shipyard exceeded NOAA's ERM values, the chemical concentrations that set the AET values were shown to be non toxic to amphipods in site-specific sediment toxicity tests. See response to Comment 3.5.

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Comment from Russell Fairey at Moss Landing.

Number 3.4:

The terminology in Option 1 for "background reference station" implies that these levels are exceedingly low, however, review of these databases demonstrate that a rough average of 50% of the sediment samples around California and 80% of the samples around the US have chemical concentrations lower than the proposed Option 1 chemical concentrations.

Response:

Staff is not implying that the copper, zinc, lead, mercury, and PCB concentrations proposed in Option 1 (Background Reference Station) are exceedingly low. The proposed concentrations are, however, comparable to concentrations present in areas within San Diego Bay with "undegraded" benthic communities (i.e., healthy benthic communities) and relatively high amphipod survival rates (74%-89%). These areas were identified by the 1996 Bay Protection and Toxic Cleanup Program - San Diego Region. In any event, pursuant to Resolution 92-49, the Regional Board cannot require NASSCO and Southwest Marine to cleanup waste to levels more stringent than background conditions - the water quality that existed before the discharge from NASSCO and Southwest Marine.

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Comment from Russell Fairey at Moss Landing.

Number 3.5:

In direct disagreement with one of the report recommendations, however, I believe it is reasonable and pertinent to consider cleanup options that remove sediments to more protective levels than those proposed in Option 1. There are other sediment quality guidelines such as TELs (threshold effects level) and ERLs (effects range low) for which chemical concentrations are predicted to have significantly lower incidences of toxicity. These chemical concentrations are predicted to be less toxic and should provide more protection to sensitive benthic organisms. Again the question is whether this better meets management objectives than the proposed options.

Response:

There have been several studies by Long et al (1995) and McDonald et al (1996) associating chemical concentrations with biological responses. The purpose of these studies was to provide guidance in evaluating the probability that a given chemical concentration most likely contributed to observed biological effects. The studies evaluated chemical and toxicological evidence from a number of laboratory, field and modeling studies to establish ranges of chemical concentrations which are rarely, sometimes, or usually associated with toxicity.

Two different methods were used to determine these chemical ranges. The National Oceanic and Atmospheric Administration (Long et al 1995) used chemical data associated with biological responses to determine the Effects Range Low (ERL) - the lower 10th percentile of ranked data where chemical concentration was associated with an effect. The second method developed by McDonald et al (1996) also used chemical data associated with biological responses to determine the Threshold Effects Level (TELs). TELs were derived by taking the geometric mean of the 50th percentile of the "No Biological Effects" data and the 15th percentile of the "Biological Effects" data. Long et al (1995) and McDonald et al (1996) never intended that the various chemical concentrations such as ERLs and TELs they derived be used for site specific cleanup levels. They intended that the ERLs and TELs for use as very conservative (i.e. environmentally protective) sediment chemistry screening tools in order to identify the need for further site specific biological and sediment chemistry site assessment studies.

The use of ERLs and TELs as cleanup levels could lead to cleanup of sediments well beyond the level necessary to fully protect beneficial uses of San Diego Bay. Site specific biological and sediment chemistry site assessment studies would develop a much more accurate relationship between sediment chemistry concentrations and potential adverse biological effects. For example, the unique physical sediment characteristics at a site can influence the bioavailability of chemicals and hence the cleanup level needed to protect beneficial uses. Accordingly, staff does not recommend that the Regional Board use ERLs and TELs in lieu of site specific biological and sediment chemistry site assessment studies.

Comment from Russell Fairey at Moss Landing.

Number 3.6:

From my review of two of the largest available databases, it is my opinion that all of the proposed cleanup options will leave sediments in place that pose a significant risk (high probability of toxic effects) to benthic communities.

Response:

The two databases fail to consider that more than one chemical may be responsible for the observed toxicity. By identifying a given sample as being toxic, all of the chemicals present in that sample, regardless of concentration, should be suspected as causing the toxicity. Consequently, the two databases cannot be used to "predict" toxic effects from concentrations of individual chemicals. See responses to Comments 1.5, 3.3, and 3.5.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.01:

First, using background reference levels (as opposed to true background levels) ensures that NASSCO and SWM remediate only the contamination they are responsible for, meaning such an order will be equitable to these companies.

Response:

Staff agrees. The sediment concentrations identified in Option 1 (Background Reference Station) were determined by staff to represent the sediment quality in terms of chemical constituent concentrations that existed before the discharge of waste by NASSCO and Southwest Marine. Under Option 1, NASSCO and Southwest Marine are required to cleanup only the waste that they caused or permitted to be discharged to waters of the state.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.02:

Second, it is important to note that cleaning to background reference levels still allows contaminated sediments to remain in the Bay. We must recognize that there will be some detrimental effects even at these background reference levels. Knowing this it would be inappropriate to adopt cleanup levels any higher than the background levels identified in Option 1.

Response:

Available BPTCP data suggest that the sediment chemistry concentrations defined under Option 1 (Background Reference Station) would not be associated with toxic biological effects. The BPTCP study identified data across the bay from the shipyards (Glorietta Bay) that resulted in undegraded benthic communities and high amphipod survival rates (81%-89%). The benthic communities at Glorietta Bay were exposed to virtually the same copper, zinc, lead, mercury, and PCB concentrations present at Broadway Pier. The range of chemical concentrations for the Broadway Pier stations are as follows: Copper = 88-110 ppm, Zinc = 180-210 ppm, Lead = 22.7-41.8 ppm, Mercury = 0.454-1.36 ppm, Total PCBs = 0.063-0.069 ppm, and Total PAHs = 5.98-48.4 ppm. The range of chemical concentrations for the Glorietta Bay stations are as follows: Copper = 86-93 ppm, Zinc = 200-220 ppm, Lead = 33-34 ppm, Mercury = 0.653-0.669 ppm, Total PCBs = 0.051-0.058 ppm, and Total PAHs = 0.946-1.2 ppm.

It should be also be noted that the sediment chemistry cleanup levels described under Option 1 are all below the Effects Range Median - the screening range developed by Long et al (1995) to define the 50th percentile of ranked data and the level above which adverse effects are expected to occur. The true threshold for observing adverse effects from sediment chemical concentrations would generally exist well above background and could be determined through further site specific biological and sediment chemistry site

assessment studies at NASSCO and Southwest Marine. Staff is recommending that the Regional Board direct NASSCO and Southwest Marine to do these studies.

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.03:

While BayKeeper acknowledges some concerns even with the background reference levels identified (as detailed below), we believe cleanup to the Option 1 values is not only warranted by existing scientific data, but is the only level that will ensure protection of benthic communities and public health, and will not require secondary remediation of the sediments in question.

Response:

The underlying premise of this comment is that background is the only acceptable cleanup level because chemical contaminant concentrations in themselves are effective predictors of environmental bioavailability and that a cleanup level allowing for increase in sediment chemical concentrations over background would not be protective of beneficial uses. Cleanup to the Option 1 (Background Reference Station) cleanup values is not the only option that fully ensures protection of benthic communities and public health.

It is not possible to evaluate sediment toxicity and possible adverse effects on beneficial uses based solely on chemical measurements. There needs to be some assessment of the bioavailable chemical concentration in a sediment through biological studies such as toxicity testing, benthic abundance analysis, etc. The term "bioavailability" refers to the portion or the total quantity of a contaminant in the environment that is available for biological action such as uptake by an aquatic benthic organism. A wide range of physical, chemical and biological factors influence the bioavailability of sediment contaminants and their potential to cause adverse biological effects on the benthic community. These factors include aqueous solubility, pH, affinity for sediment organic carbon, sediment grain size, sediment mineral constituents (oxides of iron, manganese and aluminum), and the quantity of acid volatile sulfides in the sediment.

There is no single methodology available for determining cleanup levels that measures the adverse effects of all contaminated sediments at all times and to all organisms. However, there are a variety of complimentary approaches available to derive cleanup levels (e.g. Apparent Effects Threshold (AET), Equilibrium Partitioning, Spiked Sediment Toxicity, human health risk assessment) which taken together, can provide a firm foundation for a site specific cleanup level at NASSCO and Southwest Marine that would be fully protective of beneficial uses. Staff is recommending that the Regional Board require NASSCO and Southwest Marine to develop site specific cleanup levels based on this approach.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.04:

Even stronger language: from the September 29 staff report has been curiously deleted from the October 6 report. The earlier document indicated that "AETs provide a minimum level of protection of beneficial uses. Any additional discharge of pollutants to sediment may adversely impact beneficial uses and therefore, the AET cleanup levels may no longer be protective of beneficial uses." (SR pg. 28, text with strike through, emphasis added). Given this information, it is inconceivable that this Board would consider a cleanup level that represents the equivalent of ecological brinkmanship.

Response:

The intent of the modified language in the staff report is to provide additional perspective on why properly developed AET values can be protective of beneficial uses. (See response to Comment 5.2)

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.05:

AETs were developed and tested in the Puget sound region to predict the onset of acute toxicity for a given test organism under laboratory conditions - this tool was not developed and is not intended to be used as a guideline for remediation or to ensure the protection of benthic communities or human health. In fact, there is no data to indicate that AET levels provide long term (multi-year, multi-generation) protection to benthic communities.

Response:

In 1989 The United States Environmental Protection Agency (USEPA), Science Advisory Committee recognized the Apparent Effects Threshold (AET) approach as a technically defensible tool for managing contaminated sediments. The method was considered by the Committee to contain sufficient scientific merit that, with appropriate validation could be used to estimate sediment quality at specific sites. The AET is included in the USEPA's Sediment Classification Compendium (USEPA 1992) as one of several state of the art scientific methods that can be used to assess whether, and to what extent, sediments are "contaminated" or have the potential for posing a threat to the environment. In that publication EPA notes that the AET method can be used as follows in managing contaminated sediments:

1. Provide a preponderance of evidence for narrowing a list of problem chemical measured at a site;
2. Provide a predictive tool for cases in which site-specific biological testing results are not available;
3. Enable designation of problem areas within the site by determining the spatial extent and relative priority of areas of contaminated sediment;

4. Provide a consistent basis on which to evaluate sediment contamination and to separate acceptable from unacceptable conditions;
5. Provide an environmental basis for triggering sediment remedial action; and
6. Provide a reference point for establishing a cleanup goal.

The State of Washington, Department of Ecology has used the AET approach to manage and cleanup contaminated sediments in the State of Washington for the past 10 years. The Sediment Management Standards Washington adopted in 1991 address source control and sediment cleanup activities. The regulations include numerical standards for a large number of chemicals that commonly occur in sediments that were developed using the AET approach.

The AET approach can be used to predict effects on any life stage of any marine or aquatic organism for which biological response to chemistry toxicity can be determined. The benthic AET is certainly predictive and protective of some long-term effects, because by its nature the benthic measurement methods consider all impacts to population levels (abundance), both short and long-term. Therefore, in that regard, the benthic AET incorporates a multi-generational aspect of species reproduction/survival. Washington Department of Ecology also clearly endorsed and developed the AETs with sediment remediation use in mind. This is addressed in their administrative documents accompanying their rule (e.g., their Environmental Impact Statement).

Staff agrees that AET values do not address human health concerns from exposure to pollutants through the food chain attributable to the contaminated sediment. See response to comment 2.1

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.06:

AETs do not account for bio-accumulative effects.

Response:

Staff agrees with this comment. Staff has never taken the position that AET values measure bioaccumulative effects on pollutants in sediment. See response to comment 2.1

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.07:

Considering the very definition of AET and the questionable validity of the assumptions made in this instance, San Diego BayKeeper finds it disturbing that staff would equate AET levels with protection of beneficial uses (See SR, pg. 12, Figure 1).

Response:

The Regional Board agrees that legitimate concerns have been raised by the Bay Keeper and others about the scientific validity of using the sediment cleanup levels derived from Campbell Shipyard and Shelter Island Boatyard for the cleanup of contaminated

sediments at NASSCO and Southwest Marine. The Regional Board is now convinced that it would be inappropriate to use the Campbell Shipyard and Shelter Island Boatyard cleanup levels at NASSCO and Southwest Marine in lieu of site specific studies. This is based on technical considerations such as the limited number of Campbell Shipyard sampling stations, the site specific nature of the AET numbers developed for Campbell Shipyard, potential differences in sediment chemistry between the shipyards and the lack of on-site biological testing by NASSCO and Southwest Marine.

See Response to Comment 5.2 regarding Regional Board views on cleanup levels derived through the Apparent Effects Threshold approach.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.08:

Establishing inadequate clean-up levels, such as AET, will ensure that future dredging, with all its inherent risks and damage, will be necessary.

Response:

The Regional Board agrees that cleanup levels must be based on thorough scientifically defensible methods and designed to provide adequate protection for the most sensitive beneficial use of San Diego Bay. This requires that an extremely broad group of organisms that are affected by water quality conditions be considered. These include benthic (living in sediments) and epibenthic (living on the surface of sediments) organisms, organisms living in the water, waterfowl and shorebirds, and terrestrial animals (including humans) which eat aquatic organisms. This would require cleanup levels for each constituent of concern by several complimentary methods as determined by Regional Board staff, including but not limited to, the following assessment methods:

Equilibrium Partitioning (EqP) Approach – Cleanup levels will be established at chemical concentrations in sediment that ensure interstitial water concentrations do not exceed the "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" or USEPA water quality criteria (in the absence of adopted water quality objectives)

Apparent Effects Threshold (AET) – The AET approach is the sediment concentration of a contaminant above which statistically significant biological effects (e.g. amphipod mortality in bioassays, depressions in the abundance of benthic infauna) would always be expected. The method applies the triad of chemical, toxicological, and benthic community field survey measures to determine a concentration in sediments above which adverse effects are always expected.

Spiked Sediment Toxicity – Dose response measurements are established by exposing test organisms to sediments that have been spiked with known amounts of chemicals or mixtures of chemicals.

Bioaccumulation – See responses to comments 2.24 and 4.16.

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.09:

If levels above background are adopted, natural environmental dispersion of contaminants from the still-polluted NASSCO and SWM sediments will continue to increase the levels of contamination of adjacent zones that may be at or near background levels.

Response:

The physical, chemical and biological processes that govern the fate and transport of pollutants in San Diego Bay are complex. Important physical processes include sediment resuspension, transport, dispersion and redistribution involving currents (advection), tides (dispersion), sedimentation and resuspension. In San Diego Bay the primary issues relevant to pollutant transport and potential accumulation are bay-ocean water exchange, stratification and shear, trapping in low velocity regions and the strength of longitudinal dispersion in the bay.

The cumulative effects of such complex processes can result in the transport of contaminated sediments (or the pollutants in the sediments) to previously uncontaminated areas in San Diego Bay. However these same processes can bury and dilute existing contaminants with inputs of clean sediment resulting in a reduction in contaminant concentrations and the environmental risks posed by contaminated sediments over time. These complex phenomena can be characterized using site specific models which predict the fate, transport and effects of pollutants in a water body. A series of models have been developed by the U. S. Environmental Protection Agency and the Corps of Engineers to characterize the resuspension of sediments in bays, estuaries, coastal areas and other large bodies of water. Mr. John Largier, Assistant Research Oceanographer at Scripps Institution of Oceanography and others have developed a model to characterize the bay circulation, hydrodynamics and flushing processes and the estimated residence time of water in San Diego Bay. The Regional Board intends to require NASSCO and Southwest Marine to fund the necessary studies to address these considerations as part of the overall study to determine appropriate scientifically sound sediment cleanup levels.

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.10:

The scientific validity of the study that developed the AET values for the Campbell shipyard is questionable, since it has been determined that the number of samples used to derive AET values was less than the minimum 30 and the recommended 50 samples for establishing such values.

Response:

This comment is addressed in detail in the staff report and in the response to Comment 2.12. The 15 stations used were sufficient to develop valid AET numbers for the Campbell Shipyards site. In developing AET levels, it is suggested that a biased sampling plan should always be used when developing AET values, especially when

using a small data set, to ensure that a wide range of contaminant concentrations is represented rather than a completely random sampling of the sediment. The 15 stations at Campbell Shipyard were strategically placed in locations throughout the leasehold in order to develop valid AET levels.

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.11:

To date, no study has been conducted to determine if the physical (e.g., flow regime), geological (e.g., sediment grain size and composition), and biological (e.g., benthic community composition) characteristics are similar enough to justify using the Campbell's AET at the areas of concern.

Response:

The staff report addresses physical sediment grain size and chemical data from NASSCO, Southwest Marine and Campbell Shipyards. As stated in the report, staff compiled sediment grain size and chemical data against one another using the Student's t-test to check for significant differences. Based on the grain size results, no statistically significant differences could be found between the three shipyards. The analysis of the NPDES data implies that the composition of the three shipyard sediments may have enough differences to question whether the chemical compositions are similar. Statistical analyses of the biological characteristics at the three shipyards were not conducted since biological data are currently not available for NASSCO and Southwest Marine.

NASSCO and Southwest Marine have offered to collect additional samples for toxicity, benthic infauna, and sediment chemical and physical characteristics to confirm that the physical, chemical and biological characteristics of the shipyard contaminated sediment areas are similar to Campbell Shipyards and that the Campbell Shipyard AET values are protective of San Diego Bay beneficial uses in the NASSCO and Southwest Marine leaseholds. NASSCO and Southwest Marine's proposal to conduct additional chemical and biological sampling is described in detail in a document entitled "Work Plan for the NASSCO Sediment Toxicity Study" (9/00) and "Work Plan for the Southwest Marine Sediment Toxicity Study" (9/00) which is available for public review at the Regional Board Office.

In light of the site specific nature of the Campbell Shipyard AETs and the recommendations of the peer review panel, Department of Fish and Game and others, staff is recommending that the Regional Board require the development of site-specific cleanup levels at NASSCO and Southwest Marine. The cleanup levels will be developed through scientifically defensible methods and designed to provide adequate protection for the most sensitive beneficial use of San Diego Bay. This requires that an extremely broad group of organisms that are affected by water quality conditions be considered. These include benthic (living in sediments) and epibenthic (living on the surface of sediments) organisms, organisms living in the water, waterfowl and shorebirds, and terrestrial animals (including humans) which eat aquatic organisms.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.12:

There is no scientific data to indicate that the Campbell AET plus the arbitrary 20 percent safety margin has any biological significance in providing beneficial use protection at NASSCO and Southwest Marine.

Response:

See responses to Comment 4.11 and Comment 1.2.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.13:

Another option discussed is site-specific AET. Again, this does nothing to correct the inherent flaws of AET; the fact that this methodology was never intended as a clean-up level and would allow for unacceptable environmental and public health impacts.

Response:

This option relies on site-specific data as opposed to transferring data from the Campbell Shipyard. This methodology is intended to determine the level at which impacts to beneficial uses are noted. By definition, this will not allow unacceptable environmental impacts. See Response to Comments 4.5, 4.8 and 5.2.

Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.14:

First, staff has selected a reference site (REF 03) as the control site that is substantially more contaminated than at least one other potential reference site (REF 1).

Response:

The sediment concentrations at station REF-03 were determined by staff to represent the sediment quality most similar at the three reference sites in terms of chemical constituent concentrations that existed before the discharge of waste by NASSCO and Southwest Marine. Station REF-03 was one of three stations considered by staff to represent the background, pre-discharge conditions at NASSCO and Southwest Marine. These reference stations are designated as NPDES sampling locations for all shipyard and boatyard facilities located in San Diego Bay and are located in areas that would not be influenced by shipyard discharges. In order to reflect background pre-discharge conditions at NASSCO and Southwest Marine, the reference station needs to be located at an area where its sediment chemistry would be 1) influenced by urban storm water flows from land uses similar to those in the watershed upgradient from the shipyards, and 2) not influenced by shipyard waste discharges. As described in the staff report under Option 1 - Background Reference Station, staff determined that REF-03 was the station that would best reflect background sediment conditions due to 1) similarities in sediment chemistry with Stations NSS-STD-01 and SWM-01 at NASSCO and Southwest Marine respectively, these stations are considered to have trivial influence by shipyard

discharges, 2) similarities in urban storm water influences, and 3) its location in an area not affected by shipyard discharges. REF-01 was not selected chiefly because the statistical analysis did not indicate that its sediment chemistry was similar to Stations NSS-STD-01 and SWM-01.

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.15:

In fact, Russell Fairey has indicated in a recent letter that even at background reference levels, approximately 50% of amphipods can be expected to die.

Response:

Staff disagrees based on site-specific data that was collected at Broadway Pier (where reference station REF-03 is located). According to the 1996 Bay Protection and Toxic Cleanup Program (BPTCP), three locations (Stations 90003, 93205, and 93206) were sampled at Broadway Pier. Based on the results of the bioassays, the percent amphipod survival for the three stations ranged from 70%-95% at concentrations nearly equivalent to the cleanup levels proposed in Option 1 (Background Reference Station).

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.16:

Additionally, we are concerned with the inadequate discussion and analysis of bioaccumulation of pollutants in Option 1.

Response:

Staff agrees. A sediment bioaccumulation model will be used initially as a screening tool to determine if direct measurements (i.e., measuring tissue residues in laboratory-exposed organisms) are required and as a method to predict tissue residues when direct measurements are not practical. (Also see response to Comment 2.1)

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Comment from Bruce Reznik at San Diego Bay Keeper.

Number 4.17:

First, as indicated in the staff report, NASSCO and Southwest Marine determined the cost estimates for these cleanups. Have these estimates been verified by Regional Board staff or independent third party estimates? It is impossible make an informed decision until we have certainty that the cost estimates provided are accurate.

Response:

The Regional Board is relying on these cost estimates in part in its consideration of an appropriate cleanup level and it is necessary that the basis for the estimates be well documented. By letter dated January 26, 2001 the Regional Board Executive Officer requested NASSCO and Southwest Marine to submit a technical report pursuant to Water Code Section 13267, describing the assumptions and supporting calculations used by NASSCO to develop cost estimates for the alternative bay sediment cleanup levels being considered by the Regional Board.

By letter dated January 26, 2001, Mr. David Mulliken, counsel for Southwest Marine and NASSCO submitted a report describing the supporting information and assumptions used to develop the cleanup level cost estimates. Based on the information provided in this report staff has revised the cost information provided for each of the cleanup options described in the staff report. It should be noted that based on the information provided in the January 26 submittal, the estimated cost for each of the cleanup options provided by NASSCO and Southwest Marine has substantially increased. For example the estimated cost to cleanup to background provided by NASSCO and Southwest Marine and cited by staff in the October 6, 2000 staff report was \$12.8 million and \$7.7 million, respectively. The estimated cost Southwest Marine and NASSCO provided in the January 26 submittal was approximately \$29.2 million and \$8.7 million respectively. NASSCO and Southwest Marine indicated in the report that the increases in the estimated costs were generally due to an increase in the projected dredging depth needed to attain the cleanup levels.

Comment from Nicole Capretz at Environmental Health Coalition.

Number 5.1:

Option 1 is the only alternative that 1) meets the law and 2) allows the Bay to possibly be restored to a "swimmable and fishable" water body.

Response:

Cleanup to the Option 1 (Background Reference Station) cleanup values is not the only cleanup option that fully ensures protection of beneficial uses. See response to Comment 4.3. There are a variety of complimentary approaches available to derive cleanup levels (e.g. Apparent Effects Threshold (AET), Equilibrium Partitioning, Spiked Sediment Toxicity, human health risk assessment) which taken together, can provide a firm foundation for a site specific cleanup level at NASSCO and Southwest Marine that would be fully protective of beneficial uses. Staff is recommending that the Regional Board require NASSCO and Southwest Marine to develop site specific cleanup levels based on this approach.

Comment from Nicole Capretz at Environmental Health Coalition.

Number 5.2:

As explained in our earlier letters and testimony, AETs are inherently written to identify the edge of destruction and provide the least amount of protection for beneficial uses.

Response:

Staff does not agree that a cleanup level derived from the Apparent Effects Threshold (AET) approach is tantamount to setting the cleanup level to the "edge of destruction". As discussed in the response to comment 1.2 there are safety factors already built into the AET approach (e.g. four different types of biological test for a number of chemicals) to adequately develop a cleanup level that would be protective of the marine benthic community.

At Campbell Shipyards four biological indicators were used to develop AET values at Campbell Shipyard for each chemical (amphipod mortality, polychaete growth depression, depression in total benthic infauna abundance , and depression in amphipod abundance). The lowest of the four different AET values calculated for each chemical (commonly referred to as the LAET) was selected as the AET value for that chemical. For example, the copper AET values for the four biological indicators were as follows:

- a) amphipod mortality (copper concentrations 810 - 1450 mg/kg)
- b) polychaete growth depression (copper concentrations: 1450 - 2500 mg/kg)
- c) depression in total benthic infauna abundance (copper concentrations: 1450 - 2500 mg/kg)
- d) depression in amphipod abundance (copper concentrations: 1450 - 2500 mg/kg)

The lowest of these copper AET values, referred to as the LAET, represents the most protective sediment quality value for a particular chemical. The selected LAET copper concentration was 810 mg/kg which was the lowest of the four AETs developed for copper. The AET approach interpretation of the data would be that copper concentrations can be as high as 810 mg/kg and not be associated with statistically significant biological effects. This LAET value (810mg/kg) was selected as the copper cleanup level at Campbell Shipyard.

The underlying premise of the comment is that if the LAET value of 810 mg/kg is exceeded at Campbell Shipyard, catastrophic adverse effects to the marine habitat beneficial use would ensue. This line of reasoning ignores the fact that the AET approach generates a range of potential sediment cleanup levels. For example, in the above dataset copper concentrations in the range of 810 mg/kg - 1450 mg/kg are expected to have adverse effects in terms of one biological indicator - amphipod mortality. The next highest copper AET value was 1450 mg/kg. Copper concentrations in excess of 1450 mg/kg are always predicted to have adverse effects against all four biological indicators - amphipod mortality, polychaete growth depression, depression in total benthic infauna abundance , and depression in amphipod abundance. In other words the low end of the copper concentration range (810 mg/kg) is protective of a wide range of biological effects. At the high end of the copper concentration range (1450 mg/kg), there is a high degree of confidence that sediment concentrations would always cause adverse biological effects regardless of the biological indicator test. Copper concentrations greater than 810 mg/kg but less than 1450 mg/kg could generally be expected to have a measurable, although generally mild adverse biological effect such as a minor reduction in amphipod survival. The potentially adverse effect on the benthic community would most certainly not be to the degree one would associate with the term "edge of destruction."

This is not to say that the Regional Board advocates setting cleanup levels based solely on the results of the AET results. For example, the technical study to develop the Campbell Shipyard cleanup levels encompassed and considered a multitude of factors such as sediment chemistry, sediment pore water concentrations, sediment toxicity,

benthic infauna enumeration, and bioaccumulation analyses to assess environmental and human health hazards posed by the sediment contaminants.

There are a variety of complimentary approaches available to derive cleanup levels (e.g. Apparent Effects Threshold (AET), Equilibrium Partitioning, Spiked Sediment Toxicity, human health risk assessment) which taken together, can provide a firm foundation for a site specific cleanup level at NASSCO and Southwest Marine that would be fully protective of beneficial uses. Staff is recommending that the Regional Board require NASSCO and Southwest Marine to develop site specific cleanup levels based on this approach.

Comment from Nicole Capretz at Environmental Health Coalition.

Number 5.3:

Finally, and probably most importantly, none of the cleanup levels assure us of permanently and completely restoring the health of the sediments.

Response:

There are a variety of complimentary approaches available to derive cleanup levels (e.g. Apparent Effects Threshold (AET), Equilibrium Partitioning, Spiked Sediment Toxicity, human health risk assessment) which taken together, can provide a firm foundation for a site specific cleanup level at NASSCO and Southwest Marine that would be fully protective of beneficial uses. Staff is recommending that the Regional Board require NASSCO and Southwest Marine to develop site specific cleanup levels based on this approach.

Many of the commentors mistakenly refer to the Campbell Shipyard cleanup levels as the "AET cleanup levels". The inference is that the only technical work done to develop sediment cleanup levels at the Campbell Shipyard site was through the AET approach. This is a mischaracterization of the Campbell Shipyard cleanup level study. The technical study encompassed and considered a multitude of factors such as sediment chemistry, sediment pore water concentrations, sediment toxicity, benthic infauna enumeration, bioaccumulation analyses to assess environmental and human health hazards posed by the sediment contaminants. These factors are essentially the same factors that the Regional Board would require to be addressed in site specific cleanup level studies at NASSCO and Southwest Marine.

Comment from H. Allen Fernstrom at Campbell Shipyard.

Number 6.1:

The Porter-Cologne Act regulates discharges to water. It does not regulate sediment quality or sediment conditions reflective of over 100 years of accumulated regional discharges to San Diego Bay.

Response:

The Porter-Cologne Water Quality Control Act contains a complete regulatory framework for the regulation of waste discharges that affect water quality to both surface

and ground waters of the state. In § 13000 "The Legislature further finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."

According to § 13050 " 'Waste' includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of disposal."

Discharges of pollutants to surface waters are regulated under Chapter 5.5 of the Act in conformance with the requirements of the federal Clean Water Act. The term pollutant is defined in 40 CFR 122 to include "...dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011et seq.), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water...." .

The chemical quality of freshwater and marine sediment is inextricably linked to water quality and is subject to regulation by the Regional Board under the Porter-Cologne Water Quality Control Act. Section 13050 (g) provides that the term "quality of the water" refers to the chemical, physical, biological and bacteriological, radiological, and other properties and characteristics which affect the use of water.

Many pollutants discharged into surface waters have a tendency to accumulate in sediments. Concentrations of pollutants in sediments can be several orders of magnitude higher than in the overlying water column and the sediments can become a source of continual pollutant discharges into the overlying water column and sediment pore water. The pollutants in the sediment may be directly toxic to aquatic life, or can be a source of bioaccumulation in the food chain. This can present a health risk to humans through the consumption of fish and shellfish contaminated by chemicals in the sediment .

Comment from H. Allen Fernstrom at Campbell Shipyard.

Number 6.2:

Nor has the State Board ever interpreted Resolution 92-49 to require any sediment-dredging project attain sediment background conditions. Campbell is not aware of a single dredging project in California where any Regional Board has purported to apply Resolution 92-49 as legal authority to require dredging to "sedimentary background" levels.

Response:

The State Water Resources Control Board Resolution 92-49 is a state policy that establishes policies and procedures for investigation and cleanup and abatement of

discharges under California Water Code Section 13304. The Resolution was adopted following all procedures required by state law and is legally binding on dischargers and other state agencies. Water Code Section 13304 authorizes the Regional Board to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge).

For bay sediments, the background sediment cleanup level would be the level that would achieve background conditions in the affected water (i.e. the water quality that existed before the discharge.) The translation of these water-quality-based standards to sediment chemistry levels is complicated. Attainment of background water quality may not require restoration of background sediment quality, however, in the absence of countervailing evidence, restoration of background sediment conditions is a reasonable approach to achieving restoration of background water quality conditions.

Comment from H. Allen Fernstrom at Campbell Shipyard.

Number 6.3:

Although Resolution 92-49 was in existence for three years before the Board adopted the Campbell CAO 95-21, the State never attempted to invoke it in connection with Campbell's sediment cleanup levels. The Campbell CAO and AET standards are legally based on the site's 1985 NPDES permit and Section 13304 of the Porter-Cologne Act relating to discharges to water of certain shipyard repair byproducts.

Response:

In finding 46 of the Regional Board's Cleanup and Abatement Order No. 95-21 for Campbell Shipyards, the Regional Board made reference to the fact that the Regional Board's cleanup levels at the Campbell Shipyards site must be in conformance with the terms and conditions of Resolution 92-49. Finding 46 states the following:

"46. In setting cleanup levels at any site the Regional Board must consider the terms and conditions of State Board Resolution 92-49, (Policies And Procedures For Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304) These conditions include (1) site-specific characteristics; (2) applicable state and federal statutes and regulations; (3) the Basin Plan and 4) State Water Board Resolutions No. 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California)...".

As described in the Cleanup and Abatement Order findings 42, 43, 44, and 45, the Regional Board considered several alternative cleanup levels, including cleanup to background. At the time, the Regional Board selected a cleanup level for the contaminated bay sediments based in part on the site-specific AET sediment values developed for Campbell Shipyards. See response to Comment 5.2.

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Comment from H. Allen Fernstrom at Campbell Shipyard.

Number 6.4:

The AET approach at Campbell is even more protective than the approach at Paco Terminals. Whereas, in 1992 the standard for copper cleanup at Paco Terminals was 1000 mg/kg, it is 810 mg/kg at Campbell.

Response:

The cleanup actions at Paco Terminals and Campbell Shipyards dealt with different forms of copper. The difference in the cleanup levels for copper at Paco Terminals (1000 mg/kg) and Campbell Industries (810 mg/kg) is related to the differences in the chemical form of copper at the two sites. The inference should not be drawn that the Campbell Industries copper cleanup level was more protective of beneficial uses than the Paco Terminals copper cleanup level.

The Paco Terminals cleanup involved a relatively insoluble form of copper ore which was discharged to San Diego Bay during the early 1980s in violation of waste discharge requirements. The Regional Board set a cleanup level of 1000 mg/kg copper based on data which indicated that the copper ore was causing copper concentration in sediment pore water to exceed the Ocean Plan water quality objective of 5 ug/l which was in effect at the time. Due to its relatively insoluble form, the copper ore did not exhibit any toxicity at concentrations much higher than 1,000 mg/kg.

The ongoing Campbell Shipyards sediment cleanup involves cleanup of a potentially more soluble form of copper used in vessel hull bottom paints. The Regional Board set a cleanup level for copper at the site based on a site specific AET value for copper. In setting the cleanup level at Campbell the Regional Board also examined the potential for exceedances of water quality standards in the sediment pore water as well as potential human health effects from the consumption of fish and shellfish contaminated by chemicals in the sediment.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.01:

Since, in the present case, the alleged discharges of waste into waters occurred in the past, and no waste "is" currently being discharged, nor will any waste "probably" be discharged in the future, Section 13304 may be inapplicable. Moreover, the purpose of the Porter-Cologne Water Quality Control Act, including Section 13304, is to regulate water quality, not sediment quality.

Response:

Water Code Section 13304 does apply to past discharges. Section 13304 requires that any person who has discharged or discharges waste into waters of the state in violation of any waste discharge requirement or other order or prohibition issued by a Regional Water

Board or the State Water Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance may be required to clean up the discharge and abate the effects thereof. This section authorizes Regional Water Boards to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge). The term waste discharge requirements includes those which implement the National Pollutant Discharge Elimination System.

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) regulates the discharge of waste that effects water quality. Waters of the State and the sediment are inextricably linked. It is artificial and unscientific to distinguish and separate water quality from sediment quality. Section 13050 (g) provides that the term "quality of the water" refers to the chemical, physical, biological and bacteriological, radiological, and other properties and characteristics which affect the use of water.

See response to comment 6.1.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.02:

We are unaware of any attempt, by any Regional Board, to invoke Resolution 92-49 to require the clean up of sediment to background levels.

Response:
Comment noted.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.03:

To the extent Resolution,92-49 or CAL. CODE REGs. tit. 23 § 2907 are invoked to require sediment cleanup to background, it is not supported by statute. Resolution 92-49 cites to CAL. WATER CODE § 13304 as authority for the Regional Board to require "cleanup of all waste discharged and restoration of affected water to background conditions." However, the statute only requires a discharger to "clean up the waste or abate the effects of the waste" CAL. WATER CODE § 13304(a) (emphasis added). The use of the word "or" in the statute confirms that wastes need not be cleaned up if the effects can be abated. This supports a conclusion that a biologically-based clean up standard, one that is based upon the principle that the effects of the waste can be abated without remediating to background chemical levels, is acceptable under the statute.

Response:
The State Water Resources Control Board Resolution No. 92-49 is a state policy that establishes policies and procedures for investigation and cleanup and abatement of

discharges under Water Code Section 13304. The Resolution establishes the basis for determining cleanup levels of waters of the State and soils that impact waters of the State. Dischargers are required to cleanup and abate the effects of discharges “in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored...” Alternative cleanup levels less stringent than background must, among other things, not unreasonably affect present and anticipated beneficial uses of waters of the State. The Resolution also includes procedures to investigate the nature and horizontal and vertical extent of a discharge and procedures to determine appropriate cleanup and abatement measures. Resolution No. 92-49 is consistent with Sections 13000 and 13304.

Resolution 92-49 does not require cleanup to background conditions. Resolution No. 92-49 requires cleanup to occur in a manner that promotes attainment of either background water quality or that level that is reasonable if background levels of water quality cannot be restored.

Resolution No. 92-49 requires alternative cleanup levels less stringent than background to, among other factors, “be consistent with maximum benefit to the people of the state” and requires consideration of “all demands being made and to be made on the waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.” This determination is made on a case-by-case basis and is based on considerations of reasonableness under the circumstances at the site. Factors to be considered include: (1) past, present, and probable beneficial uses of the water (specified in the Regional Board’s Water Quality Control Plans), (2) economic and social costs, tangible and intangible, of the proposed discharge compared to the benefits, (3) environmental aspects of the proposed discharge, and (4) the implementation of feasible alternative treatment or control methods.

Water Code Section 13304 gives the Regional Board the broad discretionary authority to order the discharger to cleanup all of the waste discharged or to order the discharger to abate adverse effects to beneficial uses.

Water Code Section 13000 states that the “...Legislature further finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible...” and “...that the state must be prepared to exercise its full power and jurisdiction to protect the quality of waters in the state from degradation originating inside or outside the boundaries of the state...”

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.04:

Although the plain meaning of Sections 13304 and 13307 requires the Board to consider the cost-effectiveness of proposed alternatives, to the extent the Water Code is ambiguous, the Board should look to CERCLA for guidance.

Response:

Water Code Sections 13304 and 13307 do not require the Regional Board to set cleanup levels based on cost-effectiveness but to identify and use cost effective methods for cleanup or abatement of contamination or pollution. The Regional Board has neither the authority nor the desire to require or enforce the CERCLA procedure.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.05:

The SWRCB has previously cautioned against setting a clean-up level of background where creating precedent would have substantial effects on future remediation sites. In the Matter of the Petition of Unocal Corp., SWRCB Order: WQ 99-10-UST (November 18, 1999) ("[I]f complete removal of detectable traces of petroleum constituents becomes the [cleanup standard], the statewide technical and economic implications will be enormous. ... In light of ... the precedent set by requiring additional excavation at this site, attaining background water quality in this limited area is not feasible."). Therefore, the Board should heed the SWRCB's warning and not set a precedent for sediment cleanup levels to background.

Response:

The State Water Resources Control Board Order WQ 99-10-UST does not direct the Regional Boards to not set cleanup levels to background conditions. Furthermore, the order considered many site-specific factors in determining that it was not feasible to attain background water quality at the site. One such factor included the evidence of naturally occurring biodegradation of residual petroleum hydrocarbons in soil and groundwater at the site. The heavy metals present in the shipyard sediments do not naturally biodegrade.

Under the terms of Reolution 92-49, the Regional Board is obligated to have a presumptive cleanup goal to require cleanup to attain background water quality conditions. The Regional Board will establish a cleanup level above background water quality conditions, only if the Board determines that it is technologically or economically infeasible to achieve background water quality conditions. If the Regional Board makes such a determination, the Board will then select a cleanup level that is based on the lowest levels which are technologically or economically achievable and that will not unreasonably affect present and anticipated beneficial uses of waters of the Region. This

approach provides for determining and establishing a level of protection which is reasonable without allowing or causing an unreasonable effect on water quality. (See response to Comment 7.10)

Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.06:

Cleanup to background has not been investigated and therefore cannot be imposed. If cleanup standards, other than AET-based standards, are considered by the Board, then prior to establishing those cleanup levels, the Board must follow the progressive sequence mandated by Resolution 92-49 (assessment, engineering feasibility studies, etc.).

Response:

Regional Board staff agrees that the site assessment work to date conducted by NASSCO and Southwest Marine has primarily been directed towards cleanup of the site using the cleanup levels established at Cambell Shipyard and Shelter Island Boatyard. The Regional Board staff has also determined that it would be inappropriate to use these cleanup levels at the NASSCO and Southwest Marine shipyard sites due to the considerations provided in the response to Comment 4.7. Additional site assessment work is needed at NASSCO and Southwest Marine to properly develop cleanup level(s) alternatives through scientifically defensible methods and on-site studies designed to provide adequate protection for the most sensitive beneficial use of San Diego Bay.

Regional Board staff is recommending that the Regional Board not adopt cleanup levels to attain background concentrations as described in Option 1 of the staff report at this time.

Regional Board staff recommends that that the Regional Board direct the Executive Officer to issue a Water Code Section 13267 letter to NASSCO and Southwest Marine requiring the submission of the information described below:

1. NASSCO and Southwest Marine shall submit a work plan and time schedule for site specific studies to complete a site assessment; develop sediment cleanup levels, including an adequate margin of safety, for constituents of concern identified through on-site chemical screening; and develop cleanup alternatives with projected cleanup costs.
2. NASSCO and Southwest Marine shall determine cleanup level(s) through scientifically defensible methods and designed to provide adequate protection for the most sensitive beneficial use of San Diego Bay. This requires that an extremely broad group of organisms that are affected by water quality conditions be considered. These include benthic (living in sediments) and epibenthic (living on the surface of sediments) organisms, organisms living in the water, waterfowl and shorebirds, and terrestrial animals (including humans) which eat aquatic organisms.

3. NASSCO and Southwest Marine shall determine cleanup levels for each constituent of concern by several complimentary methods as determined by Regional Board staff , including but not limited to, the following assessment methods:

- a) Equilibrium Partitioning (EqP) Approach – Cleanup levels will be established at chemical concentrations in sediment that ensure interstitial water concentrations do not exceed adopted water quality objectives or USEPA water quality criteria (in the absence of adopted water quality objectives)
- b) Apparent Effects Threshold - The Apparent Effects Threshold (AET) approach is the sediment concentration of a contaminant above which statistically significant biological effects (e.g. amphipod mortality in bioassays, depressions in the abundance of benthic infauna) would always be expected. The method applies the triad of chemical, toxicological, and benthic community field survey measures to determine a concentration in sediments above which adverse effects are always expected.
- c) Spiked Sediment Toxicity – Dose response measurements are established by exposing test organisms to sediments that have been spiked with known amounts of chemicals or mixtures of chemicals.

There is no single method that measures the effects of contaminated sediments at all times and to all organisms. The selection of the above measures allows for the integration of empirical data developed for AETs, theoretical information used in EqP, and cause and effect relationships established by spiked bioassays.

d) NASSCO and Southwest Marine shall access the potential health risk to humans from exposure to pollutants through the food chain attributable to the contaminated sediment. If preliminary screening indicates an unacceptable risk to human health, a detailed human health risk assessment shall be conducted.

e) NASSCO and Southwest Marine shall submit other additional information on cleanup costs, alternatives and methods as determined by Regional board staff. In determining this information staff will review and update the attached August 3, 1995 letter from the Regional Board to NASSCO and Southwest Marine describing the minimum criteria for contaminated sediment assessment.

Based on the information provided by NASSCO and Southwest Marine staff will develop specific cleanup recommendations for sediment cleanup levels at NASSCO and Southwest Marine and bring the matter back for Regional Board consideration at a future date.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.07:

Finally, while the staff report acknowledges in passing the serious environmental impact associated with overdredging of impacted sediments that results in increased resuspension of contaminants in the water column, no detailed analysis is contained in the Staff Report to document the magnitude of these potentially serious adverse environmental impacts that would result from unnecessary dredging and attendant re-suspension of contaminants in the waters of San Diego Bay.

Response:

All dredges resuspend sediment during the dredging process. Some contaminants in the dissolved form and some contaminants associated with resuspended particles will be released and transported away from the site. The dredging process can be designed to limit sediment resuspension through the use of silt curtains during the dredging operation

Jim Hahnenberg of USEPA Region 5 reports that wet dredging brings with it some potential for short-term release of contaminants, because sediment may "resuspend" (move back into the water column) during dredging. However, these types of release yield only a fraction of the ongoing exposures to contaminants caused by natural erosion and scouring where contaminated sediment is not dredged. And if dry-dredging is used resuspension is eliminated. In 10 dry-dredging EPA projects, virtually all PCBs and PAHs were successfully removed from the sediment, according to Hahnenberg.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.08:

The imposition of a background clean-up standard to sediment dredging of the shipyards facilities may have significant operational impacts on the shipyards. Should the RWQCB conclude that dredging to meet a background standard is required, the shipyards face a significant risk not only that operations may be curtailed or shutdown, but the continued operational viability of the shipyards could be placed in jeopardy as well. These are real and significant issues which much be addressed if the Regional Board is seriously considering any option other than the AET-based approach to the NASSCO and Southwest Marine facility sediment cleanups.

Response:

The potential disruptions to shipyard operations and structures resulting from imposition of a background cleanup standard is a consideration that could be weighed by the Regional Board in determining the appropriate cleanup level. Considerations such as this will be considered by the Regional Board in evaluating the technical and economic feasibility of attaining the cleanup level. (See Response to Comment 7.10.)

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.09:

Finally, while the risk of operational disruption at the shipyards without attendant environmental benefit should be enough in itself to preclude use of a background standard, the staffs analysis of Option No. 1 as well as EHC's advocacy of the background standard ignores completely the potentially significant problems associated with the management and disposal of significantly larger quantities of dredged sediments.

Response:

The Regional Board is aware of the management and disposal issues associated with Option 1 (Background Reference Station). If Option 1 is selected, staff will work closely with NASSCO and Southwest Marine to develop a management & disposal plan that addresses the problems. Considerations such as this will be considered by the Regional Board in evaluating the technical feasibility of attaining the cleanup level. See Response to Comment 7.10.

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Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.10:

Economic considerations weigh heavily in favor of the use of the AET-Based Approach to sediment cleanup. In these circumstances, where affected water quality and the benthic community are fully protected by the AET-based approach to remediation, the Board simply cannot justify approval of more expensive, but environmentally unnecessary, remedial options such as the background approach (Option No. 1) or even the ERM approach (Option No. 2).

Response:

State Water Resources Control Board Resolution No. 92-49 is a state policy that establishes policies and procedures for investigation and cleanup and abatement of discharges under CWC Section 13304. The Resolution establishes the basis for determining cleanup levels of waters of the State and soils that impact waters of the State. Dischargers are required to clean up and abate the effects of discharges "in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored..." Alternative cleanup levels less stringent than background must, among other things, not unreasonably affect present and anticipated beneficial uses of waters of the State.

In setting the cleanup level, Water Code Section 13000 states that consideration should be given to attaining the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible..."

Under the terms of Reolution 92-49, the Regional Board's presumptive cleanup goal at NASSCO and Southwest Marine is to require cleanup to attain background water quality conditions; i.e., restoration of background sediment conditions where waste was deposited in sediment. The Regional Board will establish a cleanup level at NASSCO and Southwest Marine above background water quality conditions, only if the Regional Board determines that it is technologically or economically infeasible to achieve background water quality conditions. If the Regional Board makes such a determination, the Board will then select a cleanup level that is based on the lowest levels which are technologically or economically achievable and that will not unreasonably affect present and anticipated beneficial uses of waters of the Region. This approach provides for determining and establishing a level of protection which is reasonable without allowing or causing an unreasonable effect on water quality.

Technological feasibility is determined through an assessment of the available technologies shown to be effective in reducing the pollutant concentrations to the established cleanup levels.

Economic feasibility refers to the objective balancing of the incremental benefit of attaining more stringent cleanup levels compared with the incremental cost of achieving those levels. Economic feasibility does not refer to the financial resources of NASSCO and Southwest Marine to pay for the cleanup. The financial and techncial resources available to NASSCO and Southwest Marine will be considered in establishing the board's schedule for investigation and cleanup.

Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.11:

Nevertheless, while the calculations are estimates (not hard bids), given the number of sediment dredging projects that have been performed in connection with the Paco Terminals clean up, the Commercial Basin remediation, and other projects conducted in other regions of the country, these estimates in all likelihood represent a fair approximation of the cost associated with the different options and for this reason have not been questioned by the RWQCB staff.

Response:

See response to Comment 4.17.

Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.12:

Finally, if the RWQCB disregards concerns about cost-effectiveness and orders the implementation of Option 1 or Option 2, the dramatic increase in remediation costs to be borne by NASSCO and SWM in all likelihood will compel both the RWQCB and the shipyards to identify and pursue additional potentially responsible parties which, in turn,

will likely require pursuing costly and time-consuming contribution actions that may well be avoidable if the more cost-effective AET approach is approved by the RWQCB.

Response:

All cleanup level options considered by the Regional Board will be evaluated thoroughly. Cost is one of many criteria that will be evaluated when selecting a cleanup level option for NASSCO and Southwest Marine. The Regional Board will make a reasonable effort to identify the dischargers associated with the waste discharge. It is not necessary to identify all dischargers for the Regional Board to proceed with requirements for a discharger to investigate and cleanup.

Comment from David L. Mulliken at Latham and Watkins (NASSCO & Southwest Marine).

Number 7.13:

Were this Board to take the unprecedented step of ordering NASSCO and SWM to dredge sediments to background, concerns for consistency of decision making and fundamental fairness both would dictate that all impacted sediments throughout the entire San Diego Bay be dredged to background levels. Not only would this necessitate the Board abandoning its well conceived approach to the Campbell site, but also would compel it to reopen the issues associated with sediment levels in the Commercial Basin and virtually every other location in San Diego Bay where any contaminated sediments exist.

Response:

The Regional Board is currently considering a decision to require NASSCO and Southwest Marine to cleanup to background concentrations based on site specific technical and economic considerations applicable solely to the NASSCO and Southwest Marine cleanup sites. The Regional Board is not considering a "cleanup to background" policy applicable to other sites at this time. The Regional Board may at any time exercise its discretion to reexamine previous cleanup decisions made in prior years at other sites to determine if additional cleanup to meet more stringent cleanup levels is warranted.