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TREASURE ISLAND
SSIC NO. 5090.3.A

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**San Francisco Bay Regional Water Quality Control Board**

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Commanding Officer
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Naval Facilities Engineering Command
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Attn.: Mr. Ernesto Galang

**Re: Comments on Appendix N of Draft Final Onshore Remedial Investigation Report, Naval Station Treasure Island, titled "Ecotoxicological Testing for the Development of Petroleum Screening Levels and Responses to Regulatory Comments", dated September 1997.**

Dear Mr. Galang:

Thank you for the opportunity to review the above-referenced document. Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) staff comments are presented in the attachment to this letter.

If you have any questions regarding these comments, please call me at 510-286-4267.

Sincerely,

David F. Leland, P.E.
Groundwater Protection and Waste Containment Division

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**Comments on Appendix N of Draft Final Onshore Remedial Investigation Report, Naval StationTreasure Island, titled "Ecotoxicological Testing for the Development of Petroleum Screening Levels and Responses to Regulatory Comments", dated September 1997.**

This Appendix does not satisfactorily incorporate previous Regional Board staff written comments (May 19, 1997) on the April 17, 1997 Draft Addendum. Nor does it address issues raised during subsequent meetings (September 22, 1997). The Navy's Responses to Comments, included in this second Draft, dated August 22, 1997, were not discussed with Regional Board staff and are not acceptable.

The major issues are summarized below. Also, an equation for calculating soil screening levels that address Regional Board staff concerns is presented at the end of these comments.

1. Screening and cleanup values for individual fuel constituents must be considered with values for petroleum mixtures. Values for the whole petroleum fuel products are not substitutes for the application of chemical-specific standards (e.g. benzene, total PAHs). Petroleum and constituent cleanup values must address risk to both aquatic organisms and to human health via fish consumption by using the more stringent of the chemical-specific standards for these receptors.

2. Parallel tests conducted on soil elutriates at the Presidio Army Base and on contaminated groundwater at Point Molate indicate that mysids are more sensitive than blue mussel larvae to petroleum fuels. At the Presidio, mysids were approximately twice as sensitive as blue mussels to lighter fraction hydrocarbons, such as gasoline/diesel mixtures (C7 to C16), and fourteen times more sensitive to heavier hydrocarbon fractions such as fuel oil (C24 to C36). At Point Molate, mysids were two to nine times more sensitive than blue mussel larvae, when these species were exposed to the same groundwater samples contaminated with diesel/Bunker C. At Hunters Point, although parallel tests were not performed, groundwater was tested with mysids, and soil elutriates were tested with bivalves/urchins. In these tests, mysids were approximately eight times more sensitive than bivalves and urchins.

Based on this information, the proposed screening levels for Treasure Island should be revised to incorporate a taxonomic uncertainty factor. In the absence of site-specific data, Regional Board staff recommend using a taxonomic uncertainty factor at Treasure Island of eight, based on the results of tests at Hunters Point.

3. Acute to chronic ratios must be applied to results of critical life stage tests in the derivation of screening values, to ensure protection over long (chronic) exposure periods. Even though short-term, critical life stage tests, such as those conducted with the larvae of molluscs and urchins or the young stages of crustaceans, are often used to estimate chronic toxicity for purposes of measuring compliance with NPDES toxicity limitations, they are not adequately protective for setting soil and groundwater screening values. The use of acute to chronic ratios is also applied in deriving Ambient Water Quality Criteria (e.g., AWQC for copper).

There is little guidance on estimating appropriate acute to chronic ratios for critical life-stage tests when contaminant- and species-specific data are lacking. However, U.S. EPA's Guidelines for Deriving Ambient Water Quality Criteria (1985) suggests that the acute to chronic ratio for the larvae of molluscs exposed to metals and, possibly, other contaminants is close to 2. An acute to chronic ratio of 2 should be applied to the effects concentration values presented in this document.

4. Some toxicity data were excluded from the Navy's calculations of screening levels, based upon the presumption that ambient soil metals concentrations contributed to observed toxicity. Chronic Ambient Water Quality Criteria (AWQC) were used to flag potential metals toxicity in Table 6. Chronic AWQC are not good indicators of the potential for toxicity in short-term toxicity tests for several reasons. First, the chronic AWQC incorporate an acute to chronic ratio as a means of estimating full life cycle (chronic) toxicity. The tests employed in this study were short-term, critical life stage tests. Hence, the acute criteria are more appropriate indicators of potential effects. Second, an acute AWQC should not be used to indicate potential effects when the criterion is "driven" by an organism that is more sensitive than the ones used for site-specific testing. The AWQC document for each metal should be consulted to determine the potential for toxicity to the organisms being tested (e.g. urchins are relatively insensitive to zinc, nickel and copper). Third, some AWQC are driven by human health (e.g., the 100 ug/L manganese criterion cited in Table 6 is based on protection of human health from consumption of shellfish), and should not be used at all for this type of screening. Fourth, the AWQC are most appropriately applied to dissolved metals, as suspended solids may reduce the bioavailability of metals in short-term tests, especially when the test organisms are non-feeding larval forms. Finally, sample dilution will mitigate toxicity during toxicity testing. The sample dilutions associated with low level petroleum effects, which are of most interest in the derivation of cleanup levels, will have reduced metals concentrations as compared to the full-strength samples used for comparison to AWQC.

Regional Board staff reviewed the metals concentrations summarized in Table 6 in light of these considerations, and provided relevant information from the Ambient Water Quality Criteria documents to the Navy in a technical memo dated August 6, 1997. Staff recommend that all toxicity data be used, except samples with ammonia concentrations exceeding acceptable levels (Samples TT04E, TT09E) and one sample for which reported petroleum concentrations appear higher than the solubility of the fuel in water (Sample TT07E). Samples TT01E and TT05E should be included in calculations.

5. Because of the large differences in toxicity observed at different sites, there is little rationale for averaging data across sites. Sites 6 and 15 are more than an order of magnitude more toxic than Site 22, and eight times more toxic than Site 12. The reason for these large differences cannot be determined from existing data. Separate cleanup values should be developed for each site.

6. Leachate factors developed from soils at each site varied by two orders of magnitude, from 0.1 % to 10.3%. These, also, should be used on a site-by-site basis. A further concern is the use of the diesel leachate factors for the mixtures, rather than a leachate factor for the entire mixture, which could be easily developed from the TPH data. A third concern is the value for soil used in the leachate factor calculation on p. 30. It appears that this value is intended to convert a soil volume to a soil mass. Given that the soil samples used in the tests are bulk samples, soil bulk density should be used in the calculation, instead of soil particle density. (The value of 2.7 appears to be representative of soil particle density values of 2.65 gm/cc.) A typical soil bulk density value would be 1.8 gm/cc.

7. Staff recommend using EC25 values, rather than EC10 values for calculating screening levels. Although the EC10 value is a more conservative (protective) value, it is a relatively unstable statistical endpoint that can behave erratically, depending upon the dose-response of the individual test. The advantage of using a more stable statistical endpoint is that the confidence interval is smaller. Hence, results of different tests can be compared with greater confidence. Further, in some cases, a specific toxicity test, even when well conducted, cannot detect a 10% difference from the control as a statistically significant effect. Although this is not always the case, selecting the EC25 will minimize the risk of concluding that a contaminant concentration is toxic, when it is not. Since the difference between EC10 and EC25 values is often small, and since it is not possible with existing science to evaluate the ecological significance of this difference, staff recommend using the EC25 or IC25. As a matter on consistency, the EC25 is used for compliance monitoring in NPDES permits in the San Francisco Bay Region.

8. The following equation, modified from that presented on p. 32, addresses the concerns presented above and should be used to calculate soil screening values.

$$\text{Soil Screening Value} = \frac{\text{Site Average EC25 Value}}{(\text{Taxonomic Uncertainty Factor})(\text{Acute:chronic})(\text{Average Site Leachate Factor})}$$