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HUNTERS POINT
SSIC NO. 5090.3

Cal/EPA

Pete Wilson
Governor

San Francisco Bay Regional Water Quality Control Board

2101 Webster Street
Suite 500
Oakland, CA 94612
(510) 286-1255
FAX (510) 286-1380

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Mr. Richard Powell
Engineering Field Activity, West
Naval Facilities Engineering Command
900 Commodore Drive
San Bruno, CA 94066-2402

Re: Draft Petroleum Hydrocarbon Corrective Action Plan for Parcel B, Hunters Point Shipyard

Dear Mr. Powell:

Regional Water Quality Control Board (Board) staff have reviewed the referenced report and have the following comments:

GENERAL COMMENTS:

1. The document would be substantially strengthened by the addition of graphical presentations of the locations and results discussed in the text. For example, no map showing the names and locations of the sites discussed is presented. The document does not show those locations or areas in Parcel B where concentrations of Total Petroleum Hydrocarbons (TPH) exceed the proposed cleanup levels. Please add graphics to address these deficiencies.

2. The intent of the ecotoxicological sampling and testing program was to develop proposed screening values for soil and groundwater containing petroleum hydrocarbons as gasoline, diesel, and motor oil. The results of the tests have enabled the Navy to develop a proposed value for diesel hydrocarbons but not for the gasoline fraction. Results for the one soil sample containing only motor oil constituents may or may not be representative. A groundwater sample containing motor oil was not used to

develop a motor oil number. The application of diesel-related values to gasoline and motor oil contamination is proposed but is not well supported. Does the Navy intend to perform additional sampling and testing to meet the bioassay program objectives?

3. This report and the appendix have done a good job of presenting information, and evaluating the results of the toxicity and chemical tests to determine the validity of data. However, Board staff have several concerns pertaining to calculation of leachate factors, acute to chronic ratios, taxonomic uncertainty, motor oil toxicity, and cleanup values.

4. There appears to be a great deal of confusion regarding the remedial alternative selection process. First, no remedial objectives are established. Second, the discussion in Chapter 5 confuses technologies with remedial alternatives. The technology evaluation is vague and general. No screening criteria are stated, although it appears from the text that several are used. However, the use of the criteria is haphazard and inconsistent. It would be of great help to the reader to establish a few clear criteria up front and to apply them consistently to the technologies discussed. Effectiveness, implementability, and cost are used later in the report and would be appropriate criteria. The technologies should be evaluated against their ability to meet the objectives in light of site-specific conditions and constraints. Overall, the chapter relies too heavily on assertions, with little in the way of support either from experience at this site or as documented for other sites to convince the reader that there is a sound basis for the conclusions reached.

SPECIFIC COMMENTS:

1. Section 2.4, p. 8. The referenced criteria state that exceptions to the stated policy that all groundwaters will be considered suitable or potentially suitable for municipal or domestic water supply will be considered for waters with total dissolved solids concentrations exceeding 3,000 mg/L and yields to a single well of less than an average, sustained value of 200 gallons/day. Please revise this section to reflect this.

2. Section 3.1, p. 10. Please provide additional information regarding the scope, schedule, and status of completion of the further soil excavation activities at Site IR-06.

3. Chapter 3. For all sites, please note the status of planned or completed Exploratory Excavations or removal actions, as is done for Site IR-20. Also, the phrase "initially identified as TPH-only AOPCs" is used throughout this chapter. Please explain who identified these areas, what criteria were used, where the analysis was documented and whether anything has changed since the initial evaluation.

4. Section 3.5. Please provide additional detail regarding locations and areas of concern at this site, and measured concentrations, similar to discussions provided for other sites discussed in this chapter.

5. Section 3.7. The text table in Chapter 7.0 notes numerous borings at IR-24 where TPH was measured above screening levels. None of these locations is discussed in Section 3.7. Please expand the discussion to reflect locations of concern at IR-24.

6. Section 3.11. Please revise this section to provide a level of detail consistent with the level of detail provided for other sites discussed in this chapter.

7. Section 4.0, second para. See Parcel B Record of Decision (e.g., Section 2.1) for a discussion of the potential use of groundwater in Parcel B as a drinking water source.

8. Section 4.2 and Table 1. Please explain the apparent discrepancy between the sample type TPH ranges described in Section 4.2 and the actual concentrations presented in Table 1. For example, Sample CP0708 is described as a "low" sample type, while the TPH-d concentration fits the definition of a "high" sample type. Also, the text notes that the sample from IR28B280 contained detectable concentrations of TPH-g, although Table 1 shows no TPH-g detected in the sample from this location.

9. Section 4.5. Acute to chronic ratios must be applied to results of critical life stage in the derivation of cleanup 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 cleanup standards. In the absence of full life cycle data, acute to chronic ratios are applied in deriving Ambient Water Quality Criteria, even when the criteria are developed from critical life-stage tests (e.g., AWQC for copper).

While there is little guidance on estimating appropriate acute to chronic ratios for critical life-stage tests when contaminant- and species-specific data are lacking, 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 at least 2 should be applied to the development of EC25 values as presented in this document.

10. Section 4.5.1, p. 29. Table 1 shows that the sample from well MW02A also contained only motor oil.

11. Section 4.5.1, p. 31. Please provide additional discussion regarding how the Navy determined that the proposed leachate factor is a conservative value. How does this statement relate to the methodology regarding elutriate preparation?

12. Section 4.5.3. The leaching factor calculations in this document do not take into account either the dilution of soil with water at a ratio of 1:4 by volume during the preparation of soil elutriates, or the bulk density of soil as compared to water. The following equation was developed to account for these factors in the evaluation of the Hunters Point data. The bulk density of soil is taken as 1.8 gm/cm^3. When this equation is applied to Parcel B data, leachate factors listed in Table 11A, as well as proposed soil cleanup levels, should be multiplied by 0.45.

$$\text{Leachate Factor} = \frac{\text{Soil conc.(ug/kg)}}{\text{Elutriate conc.(ug/L)}} \times \frac{\text{1 volume soil (L)}}{\text{4 volumes water (L)}} \times 1.8\ gm/cm^3$$

13. Sections 4.5.3 and 4.5.4. The Navy has proposed soil cleanup levels based on soil elutriate tests conducted with urchins and bivalves. A separate groundwater cleanup level is proposed based on groundwater toxicity tests, using mysid shrimp. The Navy has not provided a logical conceptual model to support this approach to developing cleanup levels. As proposed, the soil cleanup levels based on soil elutriate tests and associated leachate factors

would result in projected groundwater concentrations greater than the proposed groundwater cleanup levels. Specifically, the average IC25 of diesel in groundwater tests was 1,521 ug/L (samples MW40A and MW03A), while the average EC25 of diesel in soil elutriates was 12,500 ug/L. Therefore, the soil cleanup values, calculated from the latter EC25 value, would result in groundwater petroleum concentrations eight times higher than the proposed groundwater cleanup values. These data and data from other sites suggests that crustaceans (e.g., mysids) are among the most sensitive aquatic organisms to petroleum. The relative sensitivity of the test organisms used in this study can be estimated by calculating the ratio of the two values, which results in a value of about 8.

The groundwater tests using the most sensitive species, in this case the mysid shrimp, should be used as the basis for developing a groundwater EC25, with the leachate factor developed from the results of the soil extractions applied to the groundwater EC25 to derive a soil value. These risk-based, cleanup levels are appropriately applied along the shoreline, where soil leachate may directly contact aquatic organisms. Further fate and transport modeling may be warranted at greater distances from the Bay to account for the mitigating effects of attenuation.

Alternatively, results of soil elutriate tests can be used, but should incorporate a taxonomic uncertainty factor of 8, based upon the observed difference in toxicity between test organisms.

This second approach assumes that differences in species sensitivity account for the eight-fold difference in the toxicity of soil elutriates, as compared with contaminated groundwater. Other factors, such as differences in sample preparation methods and sample chemistry may also have contributed. However, the magnitude of the observed differences is consistent with differences in species sensitivity observed at other sites where parallel testing (same medium but different organisms) was performed. Parallel tests conducted on soil elutriates at the Presidio Army Base and on contaminated groundwater at Point Molate indicated greater sensitivity of mysids when compared with blue mussel larvae. 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.

14. Section 4.5.4, p. 31. The Navy has not proposed a cleanup level for motor oil, based upon the lack of toxicity in soil elutriates. However, one groundwater sample contaminated with motor oil (MW02A) was tested with mysids, with a resulting IC25 value of 740 ug/L. Leachate factors could be developed from results of the soil extraction tests for those samples containing motor oil and used with the EC25 value to calculate a cleanup level for soil containing motor oil.

15.Section 4.6, p. 31. The petroleum hydrocarbon cleanup levels developed from the ecotoxicological testing reported in this document are subject to regulatory review and approval and should be termed "proposed", not "established."

16. Section 4.6.1, p. 32. What is the status of the removal actions at IR-06 and for fuel lines at IR-46? What are scheduled start and finish dates for these projects? What levels are being used to establish the limits of excavation? Where are the areas of elevated concentrations of TPH? Maps showing these areas and other areas proposed for remediation are essential to understanding this CAP. References to the sources of the concentration data should be added to the text.

17. Section 4.6.2. Please provide a map or maps showing the areas discussed in this section.

18. Section 5.0. The language used in this section is confusing. What exactly is meant by a remedial technology? How is a technology different from a remedial alternative? What is a process option? One standard approach is to look at technologies (e.g., excavation, soil venting, groundwater treatment) in a screening step, then to combine the technologies that pass the screening step into remedial alternatives for a more detailed evaluation. This chapter appears to be a screening of remedial technologies, rather than a description of remedial alternatives.
Thermal desorption is a technology frequently applied to treat petroleum-contaminated soils? Was this considered?
What are the remedial objectives against which the candidate technologies are tested? What are the screening criteria used to evaluate the technologies?
Soil and groundwater technologies are typically evaluated separately. This approach would improve the readability of the document.

19. Section 5.1. What is the significance of the air emissions points raised in this section? How do these points relate to using this technology at this site?

20. Section 5.2. What is meant by feasible? What is a low-cost option? Is this the same as a process option? Where are heavy-end hydrocarbons predominant?

21. Section 5.3. Is the technology discussed here soil venting or bioventing? At the end of the section, it is stated that "this remedial option is not discussed further." Which remedial option is not discussed further? SVE or bioventing or both?

22. Section 5.4. What offsite treatment options were considered? Some landfills treat soils prior to landfilling. Is this considered disposal or treatment in this document? What are typical costs that caused these options to be rejected? Is the range of possible soil volumes from Hunters Point considered large?

23. Section 5.5. A number of landfills in northern California accept petroleum-contaminated soils and treat them by aeration or biodegradation prior to disposal. Why were these types of facilities not considered in this analysis? What is meant by minimizing the degree of contamination? The preference for offsite disposal is not well-supported. Are there specific constraints regarding, for example, geotechnical issues, community acceptance, design difficulties, or other issues that would make onsite disposal at Hunters Point problematic?

24. Section 5.6. Some of the other technology discussions reference effectiveness and implementability. Is this technology effective? Is it implementable? What is meant by "high costs"? The text seems to suggest that it would be necessary to permit an incinerator for these wastes. Are there no incinerators permitted to accept these types of wastes? The option needs to be evaluated against defined screening criteria, not against an assertion that other options are more feasible.

25. Section 5.7. This section describes multiple technologies: groundwater extraction and a variety of treatment technologies. This discussion is confusing and misleading. Treatment does not involve extraction and containment. There is confusion here between the effects of groundwater extraction (which may reduce the extent or concentrations of contaminants in an aquifer) and treatment (which can reduce the concentrations of contaminants in the extracted water). Ex situ treatment has nothing to do with plume migration control or inducing

gradients in the subsurface. This section needs to be rewritten. Consider discussing extraction separately from treatment options. Assess both extraction and treatment against specific screening criteria and in light of site-specific conditions and contaminants.

26. Section 5.8. The discussion seems to jump to a conclusion regarding cost-effectiveness without first assessing whether the technology will work at this site.

27. Section 5.8.1. What are the differences among SVE, bioventing, in situ biormediation, and biosparging? Was air sparging considered. The statement regarding bioventing at the end of the second paragraph seems out of place. What is the result of the screening of the technology? Is it carried further in the analysis?

28. Section 5.8.2. This section combines a discussion of ex situ bioremediation of soil and groundwater. It would be clearer to separate the discussions in this chapter by medium.

29. Section 5.9. The evaluation of this technology against site-specific conditions is lacking. Also, there is confusion regarding the meaning of containment. At the end of this section, the option is rejected in favor of ex situ groundwater treatment. But groundwater extraction is required in conjunction with ex situ treatment. Extraction is in effect a containment technology, and is discussed as such earlier in the section. Please clarify.

30. Section 5.10. Why are these groundwater treatment technologies discussed here and not in Section 5.7 with the other groundwater treatment technologies?

31. Section 5.11. No evaluation against screening criteria is provided. What is meant by the statement that biodegradation is probably occurring at Hunters Point? What site-specific data are available to support this statement?

32. Chapter 5. There needs to be a summary table to aid the reader in understanding those technologies that passed the screening and that will be considered further.

33. Chapter 6. Each remedial alternative should address remediation of contaminated soil and groundwater to cleanup levels. If not, the alternative would be rejected immediately because it wouldn't meet the remedial action objectives.

34. Section 6.1.1. This and the other sections describing remedial alternatives should begin with a brief description of the major components of the alternative. The description should be specific to what is proposed for Hunters Point. An understanding of standard practice should be used to inform the development of a spcific proposal for this site.
How does implementation of excavation depend on the feasiblity of another type of technology? How does implementation depend on cost? Isn't cost a separate criterion? On p. 42, the text states that implementability depends on technical and administrative issues. What are these and how does excavation stack up?

35. Section 6.1.2. This alternative is titled intrinsic biodegradation, but would be more properly termed natural attenuation. As noted in line 3, biodegradation is one of several natural attenuation processes. This section provides no evaluation of effectiveness at this site. If the process is enhanced, it is no longer natural attenuation but rather an active in situ process, and should not be discussed here. No assessment of implementability is provided. The statement that hydrocarbons are not migrating to groundwater is directly contradicted by monitoring well data that shows substantially elevated concentrations of hydrocarbons in groundwater near known areas of soil contamination. What type of soil monitoring is anticipated for HPS. Please provide a reference for a soil monitoring plan or other document to support the conclusion regarding cost.

36. Section 6.2.1. Ex situ treatment has nothing to do with transport processes in the subsurface. Neither do target groundwater cleanup levels have anything to do with discharge options. What is the proposed discharge option? This section is very misleading and confusing. The selection of biodegradation for treatment of groundwater is not well documented. It does not appear that air stripping was discussed previously, making it difficult for the reader to understand or evaluate the conclusions presented.
The discussion in the third paragraph is generic and would be better suited to the screening evaluation of candidate technologies. Other material in this section also seems out of place.
The discussion of effectiveness does not reach a conclusion. Is it effective or not?
How does doing a treatability study make an alternative implementable? Is this alternative implementable at this site under known site conditions?
How does the square foot cost estimate translate to an estimated total cost for Parcel B? How can alternatives be compared without such a number?

37. Section 6.2.2. See comments for Section 6.1.2. What is meant by designated time period?
Is it effective or not? Without some supporting data or analysis, the alternative must be considered ineffective.
The assertion that only two locations showed petroleum hydrocarbons above the (proposed) cleanup levels is not supported by a review of the data. A cursory review of the Parcel B data indicated as many as 14 wells with at least one concentration above 1000 ug/L. A map showing TPH concentrations in the parcel would be useful. What is the basis for three quarters of monitoring?

38. Chapter 7.0. The discussion is vague and general. How can conclusions regarding effectiveness, inplementability and preferred alternatives be made given the uncertainties noted at the end of the first paragraph? The relevance of the discussion in this paragraph is not clear. How will the excavation activities provide a database of treatment parameters? What data are being collected that would help in the evaluation of remedial alternatives discussed in this CAP?
The summary table notes 455 cy at IR-46, but the text on p. 54 notes 4,500 cy. Which is correct? The text notes a nominal volume of 9'x9'x9'=27 cy. How does this translate to nominal volumes of 20 or 25 cy?
As noted previously, the conclusion that migration to groundwater is not occurring is not supported by the data. The assertion that natural attenuation is occurring is not supported by any site-specific data or analysis.
Groundwater remediation at IR-46 has not been discussed previously. Please provide a description in Section 6 of the remedial alternative for IR-46.

39. Appendix A, Section 4.2.1.1. Board staff are concerned about the use of Chronic Ambient Water Quality Criteria (AWQC) to flag potential metals toxicity in Table 2. 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 2 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.

For these reasons, future toxicity testing should be based on an evaluation of potential metals toxicity reflecting the conditions of the proposed tests and test conditions. This approach could obviate the need to employ chelators, unless it were shown that metals are very likely to contribute toxicity to the specific organisms that are being tested and at the dilutions that are likely to be relevant to the development of cleanup levels. This in turn would reduce uncertainty associated with the effects of the chelation step on the actual concentrations of petroleum hydrocarbons to which the test organisms were exposed.

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

cc: John Chester, SFDPW
Glenna Clark, EFA West
Chein Kao, DTSC
Sheryl Lauth, USEPA
Claire Trombadore, USEPA

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