RESPONSE TO REGULATORY AGENCY AND PUBLIC COMMENTS ON DRAFT DEMONSTRATION PLAN FOR FIELD TESTING OF ACTIVATED CARBON MIXING AND IN SITU STABILIZATION OF PCBS IN SEDIMENT, PARCEL F HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

This document presents the U.S. Department of the Navy (Navy) responses to comments from staff from the U.S. Environmental Protection Agency (EPA) and the San Francisco Public Utilities Commission (SFPUC) on the Draft Demonstration Plan for Field Testing of Activated Carbon Mixing and In Situ Stabilization of PCBs in Sediment, Parcel F, Hunters Point Shipyard, San Francisco, California, dated September 2005.

RESPONSE TO COMMENTS FROM U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX DATED OCTOBER 7, 2005

GENERAL COMMENTS

1. Comment: **The text of the Draft Demonstration Plan for Field Testing of Activated Carbon Mixing and In Situ Stabilization of PCBs in Sediment at Hunters Point Shipyard Parcel F (the Demonstration Plan) does not provide detail about the criteria that makes sediment appropriate for remediation with activated carbon (AC). In Section 3.2, Selecting Test Site, a list of such criteria is given, but there is no explanation for each criterion and no references are provided. Similarly, Section 2.2, Previous Testing of the Technology, states that laboratory testing has been completed with sediments with PCB levels up to 10 mg/kg, but no reason is given for why this limit was chosen. This may be important given the likely heterogeneity in PCB concentrations in Parcel F sediment. Please provide more information on selection criteria, especially regarding contaminant/PCB concentration, and also provide appropriate references.**

Response: Low-range concentrations of polychlorinated biphenyls (PCBs) in sediment have been defined as less than 1 parts per million (ppm), mid-range as 1 to 10 ppm, and high-range as more than 10 ppm. The Stanford team has not observed PCBs at concentrations greater than 10 ppm for sediment samples collected from Area X in Parcel F. The laboratory results suggest that a factor of 10 or more reduction may be achieved in the bioavailability (or effective concentration) of PCBs in the field Therefore, if the final cleanup goal is less than 1 ppm of total PCBs in sediment, then sediment with a mid-range PCB concentration (1 to 10 ppm) would be an appropriate target for AC. The Parcel F feasibility study is still being developed; still, it is possible to predict that application of this in situ technology would most likely be limited to sediment that contains a low- to mid-range concentration of total PCBs. In addition, since laboratory results indicate that AC remains in cohesive sediments in

environments with low erosion rates (Zimmerman 2004), these criteria have been established for the sediment so that AC will stay in place after it is mixed into the sediment.

Sections 2.4 and 3.2 of the text have been amended to include this information.

2. **Comment:** **The scope of the demonstration is unclear. Three bullets specify the scope of the demonstration in Section 1.2 (page 3), but these bullets do not include the biological studies discussed in Section 2.3 on page 7: plot recolonization, macrofauna community structure, and organism development. These are also important objectives of the Demonstration Plan and as such they should be included in Section 1.2 and in the data quality objectives in Appendix A. Please expand Section 1.2 to include the biological objectives as well as the engineering goals, and revise the scope to clarify which objectives are the primary motivations for the study. Please revise the text to ensure that the scope and objectives are consistent throughout the Demonstration Plan. In addition, please revise the data quality objectives in Appendix A to include decision rules for all of the biological objectives.**

Response: The performance objectives were sorted between primary and secondary by applying the following logic: If the expected metric could not be achieved for a specific performance objective and the failure had a significant impact on several other performance objectives, then it was deemed "primary." If these two conditions were not met, then the performance objective was classified as "secondary." For example, if neither of the large-scale mixing technologies was able to incorporate AC homogeneously down to 1 foot, this failure in "AC application" would affect all of the other performance objectives and reduce the possibility that the overarching project goal could be achieved. Thus, the objective of "AC application" was identified as a primary performance objective. As a converse example, if a homogenous AC treatment were found not to reduce bioaccumulation of PCBs, then it would be less important that the community structure of the plot was unaffected by the AC treatment. In this way, "effects of AC treatment on indigenous benthic community" was identified as secondary to the primary "PCB bioaccumulaion in test or indigenous organisms" performance objective. Section 1.2 has been amended to include this information.

The secondary performance objective of "effects of AC treatment on indigenous benthic community structure" is already listed as a data quality objective in Table A-3. However, the decision rule (Step 5, No. 2) in Table A-3 in Appendix A has been revised for the "effects of AC treatment on indigenous benthic community" secondary performance objective as follows:

"If metrics of benthic community structure (for example, total taxa richness, total abundance, relative amphipod abundance, and various multi-metric indices) of AC-treated plots (Plots D and F) are not statistically significantly reduced compared with the control plots (Plots C, E and G), then the AC application does not affect the benthic community structure. However, if a statistically significant difference (increase or decrease) exists between treated and control plots in any metric of biological integrity, then the analysis of the community structure will be used to calculate the treatment effects on benthic recolonization. Statistical differences in measures of biological integrity will be calculated by one-way analysis of variance."

The format used for this work plan is consistent with the requirements of the ESTCP funding agency. These requirements specify that the primary objectives be generally described in Section 1.2, then further subdivided in Section 3.1, and later detailed in the performance objective assessment Sections 4.1 and 4.2. This format also requires that the secondary primary performance objectives are identified in Sections 4.1 and 4.2 after the experimental design has been introduced in Section 3.6.6.

3. **Comment:** **It is unclear why the Demonstration Plan states that biologically active zone is restricted to the first 12 inches of sediment. The Sediment Profile Imaging (SPI) Report: Benthic Macrofauna Activity at Hunters Point, San Francisco Bay (Draft Technical Memorandum, Feasibility Study Data Gaps Investigation, Parcel F, Hunters Point Shipyard, February 25, 2005) states: "it is likely that the activities of the deposit-feeding taxa present in this area extend to depths greater than those imaged with the camera, e.g. between 20-25 cm" (page 17). In addition, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) has discussed biological activity at a depth of 4 feet. Please clarify what the Demonstration Plan considers to be the biologically active zone, referring to the SPI report in the explanation.**

Response: In Figure 7 of the SPI report, the majority of the biological activity (>80%) is reflected by the depth of the oxygenated surface layer which is a maximum depth of 3 inches (Germano 2004). The amount of biological activity decreases with depth therefore, considering the top 12 inches as the biologically protective layer captures the majority of the biological activity (Germano 2005).

The quoted statement on page 17 of the SPI report refers to the fact that the maximum depth that the SPI camera can penetrate is about 8 ¼ inches so the biological structures that were seen at the base of the images at penetration depths of about 6 inches indicated to the author that some biological activity was deeper. Nevertheless, treating the top 12 inches as the biologically protective layer would likely account for 95-99% of the biological activity (Germano 2005). There was no

evidence of ghost shrimp or larger burrows that could extend to four feet or more. With this information in mind, the ESTCP Demonstration Plan will continue to conservatively estimate that the depth of the biologically active zone is limited to the top 12 inches.

4. **Comment:** **The Bay Conservation and Development Commission (BCDC) appears to have been omitted from the list of stakeholders. BCDC should also have an opportunity to review this Draft Demonstration Plan. Please include the BCDC in the discussion of regulatory agencies and stakeholders and clarify if BCDC has been given an opportunity to review this Demonstration Plan.**

   Response: Previous discussions between Mr. Ryan Ahlersmeyer (Navy Parcel F remedial project manager) and the Bay Conservation and Development Commission (BCDC) in August 2004 established that a permit is not required to place this small amount of AC.

SPECIFIC COMMENTS

1. **Comment:** **<u>Section 1.1, Background, Page 1 and Appendix A, Section A.2.3, Site Description, Page A-16</u>: The text does not include the fact that Hunters Point Shipyard (HPS) was placed on the National Priorities List (NPL) in 1989. It is important to acknowledge that HPS is a Superfund site since this status allows exemption from permitting requirements and allows treatability studies like this Field Testing of Activated Carbon Mixing and I n Situ Stabilization of PCBs in Sediment to proceed under the Navy's authority to conduct treatability studies. Please revise the text to state that HPS was placed on the NPL in 1989.**

   Response: The text of Section 1.1 has been revised.

2. **Comment:** **<u>Section 1.1, Background, Page 1; Section 3.3, Test Site History/Characteristics, Page 11; and Appendix A, Section A.2.3, Site Description, Page A-16</u>: The text states that HPS is comprised of about 955 acres, but most historical documents give the area as 928 acres. Since Parcel A has been transferred to the City of San Francisco, HPS is only 853 acres at present. Parcel F is approximately 432 acres. Please include the reduced size of HPS.**

   Response: The text of Section 1.1 has been revised.

3. **Comment:** **<u>Section 2.3, Factors Affecting Cost and Performance, Page 6</u>: The paragraph "Cost Factors" states that "the effectiveness of regenerated AC is currently under evaluation by other studies," but does not give references for these studies or include any summary of results (if they exist) of such studies. Please include references for the studies that**

are evaluating the effectiveness of regenerated AC, and, if possible, include information from preliminary results of those studies.

Response: With funds obtained from the ESTCP sponsor, Stanford and ERDC are currently conducting studies that will assess the effectiveness and toxicity of regenerated activated carbon in comparison to virgin activated carbon. Specifically, the following laboratory measurements are being made on sediment that has been contacted with 3.4 percent by weight regenerated carbon for 1 month:

(1) Aqueous equilibrium concentrations of PCBs (Stanford)

(2) PCB uptake into semi-permeable membrane devices (SPMDs) (Stanford)

(3) Biota toxicity and PCB bioaccumulation studies on *Neanthes arenaceodentata* worms (ERDC)

The measurements on regenerated activated carbon should be completed by mid-November 2005. Preliminary results at Stanford indicate that similar reduced aqueous equilibrium concentrations and uptake into SPMDs should be found for sediment contacted with either virgin or regenerated activated carbon. The results will be used to decide whether to use virgin or regenerated activated carbon in the demonstration project in January 2005. Regenerated activated carbon will be used only if it performs as (or more) effectively as the virgin activated carbon in terms of PCB stabilization and toxicity to biota.

4. Comment: **<u>Section 2.4, Advantages and Limitations of the Technology, Page 7</u>: The text states: "the application of this in situ technology may be limited to sediments having low-to mid-range contaminant concentrations," but does not state why this may be the case. In addition, it is not clear what contaminant concentrations are considered low, mid, or high. Please expand this section to include study results that indicate that the effectiveness of AC remediation is limited to low- to mid-range contaminant concentrations and give appropriate references. Please also revise the Demonstration Plan to clarify the ranges of contaminant concentrations which are considered to be low, mid, and high.**

Response: Section 2.4 has been revised to define low- (less than 1 ppm), mid- (1 to 10 ppm), and high-range (more than 10 ppm) concentrations of total PCBs. In addition, the section has been expanded to explain why sediment that contains low- to mid-range PCB concentrations is appropriate for AC remediation. This rationale is based on the 10-fold reduction in PCB bioavailability that has been observed in laboratory studies. Even though this rationale is provided, use of the AC in situ technology would be mediated by final cleanup goals for a site.

5. **Comment:** **<u>Table 3.1, Performance Objectives, Page 8</u>: This table should include more information on the different primary performance criteria. Specifically, please consider adding rows for such criteria as organism development, macrofauna community structure, and plot recolonization. Also, please consider adding columns for each criterion's measurement method, decision points, possible outcomes/decisions, and limitations. Lastly, please provide numeric performance metric in applicable cases (e.g., "Lower PCB tissue concentrations by a factor of X", instead of "Significantly lower PCB tissue concentrations"), or state what value of alpha will be used in the statistical analysis.**

Response: As discussed in the response to General Comment #2, the "effects of AC treatment on indigenous benthic community structure" (benthic recolonization, community structure, and organism growth) are considered a secondary performance objective. As a result, it is not included in Table 3-1, but can be found in Table 4-1. In addition, please consult Table 4-2 to find the expected performance metric and confirmation method for all of the primary and secondary performance objectives. The alpha value that will be used to determine significance will be set at 0.05 in all cases. This alpha value has been included in the discussion of statistical analysis in Section 4.3.

6. **Comment:** **<u>Section 3.6.3, Mount/Treatment Rate of Material to be Treated, Page 14</u>: The Demonstration Plan proposes the application of 3.4 percent by weight (wt.%) AC to sediments; however, it is unclear how this dose was selected. The evidence presented in Section 2.2 indicates the greatest reductions in bioaccumulation at 3.4 wt.%, but it does not appear that higher doses were tested. Please revise the Demonstration Plan to clarify how the dose was selected, and discuss whether higher doses may yield greater reductions.**

Response: The dose of 3.4 wt.% activated carbon for the field demonstration was chosen based on the laboratory data presented in Figure 2-2. Although higher doses have not been tested in the laboratory, the trends in Figure 2-2 indicate that the effect of the activated carbon dose on PCBs in clam tissue and PCBs in aqueous equilibrium begins to level off at 3 wt.% to 4 wt.% AC dose. Therefore, a 3.4 wt.% dose achieves a balance between maximizing the effectiveness of the AC dose and minimizing the costs of the AC. Section 3.6.3 in the demonstration plan has been revised to clarify how the AC dose was selected.

7. **Comment:** **<u>Section 3.6.6, Experimental Design, Page 21</u>: It is unclear why sediment from the bottom half of the sediment cores (i.e., 6 to 12 inches depth) will not be analyzed for PCBs since the study assumes that the first foot is "the biologically active zone" (page 16). If the total organic carbon (TOC) data indicate that the sediment has not**

been well mixed, PCB analyses of the bottom half of the sediment cores should be done. Please revise the design to include PCB analyses of the bottom half of the sediment cores (6 to 12 inches depth) if TOC data indicate that the sediment has not been well mixed or provide justification for the omission of these analyses.

Response: Previous clam deployments at HPS indicate that the clams do not burrow farther than 6 inches below the surface of the sediment. Since the goal is to analyze the exposure of the clams to the actual concentration of PCBs in sediment during the 1-month deployment, a composite of the top 6 inches of sediment will be analyzed.

8. Comment: **Section 3.6.7, Sampling Plan, Page 22: According to the information presented in Table 3-3 on this page, 11 months will pass between the removal of the first clams for analysis post-treatment and the deployment of the second set of clams. It appears that no activity is planned for this nearly year-long period. It is not clear how the test plots will be protected from disturbance during this period, or if protection will be required. Please revise the Demonstration Plan to clarify how the test plots will be protected from disturbance during the 11 months between clam deployments.**

Response: Other than ensuring that no Navy activities are planned to occur at the test plots, no protection has been planned. The two test plots that were part of the HPS Parcel F treatability study (Battelle and others 2004) conducted in fall 2004 have been unprotected for more than a year and no evidence of disturbance has been observed.

9. Comment: **Table 3-3, Schedule of Plot Sampling and Analysis and Appendix A, Table A-1, Schedule of Plot Sampling and Analysis: There appears to be an error in the timing of the first post-treatment sampling event. The time for the initial water and suspended particulate sampling is listed as "t = 0.05 Months since Treatment (t)," which would be 1.5 days after treatment. Since the most critical time for PCB re-suspension is during the first incoming tide, water sampling should be conducted during the first incoming tide after treatment. Please revise the schedule of the initial water and suspended particulate sampling event so the potential for PCB re-suspension during the initial high tide can be assessed.**

Response: The HPS Parcel F treatability study (Battelle and others 2004) conducted in fall 2004 found no change in dissolved PCBs and only a small increase in PCBs associated with suspended particles in the water column during the first high tide immediately after AC treatment. During the third water sampling event a month later, a higher turbulence generated by faster wind speeds increased suspended PCB loads in the water column. Thus, the study concluded that wind speed and direction may have a greater impact

on sediment and PCB resuspension than the immediate effect of mechanical mixing of AC with sediments.

The AC application and mixing will occur over a period of several days during low tides. Since the water sampling effort involves mobilization of five water sampling tubes and pumps on all five plots at once, it prevents other activities from occurring at the same time. As a result, the first post-treatment water sampling effort will be offset so that it will not restrict the mobility of the heavy equipment and field personnel during AC application and mixing. Therefore, to ensure that the plot treatment activities and the first post-treatment water sampling effort do not conflict with or affect one another, the first post-treatment water sampling effort will occur during the first high tide after both of the mixing devices have been demobilized from the sampling area. The preliminary findings from the HPS Parcel F treatability study indicate that the water sampling schedule proposed will fully evaluate the sediment resuspension and PCB release that may be caused by the plot treatments.

10. Comment: **Section 3.8, Selection of Analytical/Testing Laboratory; Appendix A, Section A.3.3.4, Field Sample Preservation, Packaging, and Shipment, Page A-34; and Appendix A, Section A. 3.3.6, Sample Receipt, Page A-35: It is unclear if archived samples will be analyzed within method holding time limitations. Although PCBs are considered stable and are not readily transformed, there are established data quality requirements for preservation and storage of samples. The text states that archived split samples may be analyzed by Battelle Duxbury Operations (BDO) if use of AC becomes an alternative for the Feasibility Study (FS), but the normal holding time for EPA SW846 Method 8082 is only 40 days. Since the timeframe for analyses of samples for the FS could exceed 40 days and may exceed a year, procedures for sample shipment and storage should be planned to maximize data quality and usability. It is likely that the PCB concentrations in refrigerated samples may be stable for a year, but it is unclear how stability will be determined. If samples are not analyzed within the holding time, the analytical results should not be considered representative, could not be validated, and hence, would not be usable for the FS or for decision making. Stability and inter-laboratory accuracy and precision should be established, which could be done by having samples analyzed by a certified laboratory within the 40-day sample holding times. Please include a brief statement about the limitations of holding times and the stability of PCBs and provide additional information about the archiving process, including an estimate of the length of time samples will be held before analysis. Alternatively, if the archived samples will not be analyzed within a year, please consider omission of sample archiving.**

Response: The 40 day holding time for EPA SW846 Method 8082 is in reference to the holding time for the sample extract. In other words, once a sample is

extracted 40 days is allowed to analyze the extract. No official EPA holding time exists for environmental tissue samples, however the standard holding time used by NOAA, USACE and the Navy is one year from the time that the tissue is collected so long as the tissue is held frozen. Battelle Duxbury Operations is a certified laboratory and holds the tissue samples at -20 C. Archived samples will be analyzed within the method holding time limitations. The holding times for collection to extraction and extraction to analysis are already included in Table A-6 of Appendix A.

11. Comment: **Section 3.8, Selection of Analytical/Testing Laboratory; Appendix A, Section A.3.3.4, Field Sample Preservation, Packaging, and Shipment, Page A-34; and Appendix A, Section A. 3.3.6, Sample Receipt, Page A-35: Additional sample preservation procedures are needed to ensure data quality. It is EPA's experience that problems can occur during sample shipping; if delivery is delayed, samples may warm above 4 degrees Centigrade. If samples are exposed to sunlight or if they are not kept at or below 4 degrees Centigrade at all times during sample shipment and archiving, PCB stability cannot be assumed. It is recommended that a temperature blank be included with samples shipped for archiving, that the temperature of the blank be recorded when samples arrive at BDO, and that samples be discarded if they arrive warm. In addition, the temperature during the archival period should be monitored and recorded. Please revise Sections A.3.3.5 and A.3.3.6 to specify that a temperature blank (TB) be included with all samples shipped to BDO for archiving and that the temperature of the TB be recorded when samples arrive at BDO. Please also specify that temperatures be monitored and recorded during the archival period.**

Response: Section A.3.3.4 in Appendix A already includes a discussion of using temperature blanks to verify sample temperature when samples are received. Temperature blanks will be used in all shipments to ensure that the required sample temperatures, as listed in Table A-6, will be maintained. Systems are in place at BDO to ensure that sample preservation temperatures are maintained during the archival period.

12. Comment: **Section 4.2, Performance Confirmation Methods, Page 30: Two of the listed performance criteria refer to significantly lowering PCB concentrations; however, it is not clear how a change in PCB concentration will be determined to be significant. Please revise the Demonstration Plan to clarify what will constitute a significantly lowered PCB concentration.**

Response: "Significantly" refers to significance in the statistical sense. "Significance" is claimed if two PCB concentration means are statistically different using an alpha of 0.05. A statistically significance difference

rather than a numeric goal will be sought since the results of the field data are not yet known. The numeric change will be calculated only after "significance" is determined.

13. **Comment:** **Section 5.2, Cost Analysis: It is unclear why it is appropriate to compare the costs associated with mixing AC to a depth of 1 foot with the costs associated with dredging and removal of contaminated sediments to a depth of 4 feet. Please explain why treating sediment to a depth of 1 foot is comparable to excavating contaminated sediments to a depth of 4 feet.**

Response: Since AC may serve as an alternative remediation strategy to dredging, the full costs of each strategy must be compared. In dredging, the full depth of contamination often must be removed to avoid recontamination during dredging operations and so is limited to a depth of 4 feet in the South Basin. Using the AC remediation strategy, only the top 1 foot of the sediment would need to be treated to lower the PCB availability to the food web.

14. **Comment:** **Appendix A, Table A-2: Data Quality Objectives for Primary Quantitative Performance Criteria of ESTCP DP: There are no specific criteria for decision rule 3 (Step 5, number 3) and the word "similar" is not defined. Please provide specific criteria for decision rule 3.**

Response: Specific criteria were added to decision rule 3 (Step 5) in Appendix A, Table A-2.

15. **Comment:** **Appendix A, Section A.2.6.2, Special Training, Page A-21: The text states that sediment will be scanned for radioactivity by Foster-Wheeler, but the BCT has been told on several occasions that water can interfere with the scans, so it is unclear how these scans will be done. Please clarify how radioactive scans will be done.**

Response: The water content in the sediment samples is not expected to interfere with the radioactive scans**.** All samples obtained will be monitored for radioactivity using field instrumentation to determine the potential presence of external loose surface contamination and dose rates. Any sample with a dose rate exceeding 150 percent of the established background level will not be submitted for laboratory analysis. If surface contamination is indicated on the sample container, decontamination of the container will be performed prior to submission for analysis.

16. **Comment:** **Appendix A, Section A.3.3.3.6, Sediment Core Processing and Sample Handling, Pages A-33 and A-34: The text describes sample handling**

and core archiving, but does not discuss how the samples/cores will be disposed of when they are no longer needed. Since it is likely that contaminants other than PCBs are present in the sediment, sample disposition should be specified. Please specify disposal procedures for sediment samples.

Response: Section A.3.3.3.6 in Appendix A has been amended with the following text:

At the conclusion of the project, sediment waste will be classified as hazardous waste and disposed of through procedures outlined by Stanford's environmental health and safety program.

MINOR COMMENTS

1. Comment: **<u>Section 1.1, Background, Page 1</u>: The last sentence of the first paragraph in this section is unclear: "… and address Navy high priority area of Improved Marine Sediment/Dredge Spoil Remediation & Decontamination". Please revise this sentence for clarification.**

Response: This last sentence in Section 1.1 has been revised.

2. Comment: **There are several misspellings, including:**

"Triple" is misspelled in Section 3.3, page 11.

It appears that the word "archival" in the last sentence of the third paragraph of Section 3.7 (page 23) and in the fourth sentence of the last paragraph on page 24 should be "archiving."

"Analysis" is misspelled in the title of item 17 of the References.

Response: These misspellings have been corrected.

REFERENCE

Battelle, Stanford, and NAVFAC. 2004. "Hunters Point Shipyard Parcel F Treatability Study Work Plan."

Clark, D.G., Palermo, M.R., and Sturgis, T.C. 2001. Subaqueous cap design: Selection of bioturbation profiles, depths and rates. DOER Technical Notes Collection (ERDC TN-DOER-C2), U.S.Army Engineer Research and Development Center, Vicksburg, MS.

Germano, Joe. 2004. "Sediment Profile Imaging Report: Benthic Macrofauna Activity at Hunters Point, San Francisco Bay." Draft Technical Memorandum, Feasibility Study Data Gaps Investigation, Parcel F, Hunters Point Shipyard, February 25.

Germano, Joseph. 2005. Personal communication.

Zimmerman, J.R. 2004. "In Situ Stabilization of Persistent Organic Contaminants in Marine Sediments." Ph. D. Thesis. Stanford University

RESPONSES TO SAN FRANCISCO PUBLIC UTILITIES COMMISSION

COMMENTS DATED OCTOBER 5, 2005

GENERAL COMMENTS

1. Comment: **The plan should evaluate the effect of activated charcoal on other contaminants as well as PCBs. It would not be efficient to find a method to neutralize one contaminant *in situ* and still need to dredge the treated area to remove other contaminants. For example, there likely is DDT, as well as PCB, contamination of Parcel F sediments. How will activated charcoal affect DDT or other contaminants that may be present in high levels?**

Response: The primary contaminant of concern in the South Basin is polychlorinated biphenyls (PCBs) (Battelle and others 2005). Therefore, this treatability study focuses on the effectiveness of activated carbon in reducing PCB bioavailability in situ. Dichlorodiphenyltrichloroethene (DDT) was not shown to be elevated in Parcel F South Basin. Although elevated concentrations of some metals (copper, mercury, and lead) are found in sediments along the northeastern shoreline, these metals do not appear to be posing an unacceptable risk (Battelle and others 2005). The budget for this treatability study limits the number of contaminants that can be evaluated; therefore, the study is designed to address sediments and site conditions specific to the South Basin at Parcel F.

Stanford University laboratory results indicate that similar reductions are found in the availability of PCBs, polycyclic aromatic hydrocarbons (PAHs), and DDT when contaminated sediments are amended with activated carbon (AC) (Millward and others, 2005; Tomasewski and Luthy, 2005; Zimmerman and others, 2005)

2. Comment: **The plan proposes to mix activated charcoal into the first one foot of sediment, apparently leaving lower, existing, contamination unaffected. Does this limited treatment render contaminants in the lower sediments no longer bioavialable and thus no longer of concern? It would be helpful to understand how EPA, DTSC and the Regional Board regulations and interpretations apply to the planned work, and to the remaining contaminants.**

Response: The majority of the biological activity (>80%) is reflected by the depth of the oxygenated surface layer which is a maximum depth of 3 inches (Germano 2004). The amount of biological activity decreases with depth therefore, considering the top 12 inches as the biologically protective layer captures the majority of the biological activity (Germano 2005).

Activated carbon will be mixed into the top 1 foot of sediment to significantly lower the concentrations of PCBs that are available to biota

and to decrease the subsequent biomagnification of PCBs up the food chain. The AC's sorption capacity is calculated at 10 times greater than the amount of PCB contamination in the test plots (see Section 5.2 of the demonstration plan). Therefore, any PCBs that diffuse from below into the top 1 foot of sediment should be trapped by the AC, so that this contamination would no longer be bioavailable.

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 United States Code [U.S.C.] Section 9621 [d], as amended) states that remedial actions on CERCLA sites must attain (or the relevant decision documents must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant or appropriate. The treatabilty study is being conducted in accordance with all regulations deemed applicable or relevant and appropriate.

3. **Comment:** **Mixing the activated charcoal in Parcel F sediments will increase turbidity. Will tidal action and Bay currents cause contaminants entering the water column to be moved from Parcel F to other locations, i.e. Yosemite Slough or other nearby waters?**

Response: The Hunters Point Shipyard (HPS) Parcel F treatability study (Battelle and others 2004) conducted in fall 2004 found no change in dissolved PCBs and only a small increase in PCBs associated with suspended particles in the water column during the first high tide immediately after AC treatment. During the third water sampling event a month later, a higher turbulence generated by faster wind speeds increased suspended PCB loads in the water column. Thus, the study concluded that wind speed and direction may have a greater impact on resuspension of sediment and PCB than the immediate effect of mechanical mixing of AC with sediments.

In addition, previous research at Stanford indicates that once AC is mixed into the sediment at Hunters Point, it stays in place. For example, in the HPS Parcel F treatability study conducted in fall 2004 (Battelle and others 2004), AC was mixed into a 370 square foot plot down to 1 foot. After AC treatment, sediment cores were taken after 1 month and again after 7 months. Cross sections of these sediment cores were analyzed for total organic carbon (TOC) to assess the amount of AC present. No significant differences in the AC amount were found when the TOC values between the 1- and 7-month samplings were subjected to a paired student's t-test at the 95 percent confidence level.

These field results are also supported by the combined results of Sedflume experiments (Zimmerman 2004) and modeling studies (Battelle and others 2005) that have assessed the erosion potential of sediments at HPS Parcel F amended with AC. These results indicate that the mix of AC and sediment at HPS Parcel F is unlikely to erode, even during a storm. The

sediments at HPS Parcel F are stable because the South Basin area, where Plots C through F will be located, is a net depositional zone and is composed of cohesive sediments.

4. **Comment:** **The application of 2,500 pounds of activated charcoal to tidal wetlands may be considered "fill" by both BCDC and the Corps of Engineers. Has the project sponsor obtained permits, or an exemption, to place the material?**

   Response: The area that will be affected by the treatability study is in a tidal mudflat and not a tidal wetland. Approximately 1,100 pounds of AC will be mixed into each of the two 370 square foot plots. The resulting thickness is only 0.3 inches when this quantity of AC is spread on the surface of the plot. Previous discussions between Mr. Ryan Ahlersmeyer (Navy Parcel F remedial project manager) and the Bay Conservation and Development Commission (BCDC) in August 2004 established that a permit is not required to place this small amount of AC.

5. **Comment:** **The demonstration plots are located on the Bay shoreline. Will the chosen equipment work in the deeper waters of Parcel F? Perhaps one of the test plots could be moved to a deeper location.**

   Response: The experimental design for this project dictates that the location and baseline conditions of the demonstration plots need to be similar to make useful comparisons in the data obtained. Even though no work is planned for amending sediment with overlying water in the current demonstration, another project is under way that will amend PCB-contaminated river sediments with overlying water and use silt curtains to prevent movement of the expected suspended sediment.

6. **Comment:** **The project clearly will have environmental effects. Activated charcoal affects PCBs. Does it, or the application process, affect any species? Are any of those effects adverse or significant? Has the project sponsor obtained CEQA or NEPA clearance for the work? Is an Initial Environmental Study available for review?**

   Response: The potential detrimental impact to the existing benthic community will occur when the sediments are mixed with the Aquamog's rotovator or the slurry injector system on the immediate time scale. However, unlike dredging, all of the sediment components are in place and the benthic community should reestablish relatively quickly. In addition, laboratory studies (Millward and others 2005) indicate that the survival rates and lipid content of *Leptocheirus plumulosus* amphipods and *Neanthes arenaceodentata* worms were not affected by addition of 3.4 percent by weight dose of granular activated carbon (GAC) to sediment. The growth rates of the *Leptocheirus plumulosus* were unaffected; however, a significant and yet unexplained decrease in growth rates of *Neanthes*

areneceodentata was observed in the study. The experimental design in this demonstration project will measure the effect of AC treatment on plot recolonization, macrofauna community structure, and organism development (see Table 4-2 of the demonstration plan).

The California Environmental Quality Act (CEQA) applies to state discretionary decision-making but not to actions of the federal government. Pursuant to the provisions of CERCLA, selecting a remedial action with feasible mitigation measures and provision for public review is designed to assure that the proposed action provides for short- and long-term protection of the environment and public health. Hence, CERCLA performs the same function as, and is functionally equivalent to, the state's requirements under CEQA.

Similarly, the National Environmental Policy Act (NEPA) does not apply to CERCLA, which are the functional equivalent of the NEPA process. Accordingly, compliance with the requirements of CERCLA satisfies the NEPA objectives of informed decision-making and public participation.

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