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COMMENTS ON THE DRAFT ADDENDUM 3 TO THE FINAL WORK PLAN, IN-SITU ANAEROBIC BIOREMEDIATION PILOT STUDY FOR SITES 24 AND 21, FORMER NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA

Dear Mr. Sullivan:

The Department of Toxic Substances Control (DTSC) has reviewed the January 17, 2008 "*Draft Addendum 3 to the Final Work Plan, In-Situ Anaerobic Bioremediation Pilot Study for Site 24 and 21*" (Draft Addendum) for the former Naval Station Treasure Island, San Francisco, California. The Draft Addendum was prepared by Shaw Environmental, Inc. for the U.S. Department of the Navy, Naval Facilities Engineering Command, Southwest Division (Navy). Based on our review, we have the following comments:

GENERAL COMMENT AND RECOMMENDATION:

The Draft Addendum indicates that a conclusion reached in the Final Treatability Report for In Situ Anaerobic Bioremediation (ISB) for IR Site 24 was that increased total molar concentrations of chlorinated ethenes during post-treatment sampling in the source area indicate that a portion of the chlorinated ethenes mass balance existed in a non-dissolved phase, such as adsorbed or as dense non-aqueous phase liquid (DNAPL), and that bioremediation of this phase of the contamination had occurred. It is not clear if the Navy has concluded that the non-dissolved phase will be completely addressed by the use of ISB in the presumed source area (on the northeast side of Building 99) or whether additional measures may be necessary. Due to the possible presence of DNAPL, has the Navy considered additional investigation and/or evaluation of remedial alternatives for the presumed source area similar to those that are proposed for the source area that is addressed in the

Draft Addendum (i.e., on the south side of Building 99)? It is likely that DNAPL, if allowed to remain in the aquifer will act as a long-term continuing source of groundwater contamination and may prevent remedial action objectives (RAOs) from being met within a reasonable time frame.

Recommendation
DTSC requests that the Navy discuss the extent to which the current remedial measure (ISB) is considered to be successful in completely treating non-dissolved contamination that may exist in the presumed source area (outside the area being proposed for investigation in the Draft Addendum) such that RAOs can be met within a reasonable timeframe. Additional investigation (such as Membrane Interface Probe and soil sampling) should be performed at locations within the northeast side of Building 99 to demonstrate the effectiveness of the ISB at remediating possible non-dissolved contamination.

SPECIFIC COMMENTS:

- Section 2.1 – Potential Source Area. A brief description of potential conditions that would warrant a Permeable Reactive Barrier (PRB) system should be provided in the text. A PRB system cannot not be installed until the DNAPL investigation is complete and design and installation specifications are reviewed and approved in a separate Treatability Work Plan.

- Section 2.1.1.1 – Membrane Interface Probe Study.
  (A) A brief description of the deployment of the Membrane Interface Probe (MIP) is warranted (how get into ground, how long keep in ground to equilibrate and take measurements, how the data will be used to identify if DNAPLs are present).
  (B) While the text states that "MIP locations will be determined in the field in a step-out manner, based on the real-time data from the MIP detectors", a more thorough description of how this will be implemented should be included. For example, a detection of how high will warrant how many step-outs and in what direction(s)? What level of detection will not warrant additional step-out sampling?
  (C) A description of the method of emplacement and composition of the grout that will be used to backfill the Membrane Interface Probe borings must be presented.

- Section 2.1.1.3 – Soil Sampling. A description of the method of emplacement and composition of the grout that will be used to backfill the Geoprobe borings must be presented.

- Section 2.1.1.4 – Monitoring Well Installation. Monitoring well screens must not exceed 10 feet in length to minimize the potential for dilution. If necessary, installation of a cluster of two or more short-screened (5 to 10 feet) monitoring

wells at each location should occur rather than installing one well with a long screen-length.

- Section 2.1.1.5 – DNAPL Investigation Report. As a part of the characterization of the potential DNAPL CVOC plume, a description of how the proposed characterization methods will be able to differentiate between a DNAPL plume which occurs in small residual globules disseminated throughout the aquifer and one with a low surface area to mass of larger pools of DNAPL is essential. Describe how the data obtained will be used to differentiate between these two general types of DNAPL plumes, which is a key aspect with regards to potential DNAPL plume characterization.

- Section 2.1.3 – Potential Treatment Pilot Test Alternatives. The Draft Addendum discusses potential alternatives for addressing a DNAPL plume that has yet to be identified and/or adequately characterized. Remediation alternatives cannot be effectively evaluated before characterization of any DNAPL plume is complete.

- Section 2.2.1.1 – Delineation using Temporary Wells. It is stated that the sample depth within the well screen intervals will be selected based on depths of high concentration results from nearby biobarrier well locations, but the screen-length and total depth of the temporary wells is not specified. Long screen-lengths (greater than 10-feet long) will provide a flow-weighted average of the contaminant concentrations within the screened interval and therefore, are not appropriate for plume delineation. In other words, samples should be collected from short screen-lengths at multiple depth-intervals, as needed, to evaluate the configuration of the dissolved plume in three dimensions for the purposes of site characterization and remedial design. The construction details of the proposed temporary wells must be revised to include the use of multi-depth sampling intervals for plume delineation.

- Section 2.2.1.2 – Reconfigure Injection and Extraction Wells. The text states that extraction wells will be designed with screen intervals between 10 and 30 feet below ground surface (bgs) or possibly deeper depending on the groundwater sampling at new temporary well locations. The basis for determining the screen lengths for the design of the proposed new extractions wells must be provided. As stated previously, the Navy should perform multi-depth sampling so that extraction well screen-intervals can be designed to target the intervals of highest groundwater contamination.

- Section 2.2.2.1 – Substrate Media Evaluation. The text provides a brief description of some alternative media that may be evaluated as a part of this work, but the experimental design of the media evaluation is not presented. Additional details describing the procedures that will be implemented and exactly how the various substrates will be compared and evaluated must be included.

- Section 3.0 – Site 21. Design details such as performance monitoring specifications, methods that will be used to monitor the groundwater to ensure that the plume is not being pushed into other areas, and the analytical suite of groundwater contaminants that will be monitored over time (as well as the frequency) must be presented in the Draft addendum.

- Section 3.1 – Injection of Substrate and SDC-9.
  (A) Please define what "site anisotropy" is and describe how the addition of five times the lactic acid concentration required will safely account for its occurrence.
  (B) It is unclear how injection of contaminated site water at locations in the interior of the plume will help distribute the substrate and microbes any more than injection of clean water with substrate and SDC-9 culture amendments.
  (C) The text proposes to inject the substrate and microbes one injection interval below the depth of the 100 µg/L plume to prevent the plume from being pushed deeper. However, given the lack of groundwater characterization between approximately 10 and 23 feet bgs directly south of the dip tank at 21-MW08A and B (Figure 9), as well as the dense and unpredictable nature of the contaminants, deeper groundwater contamination may in fact be present at this location. In addition, the highest soil contamination was found southwest of the dip tank, and west of monitoring wells 21-MW08A and B, but no groundwater data are available from this location. Therefore, the Navy should conduct additional soil and groundwater investigation and/or deeper injections in the areas south and southwest of the dip tank to account for uncertainties associated with site characterization.
  (D) A groundwater extraction / injection schedule with approximate time frames should be included in the Draft addendum in order for the reviewers to evaluate the phased "perimeter" and plume "interior" injections to help prevent the lateral spread of the plume due to the injection process.

- Section 3.2 – Makeup Water Extraction. The approximate volume of groundwater as well as the volume of lactic acid and SDC-9 added to groundwater that will be required for the proposed injections (per location as well as total) should be presented.

- Figure 5 – Site 24 Total Chlorinated Ethenes. The contour map shows a small area exceeding 500 micrograms per liter (µg/L) total chlorinated ethenes at the toe of the plume (within 100 feet of the Bay). However, the data upon which this interpretation is based in not shown on the map. Please specify the data that was used to derive this interpretation at the toe of the plume.

Thank you for the opportunity to review the Draft Addendum. Please provide a response to the comments provided above on the Draft Addendum by May 9, 2008. If you have any questions, please contact me at (510) 540-3775.

Sincerely,

Ryan Miya

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Copies sent via email transmission followed by hard copy.

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