



Linda S. Adams
Secretary for
Environmental Protection



Department of Toxic Substances Control

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TREASURE ISLAND
SSIC NO. 5090.3.A



Arnold Schwarzenegger
Governor

July 2, 2007

Mr. James B. Sullivan
BRAC Environmental Coordinator
Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

REMEDIAL INVESTIGATION AND FOCUSED FEASIBILITY STUDY REPORT FOR
INSTALLATION RESTORATION SITE 24 FORMER DRY CLEANING FACILITY,
NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA

Dear Mr. Sullivan:

The Department of Toxic Substances Control (DTSC) has received the April 30, 2007 "*Remedial Investigation and Focused Feasibility Study Report for Installation Restoration Site 24 Former Dry Cleaning Facility*" (RI/FFS) for the former Naval Station Treasure Island, San Francisco, California. The RI/FFS evaluates the nature and extent of contamination in soil and groundwater, assesses the risk to human health and the environment, and evaluates remedial alternatives for treatment of chlorinated volatile organic compounds posing unacceptable risk at Site 24. DTSC provides the following comments on the RI/FFS:

1. Comments from the Geologic Services Unit (GSU): DTSC forwards the enclosed DTSC's GSU comment memorandum dated June 26, 2007.
2. Comments from the Human and Ecological Risk Division (HERD): DTSC is reviewing comments from DTSC's HERD. DTSC plans to forward HERD's memorandum and any additional comments to the Navy by July 11, 2007.

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July 2, 2007
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If you have any question, please contact me at (510) 540-3770.

Sincerely,

A handwritten signature in black ink, appearing to read 'Henry Wong', with a long horizontal line extending to the right.

Henry Wong
Remedial Project Manager
Office of Military Facilities

Enclosure

cc: Mr. Charles Perry
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Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Henry Wong
Project Manager
Office of Military Facilities

FROM: Michelle Dalrymple, P.G. *Michelle Dalrymple*
Engineering Geologist
Geologic Services Unit

**REVIEWED
BY:** Michael O. Finch, P.G. *Steven Hughes for
Michael O Finch*
Senior Engineering Geologist
Geologic Services Unit

DATE: June 26, 2007

**SUBJECT: REVIEW OF THE DRAFT REMEDIAL INVESTIGATION AND FOCUSED
FEASIBILITY STUDY REPORT FOR INSTALLATION RESTORATION
SITE 24, FORMER DRY CLEANING FACILITY, NAVAL STATION
TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA, DATED APRIL
30, 2007**

ACTIVITY REQUESTED

Per your request, the Northern California Geological Services Unit (GSU) has reviewed the *Draft Remedial Investigation and Focused Feasibility Study Report for Installation Restoration Site 24, Former Dry Cleaning Facility, Naval Station Treasure Island, San Francisco, California*, dated April 30, 2007. The Remedial Investigation (RI) and Focused Feasibility Study (FFS) Report was prepared by SulTech and Tetra Tech EM Inc. for the U.S. Department of the Navy, Naval Facilities Engineering Command, Southwest Division (Navy). GSU reviewed the document with respect to geologic and hydrogeologic interpretations and technical adequacy. The review consisted of reading the document, and reviewing the DTSC project file for background information.

PROJECT SUMMARY

The former Naval Station Treasure Island (NAVSTA TI) is located in San Francisco Bay (the Bay), midway between San Francisco and Oakland, California. NAVSTA TI consists of two connected islands: Treasure Island (TI) and Yerba Buena Island (YBI). TI is a manmade island comprising approximately 403 acres. YBI is a natural island comprising approximately 147 acres. Military activities at NAVSTA TI date back to 1866, when the U.S. government took possession of YBI for defensive fortifications. In the late 1930s, TI was constructed using sand dredged from the Bay and the Sacramento River Delta, within a retaining wall of rock and sand dikes. In 1993, NAVSTA TI was designated for closure under the Base Closure and Realignment Act of 1990. The base was closed on September 30, 1997 and is currently in the Base Realignment and Closure transfer process.

Installation Restoration (IR) Site 24 encompasses roughly 20.7 acres along the eastern side of NAVSTA TI. IR Site 24 extends from the central portion of the island toward the northeast and is bounded on the northeast by the Bay. The site boundary has been modified over time and currently includes Building 99 (the former dry cleaning facility) and other buildings.

The purposes of the RI are as follows:

- Establish the nature and extent of contamination.
- Characterize the geology, hydrogeology, and physical features.
- Identify potential chemical migration pathways and receptors.
- Evaluate the fate and transport potential of chemicals.
- Conduct a baseline human health risk assessment and ecological risk assessment.

The FFS does not include a detailed development of general response actions (GRAs) or detailed screening of the technologies and process options that are typically contained in a feasibility study (FS) report. The Navy states that they performed a FFS based on the results of an ongoing anaerobic in-situ bioremediation (ISB) treatability study for chlorinated volatile organic compounds (VOCs) in groundwater at IR Site 24. The Navy indicates that the FFS approach is consistent with United States Environmental Protection Agency (EPA) management principles defined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP states that "site-specific data needs, the evaluation of alternatives, and the documentation of the selected remedy should reflect the scope and complexity of the site problems" (Title 40 *Code of Federal Regulations* Section 300.430[a]).

The FFS involved the following steps:

- Develop remedial action objectives (RAOs) that specify chemicals and media of concern, exposure pathways and remediation goals.
- Develop GRAs that address the RAOs.
- Develop remedial alternatives and perform a detailed analysis of the alternatives against the nine criteria in the NCP.
- Assess compliance with Department of Defense requirements by evaluating an alternative that would permit unrestricted use of the site if land use controls are part of an alternative.
- Perform a comparative analysis of the remedial alternatives.

GENERAL COMMENTS AND RECOMMENDATIONS

- A. The Navy states that ISB has been proven to be successful in reducing VOCs in soil and groundwater at IR Site 24 based on the initial pilot test. However, it is the understanding of GSU that significant rebound of VOC concentrations was observed in groundwater samples collected in January 2007 following the initial pilot study. The observed rebound in dissolved concentrations is likely related to the presence of significant untreated sorbed mass and/or, more likely, residual dense non-aqueous phase liquid (DNAPL) in the aquifer. GSU questions the success of the ISB treatment for the following reasons:
- Although ISB can potentially increase the dissolution rate and solubility of DNAPL thereby reducing the life of the plume, complete dissolution is unlikely. If DNAPL is present beneath Building 99, it is unlikely that the initial pilot test eliminated sufficient mass for successful remediation, as evidenced by the recent rebound in VOC concentrations in groundwater.
 - There may also be areas where DNAPL exists in the aquifer outside of the initial ISB treatment area, as indicated by elevated concentrations of tetrachloroethylene (PCE) in groundwater in the southern portion of Building 99. This area was not targeted by the initial pilot study and may be contributing to the observed rebound.
 - GSU is unaware of any data that demonstrates the effectiveness of ISB in reducing sorbed mass in the vadose zone or saturated zones at IR Site 24.

If ISB is to be considered a viable alternative for full-scale remediation of the source area, vadose zone, and dissolved plume at IR Site 24, additional data and support for this method are required.

Recommendation

Additional information should be provided so that the reviewers can understand whether or not they concur with the use of the ISB technology for full-scale remediation. The RI/FFS Report should include details about the success of the ISB pilot study and the significance of the observed rebound. The following information is needed:

- The location of the initial and expanded treatment system in relation to potential sources of sorbed mass and/or DNAPL beneath Building 99 should be provided.
- The report should clarify whether the expanded treatment system is designed to aggressively treat the significant sorbed mass and/or DNAPL that potentially still exists beneath Building 99.
- The location and results of the FLUTE™ investigation for DNAPL should be provided and discussed in greater detail. It should be clarified why the Navy determined that the staining observed on the FLUTE™ liners was not a result of DNAPL.
- Concentration data following the initial pilot test, including those that demonstrated rebound, should be provided along with an evaluation of the data.
- The report should provide data to demonstrate that the biodegradation process does not stall at cis-1,2-dichloroethylene (cis-1,2-DCE) and/or vinyl chloride, and that remediation goals can be met within a reasonable timeframe.
- The report should provide data to demonstrate how ISB has affected the vadose zone where elevated VOCs were found in both soil and soil gas samples. GSU suggests that additional soil sampling and/or soil gas monitoring be performed to verify the reduction of contaminant mass in the vadose zone to levels that are protective of human health.

- B. Because of the Navy's assertion that ISB has been proven successful at reducing chlorinated VOCs in soil and groundwater at IR Site 24, the Navy used a "focused" FS approach in which ISB is the only active remedy proposed and

evaluated. However, as discussed in General Comment A, GSU questions the determination that ISB has been proven to be successful. The Draft RI/FFS Report does not provide data to demonstrate that ISB is an effective remedial alternative for site conditions (i.e., substantial source removal), and significant rebound in contaminant concentrations has been observed during recent sampling. GSU suggests that the Navy develop and evaluate other remedial alternatives for the source zone and dissolved plume at IR Site 24 in the FS.

Recommendation

The FS should develop and evaluate an appropriate range of remedial alternatives that will effectively address the source mass beneath Building 99 as well as the downgradient dissolved plume. Remedial technologies that address potential DNAPL source zones should be considered, such as chemical, thermal, and biological technologies, or a combination of technologies. The development and evaluation of remedial alternatives should take into consideration the complications associated with long-term continuing sources such as DNAPL and propose methods that will target such sources. The remedial alternatives must consider the source and extent of DNAPL and/or sorbed mass in the saturated and vadose zones to ensure that the plume will reach RAOs within a reasonable timeframe.

- C. The Draft RI/FFS Report provides an incomplete picture of site characterization because all relevant data and analysis are not provided in the document. For example, monitoring well and extraction well construction details are not provided. Depths (or depth intervals) of groundwater samples are not included for all groundwater data (see Specific Comment 17). The "Nature and Extent of Contamination" and "Contaminant Fate and Transport" sections of the report only present and discuss chemicals that exceeded ecological screening criteria not those that exceed human-health screening criteria. For example, chemicals that pose a human-health risk due to vapor intrusion from groundwater to indoor air (such as vinyl chloride) are not included in these discussions. Finally, the Draft RI/FFS Report does not discuss the degree to which the horizontal and vertical extent of groundwater contamination has been defined, and does not evaluate the existence of data gaps.

The following data gaps have been identified by GSU:

- 1) The extent of vadose zone soil and groundwater contamination in the vicinity of boring 24-HP033 (speculated to be related to a sanitary sewer release) has not been defined. Insufficient soil and groundwater sampling has been performed near the sanitary sewer release to determine impacts associated with this release.

- 2) The extent of high concentrations of PCE in groundwater beneath the western portion of Building 99 and to the southeast of Building 99 has not been delineated (see Specific Comment 9).
- 3) The downgradient extent of groundwater contamination in the A- and B-aquifer zones and the vertical extent of groundwater contamination beneath and downgradient of Building 99 have not been delineated (see Specific Comments 9 and 10).
- 4) The possible presence of DNAPL and/or significant sorbed mass beneath Building 99 requires further evaluation.
- 5) Groundwater should be analyzed for metals to determine whether geochemical changes associated with the treatability study have resulted in mobilization of naturally occurring metals in soil.

Recommendation

The RI/FFS Report should provide the additional data and information requested in this memorandum to demonstrate the extent to which soil and groundwater contamination has been delineated at IR Site 24. The RI/FFS Report should include an evaluation of data gaps and propose a resolution for such data gaps.

SPECIFIC COMMENTS AND RECOMMENDATIONS

1. Section 1.5 – Site 24 Cleanup Actions. It is stated in this section that the expanded treatability study is being implemented to “evaluate the effects of ISB on lower concentrations in the more mobile portions of the plume.” However, the initial pilot study did not include the entire high concentration source area beneath and adjacent to Building 99. It only targeted a relatively small area beneath the northeastern portion of Building 99. Please clarify how the source area near the southern wall of Building 99 and the source area related to the sanitary sewer discharge on the southeast side of Building 99 will be addressed.
2. Section 1.5.1 – Anaerobic In-situ Bioremediation Treatability Study in the Source Area.
 - a. This section of the report states that the investigation performed to verify the presence of DNAPL found that DNAPL was not present in the source area. However, the architecture of a DNAPL source zone can be very complicated and the investigation may have merely missed the DNAPL zones. In addition, the technique that was used to detect DNAPL (i.e., FLUTE™ technology) has the potential for false negatives. Slight staining was observed on some of the FLUTE™ liners, but the Navy determined that this staining was not the result

of the presence of DNAPL. The report should clarify that although DNAPL was not detected during the investigation, the absence of DNAPL cannot be verified. Staining of the FLUTe™ liners and rebound of VOC concentrations in the post-treatment groundwater sampling should be discussed.

- b. The dissolved oxygen (DO) value reported for “favorable anaerobic conditions” seems high (≤ 2.5 milligrams per liter [mg/L]). For favorable anaerobic conditions, DO should be less than 1 mg/L. Please clarify.
3. Section 2.2.2 – Groundwater Screening Criteria.
 - a. The RI/FFS Report should explain the rationale for the selected groundwater screening criteria (applicable toxicity criterion) that are presented on Table 2-2, and provide the source for these values. The criteria appear to be based solely on potential ecological risks and do not consider potential human health risks associated with the groundwater to indoor air pathway. GSU requests that screening criteria for the vapor intrusion pathway also be included on Table 2-2. The Baseline Human Health Risk Assessment (Section 6.0) discusses the use of EPA’s vapor intrusion screening guidance to identify COPCs. GSU defers to DTSC’s Human and Ecological Risk Division regarding the appropriate use of these values in the risk assessments.
 - b. GSU questions why a screening criterion for vinyl chloride is not included on Table 2-2. Vinyl chloride is not only a degradation product of PCE, but it is a risk driver for IR Site 24. Please provide groundwater screening criteria for vinyl chloride.
 4. Section 3.3.1 – Treasure Island Aquifer Testing. Please provide additional information about the anomalous value for hydraulic conductivity from well 24-MW03. GSU questions whether this was the only IR Site 24 monitoring well that was tested for hydraulic characteristics, and how the slug test results for this well were determined to be anomalous. Hydraulic characteristics specific to IR Site 24 should be provided in the RI/FFS Report, if available.
 5. Section 3.4.2 – Site 24 Hydrogeology.
 - a. To support the discussion of IR Site 24 hydrogeology, this section should include the following:
 - A table of monitoring well construction details.
 - A table of historical water level data.
 - Historical data for specific conductivity and total dissolved solids.
 - Water level hydrographs for well clusters and other key wells.

- b. Please clarify that the information provided for typical hydraulic gradients in the first full paragraph on page 3-8 are for the A- and B-zones, not the C-zone.
 - c. It is stated that the typical horizontal hydraulic gradient for the dry season is 0.002 foot per foot and references Figure 3-8. However, Figure 3-8 shows a horizontal hydraulic gradient of 0.001 foot per foot for October 2004. Please explain or correct this information.
 - d. Please provide an estimate of the average linear groundwater flow velocity at IR Site 24 if sufficient data are available to derive such an estimate.
6. Section 4.3 – Groundwater Sample Results. Groundwater data are compared to ecological screening criteria to identify COPCs for the nature and extent evaluations. However, GSU feels that groundwater data should be compared to applicable vapor intrusion screening criteria to identify COPCs for the purposes of the nature and extent evaluations (see Specific Comment 3a). A discussion of COPCs identified from this comparison should be added to the RI/FFS report along with figures showing concentration distribution data.
 7. Section 4.3.1 – Volatile Organic Compounds. Vinyl chloride was determined to be a human health risk driver for IR Site 24 due to the potential indoor air risks associated with this VOC in groundwater. However, vinyl chloride is neither presented nor discussed in the nature and extent evaluations. In addition, no screening criteria have been provided in the Draft RI/FFS Report for vinyl chloride in groundwater (see Specific Comment 3b). It is the opinion of GSU that groundwater data should be compared to applicable vapor intrusion screening criteria and that vinyl chloride should be presented and discussed as a COPC.
 8. Section 4.3.1.1 – Cis-1,2-DCE. Cis-1,2-DCE was identified as a COPC based on a comparison to ecological screening levels but maps showing the concentration distribution of this VOC in groundwater are not provided. Although cis-1,2-DCE was detected in only one sample above the ecological screening criteria, this VOC was found to be a non-cancer human health risk driver for IR Site 24. Please include concentration distribution maps for cis-1,2-DCE in groundwater similar to those for PCE and trichloroethylene (TCE).
 9. Section 4.3.1.2 – PCE. Based on the data presented on Figures 4-8 and 4-9, it appears that the lateral extent of PCE in groundwater has not been fully delineated. In particular, concentrations of PCE in groundwater beneath the southern portion of Building 99 and in B-zone well 24-EW4 near the southern wall of Building 99 are indicative of DNAPL (i.e., exceed 1% of the aqueous solubility of PCE). Insufficient groundwater sampling has been performed to the

west and south of these areas to determine the extent of elevated levels of PCE. Furthermore, the downgradient extent of PCE has not been delineated.

Based on the information presented on Figure 4-12, it appears that the vertical extent of PCE in groundwater has not been delineated beneath and downgradient of Building 99. However, it is difficult to determine the total depth of the groundwater investigation because sample depths are not provided for groundwater data in Appendix F (see Specific Comment 17).

GSU requests that the Navy include a discussion of data gaps related to the lateral and vertical delineation of the PCE plume at IR Site 24. The Navy should also provide recommendations for fully delineating the plume to levels that are protective of human health and the environment.

10. Section 4.3.1.3 – TCE. Based on the data presented on Figures 4-10 and 4-11, it appears that the lateral extent of TCE in groundwater has not been fully delineated. Based on the information presented on Figure 4-12, it appears that the vertical extent of TCE in groundwater has not been delineated beneath and downgradient of Building 99. However, it is difficult to determine the total depth of the groundwater investigation because sample depths are not provided for groundwater data in Appendix F (see Specific Comment 17). GSU requests that the Navy include a discussion of data gaps related to the lateral and vertical delineation of the TCE plume at IR Site 24. The Navy should also provide recommendations for fully delineating the plume to levels that are protective of human health and the environment.
11. Section 4.4 – Soil Gas Sample Results. The report states that, based on the results of the soil gas survey, it appears that PCE was released to the shallow soils beneath the northeastern portion of Building 99. However, based on the soil gas sample results for PCE shown on Figure 4-15 it appears that there may be two areas beneath Building 99 where PCE was released to shallow soils. One is in the northeastern portion of the building, and one is in the south-central portion of the building near the location of the dry cleaning equipment shown on the 1964 map. The highest PCE concentration detected in B-zone groundwater (36,000 micrograms per liter) was from a well located adjacent to the southern wall of Building 99. Please clarify whether this second potential PCE source area was investigated for the presence of DNAPL.
12. Section 5.1 – Fate and Transport Approach. This section states that if concentrations of VOCs persist following ISB treatment, a detailed fate and transport analysis, including modeling, can be performed. It further states that such analysis will determine if the remaining VOC concentrations are likely to attenuate to below screening levels within a reasonable timeframe. However, in order to demonstrate that natural attenuation is viable, plume stability must be

demonstrated and plume delineation must be complete. Neither of these conditions has been met. In addition, it must be demonstrated that the VOCs will attenuate to levels below the RAOs, not "screening levels," in a reasonable timeframe.

13. Section 5.2 – Chemicals Exceeding Screening Criteria. Please include chemicals that exceed vapor intrusion screening criteria in the fate and transport analysis. In particular, vinyl chloride and cis-1,2-DCE should be discussed, at a minimum.
14. Section 5.3 – Migration Pathways. Another primary migration pathway involves dissolution of the adsorbed fraction from the saturated soil and/or residual product, followed by groundwater transport. Please include this pathway in the discussion.
15. Section 5.3.2 – Leaching of Chemicals from Vadose Zone Soil and Groundwater Transport to Surface Water. Because PCE in its pure liquid form has a density greater than water, it should be noted that a release of this liquid will penetrate the water table and continue to migrate under gravitational forces within the saturated zone. The DNAPL may accumulate as pools or as residual ganglia within the soil pores. Because of its low solubility, PCE DNAPL will dissolve very slowly into groundwater and will therefore act as a long-term continuing source of groundwater contamination. Please include this information along with the additional migration pathway suggested above in Specific Comment 14.
16. Section 8.0 – RI Summary and Conclusions. This section should include a discussion of data gaps identified for soil and groundwater. The Navy should provide recommendations for addressing data gaps to ensure that contamination is delineated to levels that are protective of human health and the environment (see General Comment C).
17. Appendix F – Groundwater Analytical Data. Appendix F contains a compilation of the analytical results for groundwater collected from all sampling locations at IR Site 24. However, sample depths are not provided along with the analytical results. Because several samples were collected at one location from different depths (i.e., Hydropunch® samples), depth information is critical to the understanding of contaminant distribution. The data are not useful without this information. Please include sample depths or depth intervals for all groundwater samples reported in Appendix F.

If you have any questions, please feel free to contact me at (510) 540-3926 or at mdalrymp@dtsc.ca.gov.