

RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT 2006 ANNUAL GROUNDWATER STATUS REPORT: GROUNDWATER MONITORING AT PETROLEUM SITES 6 AND 25, NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA

This document presents the U.S. Department of the Navy's (Navy) responses to comments from the regulatory agencies on the "Draft 2006 Annual Groundwater Status Report: Groundwater Monitoring at Petroleum Sites 6 and 25, Naval Station Treasure Island, San Francisco, California," dated June 2007. The Navy received comments from: (1) the San Francisco Bay Regional Water Quality Control Board (Water Board), on July 18, 2007 (Water Board 2007); (2) Geomatrix (on behalf of the Treasure Island Development Authority), on August 2, 2007; and (3) the Department of Toxic Substances Control (DTSC), on August 28, 2007. Comments were also solicited from the U.S. Environmental Protection Agency (EPA), Region 9. On August 9, 2007, Christine Katin, Project Manager, EPA, sent an email to Marcie Rash, Tetra Tech EM Inc. (Tetra Tech), and Charles Perry, Navy, stating that the EPA will not review this report, instead deferring to the Water Board and DTSC.

Presented below are the comments and the Navy's responses, organized by reviewer, followed by a list of references.

RESPONSES TO COMMENTS FROM AGNES FARRAS, PROJECT MANAGER, WATER BOARD

Comments on Petroleum Site 6.

- 1. Comment:** Analytes of concern detected in groundwater samples were compared to groundwater toxicity screening criteria, with the exception of isopropylbenzene (cumene) and xylene. The report states that there are no ecological screening criteria for these two constituents and does not discuss them any further. However, due to similar concerns with cumene at Site 25, the Navy reviewed available toxicity information and recommended a benchmark concentration of 680 µg/L for sessile invertebrates and 2,900 µg/L for water-column organisms (Shaw 2005). Since benchmark values for cumene have been established for Treasure Island, groundwater monitoring data should be compared to them.

Response: The Groundwater Status Report has been revised to include the benchmark concentration for isopropylbenzene (cumene) for sessile invertebrates. The maximum detected concentration of isopropylbenzene (cumene) in the last three quarters of sampling at 06-MW01 was 38 micrograms per liter (µg/L), well below the benchmark concentration of 680 µg/L for sessile invertebrates (see Appendix G).

RESPONSES TO COMMENTS FROM AGNES FARRIS (CONTINUED)

The Navy has not selected a groundwater screening criteria for xylene. The forthcoming remedial investigation (RI) report will further evaluate potential ecological risks from groundwater at Site 6.

2. **Comment:** **Figure 5-1 shows 06-MW-01 located within the excavation area at Site 6. This is problematic since a monitoring well located in clean backfill is not expected to show such high concentrations of COCs. It is my understanding from previous conversations with the Navy and their consultants that 06-MW-01 is located upgradient of the excavation area. Please verify the location of 06-MW-01 and revise the figure as needed.**

Response: While the location of 06-MW01 was correct, the coordinates of the excavation near 06-MW01 were incorrect. Using accurate coordinates, Figure 5-1 has been revised to more accurately show the excavation area at Site 6.

3. **Comment:** **At the June 19, 2007 Petroleum Program Meeting, the Navy informed us that groundwater samples from monitoring wells downgradient of Site 6 were below the screening criteria. However, Figure 5-1 does not show any existing monitoring wells down gradient of Site 6. Revise the figure to show existing down gradient wells that were sampled to support the information provided at the meeting.**

Response: The Water Board issued a letter on May 15, 2006, agreeing with the request to destroy all Site 6 wells except for 06-MW01 (Water Board 2006a). Figure 5-1 shows the locations of the abandoned/destroyed monitoring wells. Figure 5-1 has been revised to show one additional down gradient decommissioned monitoring well (06-MP06).

4. **Comment:** **Groundwater monitoring events discussed in the report are for July 2006, October 2006, and January 2007. Thus, two of the monitoring events occurred in the dry season and only one occurred during the wet season. In addition, for all COCs that exceeded screening criteria, the highest concentrations were detected during the wet season sampling event (January 2007). Because the report identifies trends in the sample data, it should include a discussion of seasonal influence on the groundwater monitoring results.**

Response: There does not appear to be a seasonal influence on detected concentrations. In 1994, two wet events and one dry event occurred and the data from these events show that the concentrations were still

RESPONSES TO COMMENTS FROM AGNES FARRIS (CONTINUED)

decreasing even during the wet season (see Figure 5-2 and Figure 5-4). The intent of this Groundwater Status Report (of which this collection of comments and responses is Appendix H) is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. Relevant information regarding the fate and transport of contaminants in groundwater will be further discussed as necessary in the forthcoming RI Report for Site 6. The RI Report will include an evaluation of analytical results for groundwater collected prior to 2006.

5. **Comment:** **Prior to the July 2006 groundwater sampling event, groundwater had not been sampled since 2004. In fact, groundwater sampling from 1987 – present has been sporadic, with a number data gaps over the years. These data gaps should be discussed in the report and should be noted as a constraint in identifying conclusive trends in the data.**

Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. A more detailed analysis of all the groundwater events conducted at Site 6 will be provided in the forthcoming RI Report for Site 6. The Groundwater Status Report has been revised to include the following statement: “Between 1987 and the present, sampling events have been sporadic, and no groundwater sampling occurred between 2004 and July 2006. A more detailed analysis of all the groundwater events conducted at Site 6 will be provided in the forthcoming RI Report for Site 6.”

6. **Comment:** **We also do not agree with the conclusion that concentrations of TPH and benzene are gradually decreasing over time at 06-MW-01. Over the course of recent sampling events (July 2006 – January 2007), concentrations of TPH and benzene generally increased, and TPH concentrations remain well above the toxicity screening criterion. Also, due to sporadic groundwater sampling discussed above, there is potential for more variability than is evident in the available data (i.e., concentrations may be fluctuating). The report should be revised to reflect these concerns.**

Response: Trend analysis of concentrations over time is depicted on Figures 5-2 through 5-4. The Groundwater Status Report has been revised to indicate that while concentrations of total petroleum hydrocarbons (TPH) and benzene at 06-MW01 have decreased overall since 2004, a decrease in concentrations was not evident in the most recent sampling round (January 2007).

RESPONSES TO COMMENTS FROM AGNES FARRER (CONTINUED)

7. **Comment:** We also do not agree that concentrations of ethylbenzene are gradually decreasing over time at 06-MW-01. Figure 5-4 shows that ethylbenzene concentrations have generally increased over the long-term (1987-present) as well as the short-term (July 2006-January 2007) and remain well above the toxicity screening criterion. The report should be revised accordingly.

Response: The concentrations of ethylbenzene increased between 1987 and 1994, but after December 1994, all detected concentrations of ethylbenzene (with the exception of one detection in June 2003) were less than that recorded for December 1994, including the one concentration detected in January 2007. The Groundwater Status Report has been revised to include this information.

**RESPONSES TO COMMENTS FROM DON C. DANIELS, P.G., SENIOR GEOLOGIST, AND
GARY FOOTE, P.G., PRINCIPAL GEOLOGIST, GEOMATRIX**

General Comments

1. **Comment:** **Toxicity Screening Criteria.** Section 2.4.1 of the Draft Sites 6 and 25 Annual Groundwater Status Report states that toxicity screening criteria have not been established under the NAVSTA TI groundwater monitoring program; however, in Table 4 of the Final Closure Report, Site 6 Request for No Further Action, Naval Station Treasure Island, San Francisco, California (Shaw 2005), human health risk criteria, including inhalation of indoor air and consumption of aquatic organisms, are presented. Why are human health risks not considered in the Draft Sites 6 and 25 Annual Groundwater Status Report?

Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. A more detailed evaluation of groundwater data will be provided in the forthcoming RI Report for Site 6 and the forthcoming Site 25 Closure Report Addendum. Additionally, the forthcoming RI Report for Site 6 and the Site 25 Closure Report Addendum will include an evaluation of potential human health risks from groundwater.

2. **Comment:** **Define Total Petroleum Hydrocarbons.** In Sections 5.4.1 and 6.4.1, tables present Total Petroleum Hydrocarbon Concentrations during the three sampling events; however, they do not indicate in the associated text that the presented values were generated by adding the purgeable and extractable components.

Response: The Groundwater Status Report, Sections 5.4.1 and 6.4.1, has been revised to indicate that TPH values are generated by adding the purgeable and extractable components (TPH-p and TPH-e, respectively).

Specific Comments

1. **Comment:** **Site 6: Isopropylbenzene (Cumene) and Xylene Toxicity Criteria.** We concur with the Regional Water Quality Board, San Francisco Bay Region comment 1 for Site 6 (Water Board 2007) regarding the inclusion of cumene and xylenes in the comparison of groundwater analytical results to risk criteria.

Response: Please see response to Water Board comment #1.

RESPONSES TO COMMENTS FROM DON C. DANIELS AND GARY FOOTE (CONTINUED)

2. **Comment:** **Site 6: Basis for Decreasing Trend Determination.** Section 5.5, the text states that the benzene, ethylbenzene, and toluene concentrations “appear to be gradually decreasing over time.” A statistical summary is presented in Table 5-2; however, trend analysis does not appear to be considered. What is the basis of for the determination of the decreasing trends?

Response: Please see responses to Water Board comments #6 and #7.

3. **Comment:** **Site 6: Potential Data Bias Due to Limited Wet Season Data.** We concur with the RWQCB Comment 4 for Site 6 (Water Board 2007) regarding the potential for bias in data trends due to only one wet season data set being included in the analysis. The wet season data set is elevated relative to the two dry season data sets. As a result, the validity of an assessment of data trends is questionable.

Response: Please see response to Water Board comment #4.

In addition, although the data since 1994 indicate some fluctuations in detected concentrations, it does not correlate specifically to seasonal changes.

4. **Comment:** **Site 6: No Threat to Human Health.** Although the Draft Sites 6 and 25 Annual Groundwater Status Report specifically states that human health risks were not considered in the toxicity screening criteria, Section 5.5 states that groundwater contaminants at Site 6 provide no threat to human health. Given that human health risks were not considered, what is the basis for the statement?

Response: The statement from this Groundwater Status Report, Section 5.5, is based on the current exposure scenario: Site 6 serves as a preparation and lay-down area for Site 12 remedial activities. The Groundwater Status Report has been revised to indicate that the forthcoming RI Report for Site 6 will contain a human health risk assessment, which will likely include an evaluation of potential risks from contaminants in groundwater to future potential receptors (e.g., residents and construction workers).

5. **Comment:** **Site 25: Basis for Decreasing Trend Determination.** Section 6.5 states that the TPH concentrations “appear to be slowly decreasing over time.” A statistical summary is presented in Table 6.2; however, trend analysis does not appear to be considered. As with Site 6, please provide the basis of for the determination that trends are decreasing.

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Response: The Groundwater Status Report, Section 6.5, has been revised to reference Figure 6-2, which shows a trend analysis of TPH concentrations over time, including a decreasing trend for TPH concentrations detected since 2004. A trend analysis will be included in the Site 25 Closure Report Addendum.

6. **Comment:** **Site 25: Evidence of Natural Attenuation of Total Petroleum Hydrocarbons. Section 6.5 refers to the need for additional monitoring to provide conclusive evidence that the remaining TPH at Site 25 is naturally attenuating. In Section 6.4, reference is made to monitored natural attenuation (MNA) parameters presented in Appendix E of the Draft Sites 6 and 25 Annual Groundwater Status Report; however, the MNA parameter results are not discussed.**

Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. The groundwater monitoring events included collection of natural attenuation data at Site 25; however, detailed analysis of the attenuation of contaminants requires examination of supporting data such as soil data which is beyond the scope of this Groundwater Status Report. A discussion of natural attenuation and trend analysis will be included as necessary in the forthcoming Site 25 Closure Report Addendum and the Site 6 RI.

General Comments

- 1. Comment:** **Criteria.** The monitoring program was based on aquatic protection criteria only (Appendix A, page ES-1, and Figure 2.1), which are called “toxicity screening criteria” (TSCs). Aquatic criteria, however, are not sufficient for all expected reuses at Site 6 and Site 25. Other considerations include indoor air intrusion, wetlands development, and construction worker safety (page 2-4), as well as nuisance concerns. Because aquatic criteria are not sufficient for all expected reuses, the monitoring program may not be sufficient for feasibility study (FS) and remedial action decision-making. Additional monitoring may be required prior to the FS. For example TSCs can be compared to Regional Water Quality Control Board’s (RWQCB’s) environmental screening levels (ESLs), which consider other reuses and multiple contaminants. TSCs are significantly greater than ESLs (ESL Table B: shallow soil/no drinking water). For example, the TSC for benzene is 700 µg/L (ESL: 46 µg/L). The TSC for toluene is 5,000 µg/L (ESL: 130µg/L). The TSC for total petroleum hydrocarbons (TPH) is 1,400 µg/L: this TSC applies to the sum of TPH-gasoline range, TPH-diesel range, and TPH-motor oil. ESLs are 500 µg/L (for TPH-g) and 600 µg/L (for TPH-d and TPH-mo). At Site 6, several compounds significantly exceeded RWQCB’s ESLs, including (in µg/L) benzene at 1,000 (ESL: 46), ethylbenzene at 840 (ESL: 290), toluene at 3,500 (ESL: 130), TPH-g at 28,000 (500), TPH-d at 830 (ESL: 640). At Site 25, TPH-g (1,500 µg/L) exceeded the ESL (500 µg/L) and trichloroethane (TCE: 5 µg/L) exceeded the ESL (0.36 µg/L). At both Site 6 and Site 25, manganese (Mn: at up to 770 µg/L) exceeded the TS of 600 µg/L identified for Site 12. No TSC for Mn (or other metals) is provided in the Annual Report. With respect to inhalation pathways (for both residential and industrial reuse), current criteria for volatile organic compounds (VOCs) are lower than earlier criteria for some compounds, including naphthalene, etc.

Recommendations: Include expected and potential reuses in the report (e.g., residential reuse, wetlands). Identify all contaminants of concern for all reuses (including radioactive compounds, if any). Provide updated screening criteria for all reuses. Evaluate whether the existing data set, including results from other investigations, is sufficient for decision-making for all expected reuses. Propose additional monitoring as needed. The criteria in the Annual Report

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should be called “aquatic screening criteria,” in lieu of “toxicity screening criteria” which implies a broader application.

Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. A more detailed analysis of groundwater, including an evaluation of potential human health and ecological risks from groundwater, will be provided in the forthcoming RI Report for Site 6 and the Site 25 Closure Report Addendum.

Although the screening criteria presented in this Groundwater Status Report is for potential ecological exposures, the sampling and analysis data requirements for groundwater monitoring are of the quality to support all potential activities at Site 6 and 25. For Site 6, this could include, but is not limited to, an RI, FS, and potential remedial actions. Detection limits, precision criteria, accuracy criteria requirements, and validation requirements are of a quality to meet all site activities.

2. **Comment:** **Metals. Metals can be mobilized during TPH biodegradation. As microbial reactions create reducing conditions, iron (Fe+3) is reduced to Fe+2 and mobilized. Arsenic (As) associated with Fe+3 is mobilized at the same time. Other metals (e.g., copper, Mn, zinc) may also be mobilized. Consequently, mobilization of metals should be evaluated wherever TPH is elevated in groundwater or soil. Examples of metals mobilization have been discussed for Site 12. Mobilization of As and Fe was discussed in a technical memorandum (As TM). And, mobilization of As and Mn was discussed in long term monitoring optimization technical memorandum (LTMO TM). Removal of TPH soil sources may eventually result in decreasing concentrations of metals in groundwater. Nonetheless, metal mobility may impact remedial decisions and/or design.**

Recommendations: Identify and discuss metals that may be of concern for all expected and potential reuses (e.g., residential reuse, wetlands). Discuss all metals above ambient values. Discuss mobilization of metals with regard to monitored natural attenuation (MNA) parameters and groundwater stabilization parameters (e.g., pH and oxidation-reduction potential, or ORP). Determine whether all TPH areas on Sites 6 and 25 have been fully characterized for metals. Identify data gaps, propose monitoring (if needed) and provide criteria, accordingly.

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Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. The fate and transport of contaminants in groundwater will be further discussed as necessary in the forthcoming RI Report for Site 6 and the Site 25 Closure Report Addendum. However, lead will be the only metal discussed in the Site 25 Closure Report Addendum. Additionally, as part of the RI report for Site 6, a data gap analysis will be conducted for groundwater to address future analytical needs for completing the RI Report.

Metals (e.g., Fe, Mn, As, Copper, Zn, etc.) were evaluated and discussed in the Final Corrective Action Plan (Tetra Tech 2002b). The Water Board agreed with the destruction of all Site 6 wells except 06-MW01 (Water Board 2006a).

3. Comment: Sources

a) On Site 6, multiple source areas for TPH contamination have been excavated (Figure 5-1). However, other source areas for TPH and other CERCLA contaminants (e.g., dioxin) still exist.

i) For example, with respect to TPH, persistent high concentrations of TPH-g in groundwater (up to 28,000 µg/L) indicate that a source still exists in soil in the vicinity of 06-MW1A.

ii) Also, 06-MW01A is located down gradient from an area of TPH-d soil contamination that has not been fully investigated. That is, TPH-d greater than 10,000 mg/kg remains in place at 06-HP087, near suspected UST 446.

iii) Other source areas for TPH (i.e., suspected UST M) and CERCLA contaminants (e.g., dioxin) have not been fully investigated.

b) On Site 25, several USTs were removed in 1961. Contaminated soil associated with these tanks was not indicated to have been removed. In 2001, the Causeway Pipeline was removed. Confirmation soil samples were not indicated.

c) From 2001 until 2005, a soil vapor extraction/air sparge, groundwater extraction system was operated at Site 25. All but two of these wells were destroyed or abandoned by 2006. The method of well decommissioning was not given.

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d) Three USTs were removed in the western half of the Site and currently have no down gradient monitoring wells.

e) The Causeway Pipeline removed in 2001 may have contaminated soil and/or groundwater and is currently not being monitored.

Recommendations: Conduct additional source area investigations. Reevaluate the groundwater program as needed.

Response: a) The bulk of contamination has been removed at Site 6 (Shaw Environmental, Inc. [Shaw] 2005a). Underground storage tanks (UST) 240A, 240B, 248A, 248B, 248C, and 248D and aboveground storage tanks (AST) 248 and 240 (suspected) have been removed from Site 6. Two subareas of petroleum impacts were identified at Site 6: (1) the USTs 240A and 240B subarea in the northern training area, and (2) the USTs 248A and 248B subarea along the east side of the central training area (Shaw 2005a). In the USTs 240A and 240B subarea, the Navy elected to remediate total petroleum hydrocarbons (TPH) in shallow soil to residential cleanup goals, and, as part of this remediation, accumulated free product was removed from the groundwater surface using oil absorbent pads (Shaw 2004). In the USTs 248A and 248B subarea, the oil water separator system, pipelines, and shallow petroleum-impacted soils were removed. All of this work was done under close oversight of the Water Board who participated in monthly Petroleum Program working meetings and commented on all decision documents and plans. The Navy agrees that residual contamination exists at Site 6, but does not believe that a mobile free product "source" exists. The area around 06-HP087 has been investigated, and soil samples and hydropunch samples have been collected in the vicinity of 06-HP087 including the following: 06-AR02, 06-HP026, 06-HP027, 06-HP029, 06-HP030, 06-HP045, 06-HP068, 06-HP069, 06-HP073, 06-HP091-06-HP093, 06-HP097, and 06-SB02.

It was concluded that suspected UST M was never installed (Shawnee 1995).

From the 2003 Facilitywide UST Summary Report (Tetra Tech 2003a):

These USTs were shown in an EBS database reference to a set of three drawings for Special Project C1-76 Oil Spill Containment. The USTs were intended to be part of a planned transformer coolant containment system for various transformers. The title blocks of these drawings were incomplete and did not include the

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approval signature for the "EFD for Commander NAVFAC." The absence of an approval signature is an indication that the three referenced drawings were not used for construction. The Navy verified that, although the contract number had been issued at Naval Facilities Engineering Command, Western Division, the contract for construction advertisement was never issued. During the site walkthrough at each location, no evidence was observed to indicate that USTs for transformer coolant recovery systems were ever installed. Because neither a visible collection system for leaking coolant nor a drain system into any UST was observed, and because Navy records indicate that the proposed project to install a coolant collection system was not undertaken, Shawnee concluded that USTs 3A, 3B, 368C, 450, 452, 453, 461, and M were never installed and therefore do not exist (Shawnee 1995). Figures 6, 8, 9, 10, and 11 show the locations and areas surrounding these previously suspected tanks.

These previously suspected tanks are recommended for NFA, because the weight of available evidence indicates that they never existed. A letter will be submitted with the final version of this report requesting an NFA concurrence for these USTs.

In 2003, the Water Board concurred that no further action was required for the previously suspected tanks, including UST M. Therefore, no further action or investigation is planned or required for UST M (Water Board 2003a).

b) According to the Site 25 closure report, in addition to the removal of the Causeway Pipeline, field activities "included the collection and screening of soil samples, and limited overexcavation" (Shaw 2005b). Additional information on the Causeway Pipeline removal and closure activities can be found in the Final Post-Construction Summary Report for the TI Causeway Pipeline Removal and Closure (IT Corporation 2003). In 2003, the Water Board concurred no further action was required at the TI Causeway Pipeline (Water Board 2003b).

c) The method of well decommissioning will be reported in the final Site 25 closure report addendum.

d) In 2006, the Water Board stated "We do agree with the request to destroy all site wells except for 25-MW05 and 25-NE07" (Water Board 2006b).

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e) In 1998, 2000, and 2001, natural attenuation data were collected to assess whether biodegradation of petroleum hydrocarbons was occurring at Site 25 (Tetra Tech 1999, 2002a, and 2003b). Based on this data, it was concluded that biodegradation of petroleum hydrocarbons had apparently progressed to the stage of methanogenesis via aerobic respiration, denitrification, manganese (IV) reduction, and sulfate reduction in source and upgradient areas of the site. Remediation of shallow soil at Site 25 was deemed unnecessary, but remediation of deep soil/groundwater was required due to elevated concentrations of TPH as gasoline (TPH-g), benzene, cumene, ethylbenzene, and xylenes (Shaw 2005b; Tetra Tech 2002b). One small Corrective Action Area (CAA) at Site 25 (25-CAA-01) was identified, and the recommended remedial alternative for Site 25 was operation of a Soil Vapor Extraction/Air Sparging (SVE/AS) system for TPH contamination in groundwater and deep soil (Tetra Tech 2002b).

Overall, the intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. The forthcoming RI Report for Site 6 and the Site 25 Closure Report Addendum will further evaluate the extent of groundwater contamination and potential data gaps. The need for additional source area investigation and a re-evaluation of the groundwater program will be discussed in the forthcoming RI.

4. **Comment:** **Monitoring well locations and plume monitoring. For both Site 6 and Site 25, the monitoring program is not sufficient for monitoring TPH groundwater plumes and source areas as discussed below.**

a) At Site 6, only one well is included (i.e., 06-MW01A) in the groundwater monitoring program. Well 06-MW1A has persistent exceedances of aquatic criteria for total petroleum hydrocarbons (TPH: 1,400 µg/L, combined TPH-extractable and TPH-purgeable), benzene (700 µg/L), ethylbenzene (86 µg/L) and toluene (5,000 µg/L).

i) One well is not sufficient to monitor the extent of the plume.

ii) Well 06-MW01A is located up gradient-to-side gradient of two former USTs: contaminated soil associated with the USTs has been excavated. That is, the location of 06-MW01A is not optimum.

iii) A TPH source area up gradient of 06-MW01A has not been fully investigated (see previous comment).

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iv) Other former source areas, where contaminated soils, former USTs and one ASTs were excavated, are not monitored (Figure 5-1).

b) At Site 25, two wells are included in the monitoring program (i.e., 25-MW05 and 25-NE-07). Both wells are equidistant from the shoreline (about 60 feet) and may not provide optimum coverage. These two wells cannot demonstrate the groundwater flow directions indicated on Figure 2-3, which appear to reflect flow conditions present during former groundwater extraction. Several former underground storage tanks (such as UST 2D) are too far cross gradient to be monitored by these wells.

Recommendations: Evaluate the groundwater program with respect to source areas and plume delineation. Provide figures that illustrate the current extent of contamination in soil and groundwater. Additional wells may be needed to monitor down gradient of former storage tanks or burn pits.

Response: a) Groundwater samples have been collected from three groundwater monitoring wells down gradient from the USTs 248A and 248B subarea (06-MW18, 06-MW19, and 06-MW24). TPH detected in these samples were consistently below the groundwater screening criterion for total TPH for all four post-excavation groundwater monitoring events. Groundwater samples have also been collected from 06-MW23, down gradient from the USTs 240A and 240B subarea. TPH was consistently below the respective groundwater screening criteria for total TPH and benzene for all four of the post-excavation groundwater monitoring events. Additionally, samples were collected from 06-MW16 and 06-MW17 (wells closest to the shoreline) in which TPH concentrations were also well below the respective groundwater screening (Shaw 2005a). The Water Board decided to abandon the other wells at Site 6 (Water Board 2006a).

b) After the Navy submitted the Final Site 25 Closure Report (Tetra Tech 2005b), the Water Board requested the wells remaining at Site 25 (25-MW05 and 25-NE07) be kept in place for further monitoring (Water Board 2006b). Regarding UST 2D, this tank was closed by the Water Board in 1996 based on field observations, tank pit excavation, and soil samples (Shaw 2005b). For additional information regarding Site 25, refer to Shaw 2005b, Tetra Tech EM, Inc. 2002a, IT Corporation 2003, and Water Board 2006b.

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The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. The forthcoming RI Report for Site 6 will further evaluate the extent of groundwater contamination and potential source areas. The Site 25 Closure Report Addendum will focus on the two remaining wells and the planned limited shallow soil confirmation sampling. The need for additional source area investigation and a re-evaluation of the groundwater program will be discussed during the Site 6 forthcoming RI.

5. **Comment** **Monitored natural attenuation (MNA). MNA data and field parameter data is presented from 1998 to 2006 (Appendix E). The data, however, is not evaluated.**

Recommendation: Please evaluate MNA results (as discussed in comments on Appendix E).

Response: This Groundwater Status Report provides a data summary update of the MNA parameters from 1998 through 2006. An evaluation of the MNA parameters will be discussed in the forthcoming Site 6 RI, and the MNA parameters for the two remaining wells at Site 25 will be discussed in the Site 25 Closure Report Addendum.

6. **Comment** **Methane. Methane is a common degradation product in petroleum areas and may serve as an indicator of source areas. Methane was included as an MNA parameter in groundwater (Appendix E). Methane was measured at 10,000 µg/L at Site 25 (at 25-MW02) and at 3,900 µg/L at Site 6. However, data presented in Appendix E are very sparse. Methane is combustible and potentially explosive when it is present at concentrations in excess of the lower explosive limit (LEL: 5% or 53,000 ppmv). However, in order to provide an appropriate margin of safety, a concentration of one tenth of the LEL (0.5% or 5,000 ppmv) is commonly utilized as an action level above which mitigation measures are recommended. For example, when methane is greater than 0.1% (1,000 ppmv) under proposed or current structures, venting systems are recommended. DTSC's approach to methane is explicitly outlined in *Advisory on Methane Assessment and Common Remedies at School Sites*, June 16, 2005. The Advisory comprises detailed recommendations for investigation, remediation, and monitoring. Although developed for school sites, the Advisory is useful for all sites with methane contamination.**

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Recommendations: Evaluate groundwater data for methane with respect to potential source areas and potential risk of fire and/or explosion. Discuss whether Site 6 and Site 25 have been evaluated with regard to potential for methane (and VOCs) in soil gas. Identify potential data gaps. Compare results in various media, and propose changes to the groundwater program (or other investigations), as appropriate.

Response: The measurement of 10,000 µg/L for methane at monitoring well 25-MW02 was taken prior to the active SVE/AS remediation completed at Site 25. Methane in soil gas was not evaluated as part of the post-remediation for the Petroleum Program sites. Soil gas will be evaluated at Site 6 and the findings will be discussed in the forthcoming Site 6 RI. If necessary, in the forthcoming RI report for Site 6 will contain a discussion of Methane, with respect to potential source areas and potential risk of fire and/or explosion.

The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007.

Specific Comments

- 1. Comment:** Title Page. All engineering or geologic work should be performed or supervised by a California Registered Professional in accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29.

Recommendation: Confirm that the person in responsible charge is a California Professional Engineer or a California Professional Geologist. Provide name, signature, stamp, and/or registration number on the title page.

Response: The final version of this Groundwater Status Report will be signed by a Registered Geologist in the state of California, whose name, signature, and stamp will appear on the signature page.

- 2. Comment:** The differences between wells designated as inactive, abandoned, or destroyed (Figure 1-2 are not explained).

Recommendation: Confirm that all wells have been decommissioned in accordance with *California Well Standards Bulletin 74-91: Section*

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

19: Requirements for Destroying Monitoring Wells and Explorations Holes. Please include a table with well construction details for all wells and ground penetrations on Site 6 and Site 25. Include dates of decommissioning on the table. Provide copies of required decommissioning documentation.

Response: No well abandonment or decommissioning at Sites 6 or 25 was conducted as part of groundwater monitoring activities in 2006. To the extent available, further discussion of groundwater monitoring well abandonment and decommissioning and a table with well construction details will be presented where applicable in the forthcoming RI Report for Site 6 and Site 25 Closure Report Addendum.

- 3. Comment:** In section 4.2.1, Hydrogeologic Characterization and Aquifer Testing, the role of leaky utilities (storm water, potable water, and sewer), are not included as sources of groundwater recharge.

Recommendation: Include leaky utilities as a source of groundwater recharge.

Response: Leaky utilities has been added as a potential contributing source to groundwater recharge to Section 4.2.1. However, it is important to note that the utilities at Site 6 are located at the periphery of the site.

- 4. Comment:** Section 6.1 lists eleven buildings on Site 25. Building 459-B is not shown on any figure and recent satellite images show Building 114 demolished.

Recommendation: Show the location of Building 459-B on Figure 2-3 and confirm if Building 114 has been demolished.

Response: Figure 2-3 has been revised to show the location of Building 459-B and that Building 114 has been demolished.

- 5. Comment:** Figures. Figures 5-3 and 5-5. Generally, detection limits (DLs) are depicted on tables and figures show ½ DLs.

Recommendation: Explain why ½ DLs are shown on the figures. Please revise figures to show DLs. Also, revise figures so that connecting lines on both sides of non-detect (ND) values (hollow points) are dashed.

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

Response: One-half the detection limit was used for one sampling round so that the trends could be portrayed on Figures 5-3 and 5-5. One-half the detection limit was applied to nondetects to be consistent with the approach used for nondetect results during risk assessment calculations. Figures 5-3 and 5-5 have been revised as suggested so the connecting lines on both sides of nondetected values are dashed.

6. **Comment:** **Tables. Include a table with summary results on a per well basis, with results of MNA parameters (anions, methane, ethane, ethane, nitrate, and sulfide) and field test kits (e.g., alkalinity, Fe+2, and Mn+2). Similar tables are included in appendices (CD only): however, summary tables should be included as hardcopies in the front of the report.**

Response: The Groundwater Status Report has been revised to include a summary of the results of MNA parameters in the front of the report.

7. **Comment:** **Tables. Similarly, include a table with stabilization parameters for each well: these have a bearing on sample integrity and geochemistry of degradation (e.g., ORP, pH).**

Response: Please see response to DTSC comment #5.

8. **Comment:** **Tables. Table 2-1. Confirm that Table 2-1 lists all compounds detected on Site 6 and Site 25, with updated criteria and ambient values (when available).**

Response: Table 2-1 has been reviewed and corrected as suggested.

9. **Comment:** **Tables. In Tables 5-2 and 6-2 (Remarks 2) include both values for duplicate results (not average values).**

Response: Tables 5-2 and 6-2 are provided as a summary of the data results. Appendix G provides a complete set of groundwater monitoring data results.

10. **Comment:** **Appendix A. Discuss ambient values in Appendix A. Describe when ambient values are selected as criteria. Include ambient values on Table A-2.**

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

Response: Appendix A presents applicable screening criteria for Naval Station Treasure Island (NAVSTA TI). Ambient values provided on Table A-1 are for reference purposes only. The discussion of ambient values is provided in this Groundwater Status Report, Section 2.4.2.

Detected chemicals discussed in this Groundwater Status Report were considered above the criteria only if they exceeded both the ambient value and the toxicity criterion, where available.

11. **Comment:** Appendix A. Appendix A says that in 2006, “screening values for human health consumption of aquatic organisms were no longer deemed applicable for use” and DTSC’s “aquatic values for NAVSTA TI were introduced” (page A-1).

Recommendation: Expand this discussion. Are values for human consumption of aquatic life still under discussion? Has DTSC provided revised values? Add old and new values for human consumption of aquatic organisms to Table A-1.

Response: The groundwater data collected at Site 6 and Site 25 will be evaluated along with the soil data for all potential receptors and pathways of concern, and the results will be discussed in the forthcoming RI report for Site 6. Only chemicals exceeding both the ecological screening criteria and the ambient values are considered chemicals of potential concern for the purposes of this Groundwater Status Report.

Although the screening criteria presented in this Groundwater Status Report is for potential ecological exposures, the sampling and analysis data requirements for groundwater monitoring are of the quality to support all potential activities at Site 6, including, but not limited to, an RI, FS, and potential remedial actions. These data requirements are also of the quality to support the Site 25 Closure Report Addendum. Detection limits, precision criteria, accuracy criteria requirements, and validation requirements are of a quality to meet all site activities.

The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. A more detailed analysis of groundwater, including an evaluation of potential human health and ecological risks from groundwater, will be provided in the forthcoming RI Report for Site 6 and the Site 25 Closure Report Addendum.

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

12. **Comment:** Appendix A. Table A-1 contains the reference: *Department of Toxic Substance Control (DTSC). 2006. "Ecological Screening Soil and Aquatic Values for Naval Station Treasure Island." [Site 201210-18Pca 18040 H:28]. March 15.* However, the reference is not connected to specific values on the Table and is not cited in notes to the table.

Recommendation: Please amend the table accordingly. For example, Footnote "s" refers to values "derived using uncertainty factors (UF) from DTSC (For acute values: divide acute LOAEL by 10 to get a chronic LOAEL)." Do these values relate to the reference? If so, include the reference in Footnote "s".

Response: The reference cited above (DTSC 2006) does not refer to specific values, but to the methodology recommended by DTSC to use uncertainty factors when extrapolating acute aquatic toxicity values to lowest observable adverse effect levels (LOAEL) and when extrapolating LOAELs to no observable adverse effect levels (NOAEL). The Navy provided DTSC with screening values and exposure values to be used for a screening-level ecological risk assessment at NAVSTA TI. In a technical memorandum dated March 15, 2006, DTSC commented on these values and recommended the use of uncertainty factors when extrapolating aquatic toxicity values. Appendix A has been revised to clarify that the DTSC reference (2006) refers to the comments and methodology recommended by DTSC, and Table A-1 has been revised to provide the DTSC reference for the footnote "s."

13. **Comment:** Appendix A. Add DTSC's "aquatic values for NAVSTA TI" to Table A-2. Provide an explanatory footnote. Include DTSC's criteria in the discussion of tiers in the text.

Response: Appendix A, Table A-2, has been updated to present DTSC criteria in the screening tiers.

14. **Comment:** Appendix A. If the criteria for "consumption of aquatic organisms" are no longer applicable, remove those criteria from Table A-2 (last column). Provide an explanatory footnote.

Response: Appendix A, Table A-2, has been updated to delete human health consumption of aquatic organism criteria as an applicable screening tier.

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

15. **Comment:** Appendix A. TPH criteria (Footnote “q”) are from a draft 1999 report.

Recommendation: If these criteria have been finalized please update the reference and footnote.

Response: Appendix A, Table A-1 (footnote), is correct.

16. **Comment:** Appendix E: Monitored Natural Attenuation. The discussion in Appendix E1 is good but it is general in nature. A site-specific evaluation is not provided with regard to the MNA parameters and the field data included in Appendix E2 as well as the chemical analytical results presented in Appendix G. Lines of evidence are mentioned for TPH and VOCs, but site-specific lines of evidence are not presented. For example, the expected trends identified in Table E-2 are not discussed.

Recommendation: Please expand the text to include a site-specific evaluation of the data. Are conditions favorable to degradation demonstrated? Include figures illustrating trends and associations. For example, use graphical presentations, like the MNA polygons presented in the arsenic technical memorandum (As TM) for Site 12.

Response: Further evaluation and presentation of MNA and field parameters will be provided in the forthcoming RI report.

17. **Comment:** Appendix E: Monitored Natural Attenuation. Metals are not fully discussed or evaluated. However, the mobilization of metals (above criteria and/or above ambient levels) with TPH degradation may be an important process at TI, as discussed in General Comment 2. With respect to metals, very little data is presented. Results of field test kits for manganese and iron are provided for two wells in 2006. Sporadic results for three wells in earlier events (before 2002) are provided.

Recommendation: Continue the discussion (which was begun in the As TM and LTMO TM) regarding mobilization of As and other metals with degradation of TPH. Propose changes, as needed (e.g., analyses for metals).

Response: See response to DTSC Specific Comment #17.

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

18. Comment: **Appendix E: Monitored Natural Attenuation. MNA results are usually evaluated as trends in time and as trends in space (e.g., along the axis of the plume). However, the data are not sufficient to demonstrate MNA at either site.**

a) For example, at Site 6, MNA parameters were analyzed only in one well (06-MW1A), at irregular intervals from 1998 to 2006: so, trends in time can be evaluated but spatial trends cannot.

b) At Site 25, MNA parameters were analyzed at two wells (25-MW05 and 25-NE-07) for one year only (in 2006). For all other wells, no results are presented after 2001: so current conditions are unknown. Trends in time and trends in space cannot be evaluated because the data is too sparse.

Recommendation: Evaluate whether the monitoring program is meeting its goal with regard to demonstrating MNA. Propose changes as needed.

Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. The fate and transport of contaminants in groundwater, including the results of MNA parameters and the potential natural attenuation of petroleum hydrocarbons, will be further discussed as necessary in the forthcoming Site 25 Closure Report Addendum.

19. Comment: **Appendix E: Monitored Natural Attenuation. Some results are inconsistent. Dissolved oxygen (DO) greater than 0.5 mg/L (indicating aerobic conditions) is inconsistent with negative ORP (indicating anaerobic conditions). For example, at 06-MW01 (10/10/06), DO is 4.75 mg/L and ORP is -111 mV. Inconsistent results may indicate equipment malfunction or sampling error.**

Recommendation: Explain these inconsistencies.

Response: Field measurements are manually entered into the database. Data entry is verified using the groundwater monitoring well sampling sheets as compared to the data printouts from the database. An additional quality control review was conducted, comparing the database entries to field data from 2003, 2004, and 2006, and several results were corrected from the field dataset.

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

DO results have been rejected for several field readings because the measurements were reported in the field by percent dissolved oxygen and not milligrams per liter (mg/L) of DO, or the equipment was not properly calibrated.

20. **Comment:** **Appendix E: Monitored Natural Attenuation. Specific conductivity varied by three orders of magnitude in 06-MW01, from about 0.5 mS/cm to 500 mS/cm. Anomalous results are also reported for 25-MW05 (3,760 mS/cm) and 25-NE-07 (5,570 mS/cm).**

Recommendation: Explain these anomalies.

Response: Field measurements are manually entered into the database. Data entry is verified using the groundwater monitoring well sampling sheets as compared to the data printouts from the database. As noted on the field forms, specific conductivity was reported using micro- and milli-seconds per centimeter as the applicable units. These values were entered correctly; however, the units were not applied to appropriately enter the results. The 2006 field measurements have been corrected.

21. **Comment:** **Appendix E: Monitored Natural Attenuation. Both Site 25 wells exhibit elevated sulfate concentrations (up to 1,500,000 µg/L).**

Recommendation: Explain the elevated sulfate concentrations in these wells.

Response: The intent of this Groundwater Status Report is to provide a data summary update for the groundwater sampling conducted in July 2006, October 2006, and January 2007. The fate and transport of contaminants in groundwater, including the influence of MNA parameters, will be further discussed as necessary in the forthcoming Site 25 Closure Report Addendum.

22. **Comment:** **Appendix E: Monitored Natural Attenuation. Some values (Appendix E2) are shown as "R," for rejected during quality assurance (QA) review.**

Recommendation: Explain the QA process, including criteria for rejection. Are inconsistent or anomalous values (previous comments) considered?

RESPONSES TO COMMENTS FROM EILEEN HUGHES AND MICHAEL FINCH (CONTINUED)

Response: See response to DTSC Specific Comment #19.

- 23. Comment: Appendix E: Monitored Natural Attenuation. Typo. Appendix E1, page E1-3. Add a negative sign: change “400 mV” for anaerobic environments to “-400mV.”**

Response: Appendix E, Section 4.0 (third sentence), has been revised as follows, “The oxidation-reduction potential of groundwater ranges from 800 millivolts (mV) for aerobic environments to -400 mV for anaerobic environments.”

REFERENCES

- Department of Toxic Substances Control (DTSC). 2006. Ecological Screening Soil and Aquatic Values for Naval Station Treasure Island. Site 201210-18 Pca 18040 H:28. March.
- IT Corporation. 2003. Final Post-Construction Summary Report, Treasure Island Causeway Pipeline Removal and Closure, Petroleum Remedial Excavation Program, Treasure Island, San Francisco, California. January.
- Regional Water Quality Control Board, San Francisco Bay Region (Water Board). 2003a. Letter Regarding Concurrence on Request for NFA, Suspected USTs, NAVSTA TI, San Francisco, California (Tanks 3A, 3B, 368C, 450, 452, 453, 461, M, 7, 145, 180F, 180G, 267, FF8, 213, 262). From Sarah Raker, Engineering Geologist, Water Board, to Ellen Casados, RPM, SWDIV. December 2.
- Water Board. 2003b. Letter Regarding Concurrence on NFA, Causeway Pipeline Removal, NAVSTA TI. From Sarah Raker, Engineering Geologist, Water Board, to Ellen Casados, RPM, SWDIV. March 11.
- Water Board. 2006a. Letter regarding "Water Board Staff Comments on the final closure report, Site 6, Request for No Further Action, Naval Station Treasure Island, San Francisco." May.
- Water Board. 2006b. Letter regarding "Water Board Staff Comments on the final closure report, Site 25, Request for No Further Action, Naval Station Treasure Island, San Francisco." May
- Water Board. 2007. Water Board Comments on Draft 2006 Annual Groundwater Status Report: Groundwater Monitoring at Petroleum Sites 6 and 25, Naval Station Treasure Island, San Francisco. Dated July 18, 2007. From Agnes Farres.
- Shaw Environmental, Inc. (Shaw). 2004. Final Post-Construction Summary Report, Site 6, Fire Training School Remedial Excavation, Naval Station Treasure Island, Petroleum Remedial Excavation Program Treasure Island, San Francisco, California. March.
- Shaw. 2005a. Final Closure Report Site 6, Request for No Further Action, Naval Station Treasure Island, San Francisco, California. December.
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- Shawnee. 1995. Final Report Assessment of Suspect Underground Storage Tank Sites, Naval Station Treasure Island. June.
- Tetra Tech EM, Inc. (Tetra Tech). 1999. Groundwater Status Report: Summary of Groundwater Monitoring from January to November 1998, Naval Station Treasure Island, San Francisco, California. May.

Tetra Tech. 2002a. Final Groundwater Status Report: Summary of Groundwater Monitoring from March to October 2000, Naval Station Treasure Island, San Francisco, California. March.

Tetra Tech. 2002b. Final Corrective Action Plan for Site 06, 14/22, 15, and 25, Naval Station Treasure Island, San Francisco, California. June.

Tetra Tech. 2003a. Final Facilitywide UST Summary Report. October.

Tetra Tech. 2003b. Final Groundwater Status Report: Summary of Groundwater Monitoring from May 2001 through August 2002, Naval Station Treasure Island, San Francisco, California, August.



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April 2, 2008

Responses to Regulatory Agency Comments on the Draft 2006 Annual Groundwater Status Report: Summary of Groundwater Monitoring at Petroleum Sites Site 6 and 25, Naval Station Treasure Island, San Francisco, California

Dear Ms. Silva,

Please find enclosed three (3) copies of the subject document as well as a CD-ROM containing the electronic files. Please note that this is not a formal deliverable, hence there is no transmittal receipt. We are sending you these copies per direction from James Whitcomb, Remedial Project Manager, and because copies of this response to comments (RTCs) document are being sent to representatives from agencies such as the California Regional Water Quality Control Board, the California Department of Toxic Substances Control, the U.S. Environmental Protection Agency, and the Treasure Island Development Authority, among others, as well as Restoration Advisory Board members.

At a future date, this RTCs document will be included as an appendix to the *Final Annual Groundwater Status Report: Summary of Groundwater Monitoring at Petroleum Sites 6 and 25, Naval Station Treasure Island, San Francisco, California*.

Please feel free to contact me with any questions, at (415) 693-0971.

Sincerely,

Gabe Samrock
Supervisor – Quality & Production
Sullivan International Group, Inc.

Enclosures: 3 hardcopies, 1 CD-ROM

cc: Hannah Thompson, Project Manager, Sullivan International Group, Inc.