Geomatrix

July 9, 2007
Project 4850.005.3

Mr. James B. Sullivan
Mr. Charles Perry
Mr. Scott Anderson
Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

Subject: Comments on April 30, 2007 Draft 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, Mr. Perry and Mr. Anderson:

On behalf of the Treasure Island Development Authority (TIDA), Geomatrix Consultants, Inc. (Geomatrix) and Exponent have reviewed the April 30, 2007 Draft Remedial Investigation and Focused Feasibility Study Report for Installation Restoration Site 24, Former Dry Cleaning Facility, Naval Station Treasure Island, San Francisco, California (Draft Site 24 RI/FSS). The human health risk assessment presented in Appendix J and summarized in Section 6.0 of the report were reviewed by Greg Brorby of Exponent and his comments are presented in the attached memorandum. The ecological risk assessment presented in Appendix K was reviewed by Steve Ellis of Geomatrix and his comments are presented in a separate memorandum that is attached. We will defer to regulatory agencies to comment on the Applicable or Relevant and Appropriate Requirements (ARARs) presented in Appendix L and summarized in Section 9.0 of the report. Geomatrix did not independently evaluate the accuracy of data presented in the report; however, discrepancies noted are identified herein. This letter contains a brief summary of the document, as well as general and specific comments.

SUMMARY

The Draft Site 24 RI/FSS summarizes data collected at Site 24. The human health risk assessment (HHRA) concludes that risks posed to current commercial/industrial workers who visit the site on an infrequent basis are below the risk range and, therefore considered acceptable. However, the HHRA concludes that risks posed to future receptors (commercial/industrial workers, construction workers and hypothetical residents) are unacceptable. The risks are primarily driven by volatile organic compounds (VOCs) in groundwater. To address these risks the document evaluates the following remedial alternatives: Alternative 1—No action; Alternative 2—Engineering controls, institutional

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controls and groundwater monitoring; Alternative 3A—Enhanced in situ bioremediation (ISB) to achieve unrestricted use and groundwater monitoring; and Alternative 3B—Enhanced ISB to achieve commercial/industrial use, institutional controls, and groundwater monitoring. The document does not recommend an alternative, but based on the Navy's scoring, Alternative 2 ranks slightly higher than Alternatives 3A and 3B. The institutional controls under Alternative 2 would prohibit residential development and require a Site Management Plan.

GENERAL COMMENTS

1. ***Evaluation of Petroleum Hydrocarbons in Soil and Groundwater.*** The document identifies three primary areas where concentrations of total petroleum hydrocarbons (TPH) quantified as gasoline (TPHg), diesel (TPHd) and/or motor oil (TPHmo) significantly exceed screening criteria: the north and east sides of Building 99, within Site 5 and 17 (overlaps with Pipeline Site F2B), and Petroleum Site 04/19. Groundwater in the vicinity of Building 99 also appears to be impacted with petroleum hydrocarbons at concentrations above screening criteria. In addition to these three areas, soil and groundwater at a location on the west side of Building 260 (TD4HP007) is significantly impacted by petroleum hydrocarbons (22,000 mg/kg TPHd in soil and 34.4 mg/L TPHd in groundwater). As presented, it is not possible for the reader to assess whether the extent of TPH in soil and groundwater has been adequately characterized at these four sub-areas. We recommend that each sub-area with petroleum hydrocarbons be individually evaluated, with separate figures showing chemical data in plan view and cross section. This will allow the reader to better assess whether the vertical and lateral extent of TPH has been characterized.

   Additionally, the document does not evaluate the need for remediation of the areas where petroleum hydrocarbons exceed screening criteria in soil and groundwater. The document only evaluates remedial alternatives to address VOCs in groundwater and presents no rationale for why there is no evaluation of petroleum hydrocarbon impacts. The petroleum hydrocarbon impacts at the Site are a liability for the future property recipient and should be properly evaluated in this document.

2. ***Evaluation of Subsurface Utilities.*** The document does not present an evaluation of the potential for subsurface utilities to affect the distribution of contaminants in the subsurface, either as a direct source (resulting from past chemical discharge to the utility) or by creating preferential pathways. For example, information presented in the document suggests that chemicals may have been discharged to the sanitary sewer exiting Building 99 to the southeast; however, it does not appear that this sanitary sewer has been thoroughly investigated. Could chemicals have been discharged to

other sanitary sewers? We recommend that the report present a thorough analysis of this potential migration pathway.

3. ***Remedial Action Objectives (RAOs; Section 9.1.3).*** The text in this section states "Although the Draft Reuse Plan (CCSF 1996) lists employee housing as a potential site use, residential use of the property is not likely." We request that this statement be deleted because future use of the site could very well include residential. The text further states, "The RAOs developed for Site 24 are based on the reasonably anticipated future land use described in the Draft Reuse Plan (CCSF 1996), the COCs, and the potential exposure routes; as a result, no RAO was developed for the hypothetical future resident." Because the Draft Reuse Plan does include employee housing, we believe it is appropriate to include an RAO that addresses this potential future receptor.

4. ***Conditions Evaluated by Focused Feasibility Study (FFS).*** It appears that the FFS evaluates remedies assuming that groundwater conditions are those that existed prior to implementation of the treatability study. We recommend that the alternatives also be evaluated assuming current groundwater conditions. Because the Navy has already expended considerable effort and cost to implement the treatability study throughout the entire plume and this effort appears to have successfully treated much of the groundwater plume, the likely remaining future costs to complete remediation and meet RAOs under Alternatives 3A and 3B are likely to be lower than those presented in the FFS.

5. ***In Situ Bioremediation (ISB) as the only Active Alternative Evaluated.*** ISB is the only active remedial alternative evaluated in the document because of the apparent success from the treatability studies. Although information regarding the results from the treatability studies has been presented informally to the Base Realignment and Closure (BRAC) Cleanup Team (BCT) during meetings and results do appear promising, there remain many questions about the overall success of the technology. For example, initial concentrations of VOCs in groundwater were very high (in excess of 40 milligrams per liter PCE and TCE) and, as noted by TetraTech (2002b), are likely indicative of the presence of dense non-aqueous phase liquid (DNAPL). Although the FLUTE investigation by Shaw (2005b) did not locate DNAPL, the potential presence must be acknowledged and addressed with an appropriate remedy. The proposed ISB likely will not be effective in achieving proposed RAOs, either for unrestricted (Alternative 3A) or commercial/industrial (Alternative 3B) land uses if DNAPL is present. To justify consideration of only one active remedial technology, we believe it is prudent to thoroughly document results from the treatability studies (including an assessment of rebound following treatment and breakthrough of the

biobarrier wells) before proceeding with an FFS that only considers one active remedial technology.

6. ***Conclusions from FFS.*** The Conclusions and Recommendations presented in the Executive Summary state, "Based on a comparison of these alternatives, Alternative 2 ranks the highest against seven of nice NCP criteria. The final remedy will be documented in the Proposed Plan after agency and public comments are received and evaluated." We believe that there are some significant flaws in the analysis and ranking of Alternative 2 as follows:
   - As indicated in Section 9.4.2.1, this alternative relies on engineering controls (ECs) to meet the RAOs. The text states, " ECs considered for Site 24 include maintaining existing building foundations and existing pavement and concrete surfaces...." However, the document does not present information to demonstrate that these existing features are sufficiently protective. The document needs to present conclusive information about current building foundations to demonstrate that they prevent exposure to future commercial/industrial workers via inhalation of vapors from groundwater containing VOCs (first RAO). In the absence of such information, it is not possible to assess weather Alternative 2 meets the threshold criterion of "Overall Protection of Human Health and the Environment."
   - If current building foundations and pavement cannot be demonstrated to meet the threshold criterion of "Overall Protection of Human Health and the Environment," then Alternative 2 needs to include cost to retrofit these barriers (e.g., installation of vapor barriers beneath building foundations). Section 10.2.2.7 states that Alternative 2 does not include cost for installing vapor barriers beneath existing buildings. Unless it can be demonstrated that current building foundations are sufficiently protective, the alternative needs to (1) include all costs to make the alternative compliant with the threshold criterion, or (2) acknowledge that the alternative may not meet the threshold criterion.
   - As discussed in the specific comments below, we do not concur with all of the subjective rankings presented in the FFS and, therefore, we do not concur that Alternative 2 (engineering controls, institutional controls, and groundwater monitoring) ranks the highest against the NCP criteria.

SPECIFIC COMMENTS

- ***Executive Summary, Current and Future Land Use, Pages ES-2 and ES-3 and Section 1.3.5, p. 1-11.*** The text states, "Although the reuse plan includes employee housing as one of the potential site uses at Site 24, residential use at Site 24 is unlikely.

Therefore, this RI/FFS Report evaluates Site 24 future reuse as industrial/commercial reuse." This RI/FFS Report actually *does* evaluate hypothetical future residents, consistent with other RI Reports where future reuse may include employee housing. We recommend that the statement be revised to acknowledge that residential reuse is evaluated in this report.

- ***Executive Summary, Geology and Hydrogeology, p. ES-3, last paragraph.*** The text should indicate that groundwater flow direction in the C Zone (south-southeast) is different from that in the A and B Zone (east-northeast).

- ***Section 1.2.3, p. 1-5, list of bullets at bottom of page.*** Under the steps used to evaluate alternatives, the second to last bullet says, "Assess compliance with DoD requirements by evaluating an alternative that would permit unrestricted use of the site if land use controls (LUC), including engineering controls (EC) and institutions controls (IC) are part of an alternative." This language appears to be contradictory. How can an alternative permit "unrestricted use" if it includes LUCs?

- ***Section 1.2.2.1 Buildings within Site 24.*** The report should identify past chemical use at the buildings and discuss how potential impacts from past chemical use have been evaluated. Specifically, Building 69 (Engineers and Shipfitters Shop; Hobby Shop; Garage; Storage) and Buildings 101, 102 and 105 (Oil Pump House and Heating Plant #3) appear to have had past chemical use. Have potential environmental impacts been assessed? .

- ***Section 1.4.4.*** Please define the depths that coincide with the terms "shallow" "intermediate" and "deep" zones. The text states that trichloroethylene (TCE) was detected at a concentration of 370 ug/L in a groundwater sample from 05-HP005 located within Site 5; this detection is above the TCE screening criterion of 200 ug/L. However, this detection does not appear on Figure 4-10, where the datum from 05-HP005 is shown as being below the TCE screening criterion. If this detection is correct, this area of impacted groundwater should be further evaluated in the document.

- ***Section 2.0 Remedial Investigation Approach and Investigation Methods and Procedures.*** Contrary to what the title suggests, this section contains no information about the investigation methods and procedures. The report needs to thoroughly document the investigation methods and procedures that were used and identify any procedures that might have resulted in questionable data (e.g., collection of turbid groundwater samples).

- ***Section 2.1 Site Conceptual Models.*** This section describes the site conceptual model for the perchlorethene (PCE) release associated with Building 99; however, it does not describe the site conceptual model for releases of other chemicals in other portions of the site (e.g., petroleum hydrocarbons north of Building 99, petroleum hydrocarbons and metals at Sites 5 and 17). It may be more appropriate to discuss the Site Conceptual Model after the discussion of the nature and extent of contamination (Section 4.0) but before the Human Health Risk Assessment (HHRA; Section 6.0

- ***Table 2-1.*** This table identifies the screening criterion for dioxins as 19.5 nanograms per kilogram (ng/kg). However, Stakeholders have more recently agreed to use the ambient concentration of 12 ng/kg as a screening criterion, as presented on Table 4-2 of this document.

- ***Section 3.3 Local Hydrogeology.*** This section provides a general summary of information from previous aquifer testing and tidal influence studies conducted throughout Treasure Island. During these studies, was any information collected within or near Site 24? If so, this information should be independently discussed. The text states that an "anomalous" hydraulic conductivity value from well 24-MW03 was excluded from the discussion. Because this well is immediately adjacent to Site 24, the results should be presented and discussed, along with results from any other wells within or near the site.

- ***Section 3.4.2 Site 24 Hydrogeology.*** The discussion of groundwater flow direction in the second paragraph should point out the groundwater flow direction in the C Zone is different from that in the A and B Zone. The last paragraph discusses vertical gradients at Site 24, but presents no data to support the statements made.

- ***Figures 3-5 and 3-6, Cross Sections C-C' D-D' and E-E'.*** We suggest showing the location of the A, B, and C zones referenced in Section 3.4.2 of the text. Please explain how a thin layer of Younger Bay Mud occurs above Dredge Fill and Shoal Sands as shown on Cross Section C-C'. This layer is not present on Cross Sections D-D' and E-E', which both intersect Cross Section C-C'. Please explain the significance of the brown line within the deeper interval of Dredge Fill and Shoal Sands. Is it intended to differentiate a different stratigraphic unit? On Cross Section D-D', none of the borings penetrate the Younger Bay Mud shown on the bottom of the section; please provide the basis for the interpretation of the depth of Younger Bay Mud on this section. On Figure 3-6, it would be helpful to identify which section is D-D' and E-E' on the index map.

- ***Section 4.2.4 Polychlorinated Biphenyls (PCBs) in soil.*** It would be helpful if the text would report the boring location and concentration of the one sample with PCBs above the screening criterion of 0.22 mg/kg. Based on the statistical summary in Table 4-2, the reader can infer that the concentration was 0.31 mg/kg; however, this information should be explicitly stated in the text. Also, it is unclear whether soil at the location with this exceedance was removed during the EBS Data Gaps trenching investigation.

- ***Section 4.2.5.2 TPH-Purgeables soil.*** It would be helpful if the text would report the concentrations of TPHg in the two samples where it was detected above the screening criterion of 1,030 mg/kg.

- ***Section 4.2.6 Metals in soil.*** Please present the data that supports the conclusion that the antimony detection in a sample from boring 19-SISB06 (4,820 mg/kg compared to screening criterion of 31.3 mg/kg) is an isolated detection.

- ***Section 4.3 Groundwater Sample Results.*** Please explain how multiple samples from a single well were handled when calculating the summary statistics presented in Table 4-4. Also, please specify the time period from which data were used (i.e., all historical data or only more recent data).

- ***Section 4.3.2 Semivolatile Organic Compounds (SVOCs) in Groundwater.*** The text should clarify that the exceedances of the screening criteria for flourene and phenanthrene occurred in the same two grab groundwater samples. The document should consider the possibility that these reported concentrations represent non-dissolved SVOCs associated with sediment entrained in the grab groundwater sample. Were the grab groundwater samples turbid? Were flourene and phenanthrene detected in soil at these two locations?

- ***Section 4.3.4 Total Petroleum Hydrocarbons in Groundwater.*** The extent of TPH in groundwater at concentrations exceeding the screening criteria has not been defined to the north, west and south of Building 99 nor to the north, west, and south of location TD4HP007 (Building 260). See General Comment #1.

- ***Section 4.3.5 Metals in Groundwater.*** It would be helpful to have a figure showing the location of groundwater samples analyzed for metals that the reader could refer to when reading this section.

- ***Section 4.3.5.3 Lead in Groundwater.*** In making the case that lead exceedances are due to suspended sediment in the grab samples, it would help to point out that the grab groundwater sample with significantly elevated concentrations of lead (779 ug/L) came from a boring that also had elevated lead in soil (T069HP005). Similar correlations for other metal exceedances should also be acknowledged, if they exist.

- ***Section 4.4 Soil Gas Sample Results.*** This section identifies the sanitary sewer exiting Building 99 to the southeast as a potential release area for VOCs. Based on data presented in this report, it does not appear that the sanitary sewer has been adequately investigated to assess the other potential release locations. See General Comment #2.

- ***Section 4.5 Summary of Chemicals Exceeding Screening Criteria.*** This section summarizes chemicals exceeding screening criteria "in at least three samples at Site 24." What is the basis for identifying only chemicals that exceeded criteria in three samples? This comment also applies to Section 5.1, where the fate and transport discussion was limited to chemicals that exceeded criteria in three samples.

- ***Section 5.3 Migration Pathways.*** This section should discuss potential migration via subsurface utilities, either from past chemical discharge to utilities (i.e. sanitary sewer) or from preferential migration along utility conduits. See General Comment #2.

- ***Section 5.4.2 Semivolatile Organic Compounds.*** The text states that there is a lack of correlation of PAHs at the site with TPH. The text should provide the analysis to support this statement.

- ***Section 5.4.3 Total Petroleum Hydrocarbons.*** The text defines "alkanes" as straight-chain hydrocarbons, which is not entirely correct. Alkanes are hydrocarbons made up exclusively of carbon-carbon single bonds and they can be straight-chain, branched, or cyclic (normal alkanes, isoalkanes, and cycloalkanes, respectively).

- ***Section 5.4.3*** also states that, "The data on TPH distribution in soil relative to distribution in groundwater suggests that TPH has not readily migrated from soil to groundwater at Site 24." The data do not appear to support this statement, as TPH was detected in groundwater at two areas where it also was detected in soil (Building 99 and Building 260).

- ***Section 5.4.4 Metals.*** The discussion indicates that arsenic and iron are more mobile under reducing conditions. The document should discuss whether mobilization of

arsenic and iron is of potential environmental concern under alternatives 3A and 3B, where enhanced reducing conditions are intentionally created to facilitate degradation of chlorinated ethenes.

- ***Section 6.1.1.2 Groundwater Data.*** The text states that VOC data from Hydropunch grab groundwater samples were included in the groundwater data set, whereas inorganic data collected using this method were excluded because of likely high bias due to turbidity in the sample. The text should specify whether data from grab samples analyzed for SVOCs, PCBs or pesticides were included or excluded due to potential high bias from sample turbidity. This comment also pertains to Section 6.3.1.

- ***Section 9.1.4 Proposed Remediation Goals.*** The text indicates that one reason a risk management goal of 1×10^{-5} is appropriate is because groundwater is not designated as a municipal or domestic water supply. Because the RAOs are not based on ingestion of groundwater, we recommend removing this justification for the risk management goal.

- ***Section 9.4.2.1 Engineering Controls (Alternative 2).*** The text indicates that engineering controls under Alternative 2 will include maintaining existing building foundations and existing pavement and concrete surfaces to prevent exposure of future commercial/industrial workers to unacceptable concentrations of vapors in indoor air. Although Section 9.4.2.2 suggests that there are existing vapor barriers, the document should provide specific information (e.g., construction drawings documenting presence of vapor barriers) to demonstrate that these existing features will provide sufficient protection to future receptors. See General Comment #6.

- ***Section 9.4.3.1 Enhanced In-Situ Bioremediation under Alternatives 3A and 3B.*** It is unclear whether this component of the alternative is describing the existing system that was already installed as part of the expanded treatability study, or all new components that have not yet been installed. The text states that "Alternative 3A would build upon the system installed for the enhanced ISB treatability study," suggesting that the subsequent discussion describes components that have not yet been installed. However, the text and information presented on Figure 9-1 appear to describe components that were already installed as part of the expanded treatability study. It is important to understand whether the costs for Alternatives 3A and 3B include only future costs or costs already expended by the Navy. Please clarify. See General Comment #4.

- ***Sections 9.4.3 and 9.4.4, Descriptions of Alternatives 3A and 3B.*** The descriptions of the ISB alternatives are short and leave out much detail that is necessary to be able to evaluate the merits of the approaches. Much of the information is no doubt contained in other reports, both existing and to-be-issued, but the technical approach cannot be determined with any accuracy from the alternative descriptions. For example, why is 375 pounds of lactate appropriate? Please elaborate on the stoichiometry calculations to develop this estimate. Will the injection/extraction episodes last the entire five days at all wells, or will they be phased? What are the goals of the injection/extraction episodes: extract until lactate is observed in the extracted water, or inject a known quantity of lactate? Were the extraction/injection scenarios modeled in any way? How was it determined that three rounds of injection will likely achieve residential remediation goals and one round will achieve commercial/industrial remediation goals? How was the radius of influence of 15 feet determined? If the injection/extraction episodes last for five continuous days at every well at the rate of 8 gallons per minute (gpm) injection, 5 gpm extraction, approximately 1,000,000 million gallons of groundwater will be extracted and re-injected. Based on the estimate in Section 9.4.3.1 approximately 10,700,000 million gallons of affected water are present at the site. Please explain the rationale for only circulating about 10% of the water during each injection/extraction scenario to achieve RAOs.

- ***Section 10.2 Individual Analyses of Alternatives.*** The text states, "...and chemicals in groundwater at Site 24 do not pose an unacceptable risk to benthic invertebrates or other aquatic biota offshore of NAVSTA TI." See comments in the attached memorandum from Steve Ellis.

- ***Section 10.2.2.1 Overall Protection of Human Health and the Environment (Alternative 2).*** As indicated in General Comment #6, Alternative 2 may not meet this threshold criterion.

- ***Section 10.2.2.7 Cost for Alternative 2.*** The text states that the cost estimate does not include installing vapor barriers below existing buildings. See General Comment #6

- ***Section 10.2.3.5 and 10.2.4.5 Short-Term Effectiveness for Alternatives 3A and 3B and Table 11-12.*** We do not concur that these alternative warrant a "low" or "low moderate" rating for short-term effectiveness. While there are some construction-related short-term impacts associated with in situ remediation, they are small when compared with other remedial alternatives that are not considered in this document.

- ***Section 10.2.3.6 and 10.2.4.6 Implementability for Alternatives 3A and 3B and Table 11-12.*** We do not concur that these alternatives warrant a "low" or "low moderate" rating for implementabilty. As the text states, "The technology and equipment used for this alternative are commonly used and widely available." In situ remediation is readily implementable. Although the level of effort may be greater than that for Alternative 2, the higher level of effort is captured under the cost.

- ***Appendix M Cost Estimates.*** Because so little detail was presented on the design of the ISB systems, a systematic review of the cost estimated presented in Appendix M is difficult. However, we have a few preliminary questions:
  - Why are unit costs for HDPE piping different for Alternatives 3A and 3B?
  - The rate of $255/day for the truck-mounted direct push rig seems very low.
  - Why are unit costs for the hydrogen sparger different for Alternatives 3A and 3B?
  - What is the purpose of the reverse osmosis equipment during injection?
  - What is the purpose of the water level chart recorder during extraction?

We appreciate the opportunity to review the Draft Site 24 RI/FSS. Feel free to contact me if you have any questions.

Sincerely yours,
GEOMATRIX CONSULTANTS, INC.

Gary R. Foote

Gary R. Foote, P.G. #5044
Principal Geologist

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Attachments

cc: Mr. Jack Sylvan, TIDA
Ms. Mirian Saez, TIDA
Mr. Henry Wong, Cal EPA Department of Toxic Substances Control
Mr. Christine Katin, U.S. Environmental Protection Agency
Ms. Agnes Farres, Cal EPA Regional Water Quality Control Board

Geomatrix

Memorandum

TO:	Gary Foote	**DATE:**	June 28, 2007
FROM:	Steven Ellis, Ph.D.	**PROJ. NO.:**	4850.005.3
CC:		**PROJ. NAME:**	Treasure Island

SUBJECT: **Review of Appendix K Ecological Risk Assessment for Installation Restoration Site 24, Former Dry Cleaning Facility, at the former Naval Station Treasure Island**

I have reviewed the following document: Appendix K *Ecological Risk Assessment* which is part of the RI/FFS Report for Naval Station Treasure Island (NAVSTA TI). My comments are listed below.

- Appendix K presents the results of the ecological risk assessment (ERA) conducted as part of the remedial investigation and focused feasibility study for Installation Restoration Site 24 – Former Dry Cleaning Facility. The ERA was conducted in accordance with ERA guidance from the U.S. Department of the Navy and U.S. Environmental Protection Agency (EPA). The presentation of the ERA results in Appendix K is in accordance with accepted guidance and industry standards.
- Potential ecological risk was evaluated by comparing concentrations of chemicals detected in groundwater prior to the onset of remedial actions at the site in September 2003 to screening criteria from three main sources: EPA National Ambient Water Quality Criteria for Protection of Saltwater Aquatic Life, California Toxics Rule Criteria for Enclosed Bays and Estuaries, and the San Francisco Bay Basin Plan. Additional sources were consulted for six constituents because no screening values were available from the above sources. Chronic criteria from these sources were used for screening when values were available. The EPA chronic criteria for the protection of aquatic life and the California Toxics Rule criteria continuous concentration is the estimated highest concentration of a constituent that aquatic organisms can be exposed to for a 4-day period without deleterious effects. When chronic criteria were not available, screening criteria were calculated from acute criteria by dividing these values by a factor of 10; this approach is recommended by California Department of Toxics Substance Control. The selection of screening criteria for organic chemicals is in accordance with accepted guidance and industry standards.
- Inorganic chemicals (metals) were also compared to "estimated background concentrations" in groundwater at NAVSTA TI. A metal was identified as a chemical of

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potential concern (COPEC) only when the groundwater concentration exceeded the screening value and the background concentration. Background concentrations of three metals (copper, mercury, and silver) exceeded the selected toxicity screening values by factors ranging from 2.1 to 11.6. Mercury was identified as a COPEC in the Tier 1 Screening Ecological Risk Assessment (SLERA); however copper and silver were not identified as COPECs. Appendix K notes that metals were not identified as COPECs unless they exceeded background concentrations "because they may be present throughout the naval base and are unrelated to site-specific activities". No information is provided as to whether elevated copper and silver concentrations occur at Site 24. No discussion is included regarding the ecological risk implications of having "groundwater background concentrations that exceed ecological risk thresholds. It is recommended that this information be included in the report.

- Section K.3.3.5 of Appendix K notes that surface water screening criteria were not available for all chemicals detected in groundwater so the risk posed to aquatic receptors from these chemicals was not evaluated. The report should list these chemicals. In addition, it is recommended that the report indicate which, if any, of these chemicals are associated with Site 24 and how the groundwater concentration of these chemicals within Site 24 compares to the NAVSTA TI groundwater background concentration. Chemicals that exceed background concentrations should be discussed to justify their exclusion from the risk assessment.
- Mercury was identified as a COPEC in the SLERA and further evaluated in the Tier 2 Baseline Ecological Risk Assessment. Mercury was eliminated as a chemical of ecological concern because it was only detected once at a concentration (0.11 µg/L) slightly above the NAVSTA TI background concentrations (0.1 µg/L). However, the detected value and the background concentration are 4 times higher than the ecological screening threshold for mercury (0.25 µg/L). As noted above, the report should include a discussion about the ecological risk implications of having groundwater background concentrations that exceed ecological risk thresholds.
- Nickel was identified as a COPEC in the SLERA and further evaluated in the Tier 2 Baseline Ecological Risk Assessment. Nickel was eliminated as a chemical of ecological concern because the ecological screening criterion (8.2 µg/L) has been exceeded only once, at a concentration of 9 µg/L, since 1995. The concentration of nickel in the well where the screening criterion was exceeded was 2.4 µg/L in 2005. The report concludes that based on the most recent data nickel does not appear to pose a risk to ecological receptors. The report does not indicate how many groundwater samples have been analyzed since 1995. This information should be provided to support the argument being presented for nickel.

- Groundwater screening values for ecological risk were proposed for volatile organic chemicals (VOCs) in Appendix K (Table K-1). However, the report does not compare groundwater VOCs to the screening values. Instead, the report concludes that "VOCs are not generally considered chemicals of concern in the offshore environment because they rapidly volatilize as a result of water column mixing". Populations of benthic invertebrates could be adversely impacted by VOCs in pore water. Pore water would be expected to have higher concentrations of VOCs than the overlying water column. It is recommended that VOCs be evaluated in the ecological risk assessment.
- The ecological risk assessment compares groundwater concentrations to toxicity screening criteria without assuming any dilution due to mixing with waters adjacent to Site 24. This assumption, while conservative, would be expected to substantially overestimate the exposure concentration to aquatic receptors. Discussion of this assumption in conjunction with the decisions made to eliminate mercury and nickel as chemicals of concern would strengthen the rationale provided in the report to eliminate these metals.

Exponent

EXTERNAL MEMORANDUM

TO: Gary Foote – Geomatrix

FROM: Greg Brorby

DATE: July 2, 2007

PROJECT: 8601649.003

SUBJECT: Comments on Site 24 Remedial Investigation Report

This memorandum presents the results of my review of specific sections of the draft "Remedial Investigation and Focused Feasibility Study [RI/FSS] Report for Installation Restoration [IR], Site 24, Former Dry Cleaning Facility, Naval Station Treasure Island, San Francisco, California" dated April 30, 2007. Specifically, my review focused on Section 6, Baseline Human Health Risk Assessment (HHRA) for Site 24, and Appendix J, Human Health Risk Assessment. In addition, I reviewed other sections of the report that pertain to the HHRA, as indicated below. It should be noted that this review did not include a rigorous assessment of the information presented in the tables, nor any verification of the risk assessment calculations. To the extent that I noticed discrepancies between information presented in the text versus information presented in the tables during my review, these discrepancies are indicated below.

General Comments

1. Exposure-point concentrations (EPCs) were calculated for soil and groundwater for the entire approximately 20-acre site. While this may be appropriate in some circumstances (e.g., chemicals are present at similar concentrations at different locations on the site, exposure is expected to occur randomly across the entire site), this is not the case for Site 24. On the contrary, much higher concentrations of chemicals are present in portions of the site (e.g., solvents in soil gas and groundwater in the vicinity of the former dry cleaning operation). Including data from other areas on the site in the EPC calculations has the potential to significantly underestimate EPCs for receptors that may be present in only portions of the site (e.g., future residents, commercial/industrial workers, and utility workers). This is particularly true when evaluating vapor intrusion into indoor air. The HHRA should be revised to incorporate estimated health risks associated with different areas of the site. At a minimum, the area of Site 24 affected by high concentrations of solvents in soil gas and groundwater should be evaluated separately from the rest of the site.

2. In a footnote to Table J-1 (EPA RAGs Part D Table 1, Selection of Exposure Pathways), the Navy asserts that "[e]xposures to a construction worker are considered protective of exposures to a utility/maintenance worker." This appears to be the only place where this statement is made, and essentially, no further reference to a utility/maintenance worker is made throughout the entire RI report. While this assertion may be true in some circumstances, this is not the case for Site 24. As discussed above, EPCs were calculated for the entire site as a whole. This may be appropriate for a construction worker, who is expected to be present across the entire site during construction, but this is not necessarily the case for utility workers, who may be present in only limited portions of the site. Further, as stated in Attachment J3 to Appendix J (Groundwater-to-outdoor-air model for construction worker trench), the Navy modified the default assumptions regarding the size of a trench, stating that the default assumptions were more appropriate for a utility trench. By changing this assumption, the Navy used an air exchange rate of 360 per hour rather than 2 per hour, resulting in an essentially 150-fold reduction in the predicted air concentrations (and risks). Given that the estimated health risks for a future construction worker are above 1×10^{-4} and a hazard index of 1, a separate utility worker scenario should be included in the final Site 24 HHRA.

3. There is conflicting information as to which data were used to evaluate vapor intrusion into indoor air for which receptor. In Section 6.0 of the main report (Baseline Human Health Risk Assessment for Site 24), the Navy states that soil gas concentrations were used for current commercial/industrial workers, and soil and groundwater concentrations were used for future commercial/industrial workers and hypothetical future residents. However, in Attachment J2 (indoor air-vapor intrusion modeling), the Navy states that indoor air concentrations for a current commercial/industrial worker were estimated using both groundwater and soil gas data, with the higher concentrations being used for risk management decisions. For the future commercial/industrial worker and future hypothetical future resident, indoor air concentrations estimated from soil and groundwater data were summed and compared to the indoor air concentrations estimated from soil gas data. The results presented in the main results tables in Appendix J (Human Health Risk Assessment) suggest that the former approach was used.
I advocate the approach outlined in Attachment J2; however, it will be important to limit the soil and groundwater data to locations within the affected area, rather than using data from across the entire site.

Specific Comments

1. Executive Summary, p. ES-2 to ES-3 and Section 1.3.5, p. 1-11 — These sections include the following statements: "Although the reuse plan includes employee housing as one of the potential site uses at Site 24, residential use at Site 24 is unlikely. Therefore, this RI/FFS Report evaluates Site 24 future reuse as industrial/commercial reuse." These statements are confusing, given that a hypothetical future resident was evaluated in the HHRA.

2. Section 6.1.1, p. 6-2 — This section states that nondetect results with reporting limits greater than the maximum detected concentration were excluded from consideration. As explained in Section J.3.0 (p. J-2 to J-3), these data were excluded from the calculation of summary statistics, because "...these high nondetect concentrations provide no useful information for estimating population parameters..." While this may be true, there should be some discussion of the number of data points eliminated, the number of data points remaining, and whether the elimination of data points affects the adequacy of site characterization data (e.g., if all of the eliminated data were from one area, and no other data existed for that area, then additional information may be necessary to complete the site characterization).

3. Section 6.1.1.1, p. 6-2, 4th bullet — This bullet implies that indirect exposure to volatile chemicals in soil was evaluated only for indoor receptors, whereas other sections of the report (e.g., Section 6.1.3.3, p. 6-12) state that inhalation of vapors from soil in outdoor air was also evaluated. The exposure pathways evaluated should be clear and consistent throughout the report.

4. Section 6.1.1.3, p. 6-4 — This section states that "soil gas was used solely to evaluate exposure to the vapor intrusion pathway under the current land use scenario." This statement is in direct conflict with the following statement from Attachment J2 of Appendix J (indoor air vapor intrusion modeling): "For the current commercial/industrial worker, indoor air vapor intrusion was evaluated using both groundwater and soil gas results." Based on a review of the results tables in Appendix J, it appears that soil gas data were used to evaluate the indoor air pathway for the current commercial/industrial worker. Further, review of the tables in Attachment J2 indicates that the estimated indoor air concentrations based on soil gas data are higher than those estimated based on groundwater data. However, the groundwater EPCs were based on site-wide groundwater data, whereas the soil gas EPCs were based on soil gas data beneath Building 99, the former dry cleaners. As stated in General Comment #1, the HHRA should be revised to evaluate subareas of Site 24 where chemical concentrations are significantly higher than in other areas of the site, such as the Building 99 area. This comparison between estimated indoor air concentrations based on soil gas and groundwater data should then be updated to ensure that the soil gas data result in the higher estimates of indoor air concentrations.

5. Section 6.1.2.2, p. 6-8 — This section states that inhalation of vapors in outdoor air was evaluated for volatile chemicals detected in groundwater. In addition, the conceptual site model shown in Figure 2-2 indicates that this pathway was evaluated for all three receptors (i.e., hypothetical future residents, commercial/industrial workers, and construction workers). However, as explained further in Section 6.1.3.3 (p. 6-12) and Appendix J (Section J.5.1, p. J-6, and Attachment J3), this pathway was evaluated only for the future construction worker. This exposure pathway should be evaluated for all three receptors, or an explanation should be provided as to why this exposure pathway is not evaluated for the hypothetical future resident and commercial/industrial worker.

6. Section 6.1.2.3, p. 6-10 — This section identifies ten chemicals of potential concern (COPCs) for soil gas using Method 1 or Method 2. However, Table J-8.1 (EPA RAGS Part D Table 7, calculation of RME cancer risks and noncancer hazards using toxicity data from EPA sources [Method 1], current commercial/industrial worker, surface soil [0-2 ft bgs], unpaved areas) appears to include only five of these chemicals. The corresponding table for Method 2 (Table J-8.9) includes all ten chemicals.

7. Section 6.1.3.1, p. 6-11 — This section asserts that landscape workers do not need to be evaluated separately from commercial/industrial workers, because landscape workers will not be exposed via inhalation of vapors in indoor air. Additional information should be provided to further substantiate this statement (e.g., potential risks associated with inhalation of indoor air are much higher than potential risks associated with direct contact with soil, landscape workers would not be expected to be present at Site 24 as frequently as other commercial/industrial workers, etc.).

8. Sections 6.1.3.2, p. 6-11, and 6.2.2, p. 6-20 — Further substantiation is needed for the Navy's assumption that future recreational exposure is expected to be significantly less than exposure to the future commercial/industrial worker. For example, it is not necessarily valid to assume that a recreational receptor will spend 5% of his or her time at Site 24 simply because the size of Site 24 is approximately 5% of the total size of Treasure Island (TI). Instead, this factor is more likely to be related to the size and type of recreational facilities at Site 24 relative to the size and type of recreational facilities in other areas of TI. Further, future residents of TI may well visit Site 24 for recreational purposes more frequently then 2 days per week (e.g., evening walks along the shoreline). I do agree that it is reasonable to assume that the time spent at Site 24 by a recreational receptor would be less than for a commercial/industrial worker. This comment also pertains to Section J.5.2.3 (p. J-13).

9. Section 6.1.3.3, p. 6-12 — As stated in General Comment #3, the description of which data were used to evaluate vapor intrusion into indoor air for which receptor is inconsistent with the description in Attachment J2 to Appendix J.

10. Section 6.1.3.4, p. 6-12 — As stated in General Comment #1, separate EPCs should be calculated for multiple possible exposure areas, rather than for the entire site as a whole, given that a future commercial/industrial worker or hypothetical future resident may spend time in only one portion of the 20-acre site. At a minimum, the area of Site 24 affected by high concentrations of solvents in soil gas and groundwater should be evaluated separately from the rest of the site.

11. Section 6.1.3.5, p. 6-15 — The Navy states that intake parameters for the current commercial/industrial worker are based on the Navy's own observations, as documented in an electronic mail message. Because this documentation is not in the public domain, the Navy should include this reference as an attachment to the report or provide additional documentation in the report itself. In particular, the basis for the number of days per year and the number of years should be provided. Further, the values for these

parameters are not consistent between this section of the report and Section J.5.2.1.1. (12 vs. 24 days per year and 3 vs. 2 years, respectively). This discrepancy should be resolved.

12. Section 6.2.4, p. 6-23 — This section states, "Although no single COPC had an HQ greater than 1 for the future commercial/industrial worker, a target organ analysis indicated that the liver has an HI of greater than 1 for both Method 1 and Method 2." This statement is inconsistent with the table in Section 6.2.2 (p. 6-20), which indicates that the HI (hazard index) for all COPCs is equal to, not greater than, 1.

13. Section 6.2.4, p. 6-23 — The groundwater hazard quotients (HQs) for the future construction worker in the table on this page are inconsistent with the values in the table in Section 6.4 (p. 6-35) and in Tables J-8.2 and J-8.10 in Appendix J. In addition, the groundwater HQs for the "hypothetical future resident (adult and child) – exposure to soil (0 feet bgs to groundwater) and indoor air vapor intrusion" of 15 should be rounded to a single significant figure (i.e., 10) as was done in the table in Section 6.4 (p. 6-36) and in Table 9-1 of the main text.

14. Section 6.3.5, p. 6-30 — If the final HHRA does not estimate risks separately for different exposure areas within Site 24, then the uncertainty associated with calculating EPCs based on data from across the entire site should be addressed in this section, given that much higher concentrations of chemicals are present in some areas of the site, and that site-wide EPCs likely underestimate the concentrations to which some future receptors could be exposed.

15. Section 9.1.4, p. 9-3 — Presumably, the Navy used the results from the risk assessment presented in Section 6.0 of the main text and Appendix J to calculate the remedial goals presented in Table 9-2 (i.e., based on a known EPC and a known risk, a remedial goal can be calculated for a specified risk level). Even if this presumption were correct, the reader would have to identify the appropriate EPCs and risk (or hazard) values from the results tables in Appendix J to verify these calculations. The Navy should provide additional information and documentation regarding how these values were calculated.

16. Section 9.1.4, p. 9-3 — The Navy states that the remedial goals were based on the results of the Method 1 risk assessment. However, if the results of the Method 2 risk assessment were used, the remedial goal for vinyl chloride would be more than an order of magnitude lower because of differences in the U.S. Environmental Protection Agency (EPA) and California EPA (Cal-EPA) toxicity criteria for this chemical. Remedial goals should be calculated based on both risk assessment methods and the rationale for choosing the remedial goals based on the Method 1 risk assessment results should be provided.

17. Section J2.2.1.4, p. J2-4 — I do not agree that use of the 95% upper confidence limit (UCL), as currently calculated, should be regarded as a reasonable estimate of concentrations likely to be encountered in indoor air. As discussed repeatedly above, the

concentrations of several solvents are significantly higher in the immediate vicinity of the former dry cleaning operation than in other areas of the site. As such, a 95% UCL concentration based on data from the entire site clearly underestimates the average concentration to which a future commercial industrial worker or hypothetical future resident could be exposed should a building be constructed above the highly affected groundwater.

Miscellaneous Comments

1. Section 6.1.2, p. 6-4, 2nd bullet — This bullet provides a definition of volatile chemicals based on molecular weight and Henry's Law constant and implies that this definition was used to identify volatile chemicals for purposes of the HHRA. While this definition appears in the cited U.S. EPA references, inhalation of vapors was actually evaluated for those chemicals listed in EPA's (and Cal-EPA's) vapor intrusion guidance, some of which do not conform to this definition (e.g., chrysene). It would be simpler to state that chemicals listed in EPA's (and Cal-EPA's) vapor intrusion guidance were considered volatile for purposes of the HHRA. This comment also applies to Sections J.4.1 and J2-1.1.

2. Section 6.1.2, p. 6-4, 1st bullet — Please provide a reference to where the analysis of essential nutrients can be located.

3. Section 6.1.3.5, p. 6-15 — The values for particulate emission factor in the table on this page appear to be incorrect for the future commercial/industrial worker and future hypothetical adult and child resident. In addition, this table should include a reference to the location in the document of the chemical-specific dermal absorption factors (i.e., Table J-5.1).

4. Sections 6.2.3, p. 6-22, and 6.3.10 — The Navy should acknowledge that the 1:6 ratio of hexavalent chromium to trivalent chromium is based on EPA Region 9's preliminary remediation goal (PRG) table and does not have anything to do with what might be present at Site 24.

5. Section 6.3.11, p. 6-34 — I do not understand what is being stated in this section. Please clarify.

6. Section J.5.2.2.1, p. J-11 — The reasonable maximum exposure (RME) inhalation rate for the future hypothetical commercial/industrial worker is the only value presented in units of cubic meters per day. For consistency (and comparability), this value should be presented in units of cubic meters per hour.