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TREASURE ISLAND
SSIC NO. 5090.3.A

Department of Toxic Substances Control

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February 20, 2007

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REMEDIAL INVESTIGATION REPORT FOR INSTALLATION RESTORATION SITE 32, FORMER TRAINING AND STORAGE AREA, NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA

Dear Mr. Sullivan:

The Department of Toxic Substances Control (DTSC) has received and reviewed the October 2006 draft *Remedial Investigation Report for Installation Restoration Site 32, Former Training and Storage Area, Naval Station Treasure Island, San Francisco, California.* Enclosed are DTSC, Human and Ecological Risk Division's February 9, 2007 comment memorandum and DTSC, Office of Military Facilities' February 14, 2007 comment memorandum. DTSC is ready to work with the Navy in resolving the comments and keeping the project schedule.

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

Sincerely,

Henry Wong
Remedial Project Manager
Office of Military Facilities

Enclosures

cc: See next page.

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MEMORANDUM

TO: Henry Wong
Project Manager
Office of Military Facilities

FROM: Eileen Hughes, PG
Engineering Geologist
Office of Military Facilities

Reviewed by: Michael O. Finch, PG
Senior Engineering Geologist
Geologic Services Unit

DATE: February 14, 2007

SUBJECT: **REVIEW OF THE DRAFT REMEDIAL INVESTIGATION REPORT FOR INSTALLATION RESTORATION SITE 32, FORMER TRAINING AND STORAGE AREA, NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA, OCTOBER 2006**

ACTIVITY REQUESTED

Per your request, the following report has been reviewed: *Draft Remedial Investigation Report for Installation Restoration Site 32, Former Training and Storage Are, Naval Station Treasure Island, San Francisco, California* dated October 2006 (RI Report). The RI Report was prepared by SulTech, a joint venture of Sullivan Consulting Group and Tetra Tech EM Inc., for the U.S. Department of the Navy, Naval Facilities Engineering Command, Southwest Division (Navy). The RI Report has been reviewed with respect to geologic and hydrogeologic interpretations and technical adequacy—in particular, with regard to the extent of contamination.

PROJECT SUMMARY

The former Naval Station Treasure Island (NAVSTA TI) comprised two connected islands in the San Francisco Bay – Yerba Buena Island (YBI, a natural island) and Treasure Island (TI, a manmade island). Military activities at NAVSTA TI date back to 1866, when the U.S. government took possession of YBI (147 acres) for defensive fortifications. In the late 1930s, TI (403 acres) was constructed over a sand spit (Yerba Buena Shoals) which extends north from YBI. Silt was dredged from the Bay and the Sacramento River Delta, emplaced over the sand spit, and retained within perimeter dikes of rock and sand.

Installation Restoration Site 32 (Site 32) is located on the northeastern shore of TI and comprises Parcel T115 and portions of Parcel T111 (for a total of 2.6 acres). Parcel T111 was used for vehicle and forklift parking, miscellaneous outdoor storage, and hazardous materials/waste storage. Parcel T111 was also used as a tear gas training area and as a storage area for training structures, including two steel mock-ups and a vessel (USS Pandemonium).

Buildings (and their uses) at Site 32 included: 42 (pyrotechnics and small arms storage), 56 and 57 (shop and storage), 58 (incinerator and refuse, paint shop), 59 (office work improvement program), 60 (shop and storage), 327 (salvage), 336 (linoleum shop), 337 (mason's locker), 371 (training mock-up), 403 and 404 (incinerator), 445 (forklift maintenance, boat motor storage, general shop activities and offices), 462 (offices and classrooms for instruction in decontamination procedures), and 463 (tear gas training). Buildings 445, 462, and 463 are the only buildings still standing at Site 32. Except for storage/retrieval of landscaping equipment in areas near Building 445, Site 32 is currently unused and unoccupied.

Site 32 Reuse is designated as "Residential/Open Space/Publicly Oriented Uses/Shoreline Open Space".

GENERAL COMMENTS AND RECOMMENDATIONS

1) Potential sources. Multiple activities were conducted at Site 32 including: incineration, tear gas trainings, hazardous materials/waste storage, salvage operations, pyrotechnics and arms storage, transformers, and shop operations. These activities may be associated with source areas for contamination. However, information on the locations of activities is not provided (with few exceptions). Moreover, the report does not describe how various areas were included or excluded from investigation as potential source areas. That is, a logical path linking site activities and potential contaminants to the sampling and analysis program is not presented. Therefore, it has not been demonstrated that the investigation (i.e., analytes, locations, depths, number of samples) is appropriate or adequate.
   Questions are raised by the site activities, but the report does not provide answers to many questions. Examples of questions: Was tear gas contamination investigated? Were dioxin samples located proximate to the incinerators? How were "mock-ups" and USS Pandemonium used?
   Recommendations: The RI Report should be a stand-alone document providing a transparent summary of site activities and the rationale and approach to site investigations. To meet this objective, please respond to the following requests.
   a) Provide a tabulated summary of all buildings, structures, storage areas for hazardous substances/wastes and radiological materials, and polychlorinated biphenyls (PCBs) areas. For each location, describe activities through time and hazardous materials used and stored. Identify potential source areas and potential contaminants. Summarize investigations associated with each potential source area. Discuss the use of lead-based paint and asbestos on site.
   b) Include a figure showing locations of all current and historic buildings, storage/staging areas, PCB areas, wash pads, and structures (e.g., mock-ups, tanks). Include buildings and structures on nearby parcels (e.g., Site 10). Have outfalls, drain lines, and sumps been investigated?
   c) Identify all regulated units (e.g., waste managements units, underground storage tanks).
   d) Document all uses of radiological materials at Site 32 (e.g., tracers used for training exercises). Summarize radiological investigations and include citations.
   e) At adjacent Site 12, multiple disposal areas were located along the Bay margin. Has similar disposal occurred at Site 32?
   f) Include building plans and aerial photographs.
   g) Summarize investigations on adjoining parcels and offshore areas. Include figures showing site features, sources, and extent of contamination (e.g., pesticide storage, USTs, offshore samples).
   h) Are there current or historic water supply wells at Treasure Island?
   i) Provide rationales for sampling locations. For example: Why were only shallow samples collected (generally less than 5 feet below the ground surface (fbgs), with only one sample below 9 fbgs)? Why was grid sampling used on T111 and not on T115? Biased sampling was conducted near the transformer pad. Was biased sampling considered for other areas of suspected contamination?
   j) For references cited, provide document titles and page numbers and include the cited references (e.g., workplan) in PDF files on a compact disc included with the report.

2) Extent of contamination. The approach taken in these comments is that additional investigations are warranted where the extent of contamination has not been determined. However, the evaluation of the extent of contamination is hampered by the lack of information about potential sources (as discussed above). Therefore, comments on extent of contamination may be incomplete. Also, the need for additional investigation is somewhat dependent on proposed reuse. In some cases, investigation may not be necessary – for example, if a parking lot will function as a soil cap. In other cases, investigations may be postponed to the remedial action phase.
   a) Polychlorinated biphenyls. PCBs were not linked to the transformer pad exclusively. In fact, significant shallow contamination was measured over most of the site. Higher concentrations and deeper contamination was measured at the shoreline (far from the transformer pad). The extent of PCB in the direction of the Bay has not been determined (e.g., 79 mg/kg at T111HP016). The extent of PCBs at depth was not determined near the shoreline at T111HP023 (35 mg/kg at 3.7

fbgs) and at T111HP038 and T111014 and T111013 (1.6 at 4.3 fbgs and 0.35 at 4 fbgs and 0.30 at 4.4 fbgs). Parcel T115 was not investigated for PCBs.
Recommendations: Perform additional sampling at depth (especially at the shoreline) to determine the extent of PCB contamination as well as stepout samples in the direction of the Bay. Discuss sources of PCB contamination.

b) Total petroleum hydrocarbons (TPH). The extent of TPH-diesel (TPH-d) in soil at T111HP012 (7,800 mg/kg at 9 fbgs) was not determined, since nearby borings did not extend to 9 fbgs. The extent in groundwater was not determined.
Recommendations: Perform additional sampling to determine the extent of TPH contamination in soil near T111HP012 (to depths of at least 9 fbgs). Discuss sources of TPH contamination.

c) Dioxin. Dioxin was present above the dioxin toxicity equivalent level (TEQ) in shallow soils (at about 1 fbgs) over most of the southern portion of Site 32. Except for two locations at opposite ends of the site, samples were not collected near the shoreline. The horizontal extent has not been determined at two locations along the shoreline (S32-T001 and S32-T009) and at three locations near the southern boundary (T111HP006, T111HP034, and T111HP011, on the boundary of T111 and T115). Parcel T115 has not been investigated for dioxins. Soils below 2 fbgs were not analyzed for dioxins at most locations; therefore, the extent of dioxin contamination in deeper soils has not been determined. However, for locations where samples were collected at 3 fbgs, TEQs were not exceeded.
Recommendations: Perform additional sampling at depth, at boundaries, and near the shoreline to determine the full extent of dioxin contamination. Discuss sampling locations with respect to the locations of incinerators and other incendiary activities. On Figure 4-11, identify cancer and noncancer risks levels for the screening criteria (i.e., TEQ of 12 ng/kg).

d) Semi-volatile organic compounds (SVOCs).
   i) Detection limits (DLs) for SVOCs in soil often exceed screening criteria, perhaps due to presence of TPH. Consequently, the extent of SVOCs (primarily polycyclic aromatic compounds, or PAHs) may be underestimated. Also, samples with elevated DLs were eliminated from the risk assessment (Appendix I, Section 1.3.0); therefore, risks due to SVOCs may be underestimated.
   Locations where benzo(a)pyrene (B(a)P) contamination is indicated on Figures 4-3 and 4-4, are likely locations where B(a)P has low concentrations, due to the absence of TPH at these locations. Where TPH was low or non-detect, DLs for SVOCs were low; therefore, B(a)P and other PAHs were measurable. Conversely, where TPH-d was high (e.g., T111HP012: 7,900 mg/kg), the DL for B(a)P was elevated (e.g., 39 mg/kg). At locations with elevated B(a)P DLs, the RI Report identifies B(a)P as non-detect (ND) and excludes B(a)P from risk calculations. Because of the manner in which NDs are depicted on figures, Figures 4-3 and 4-4 may be misleading regarding the possible extent of SVOC contamination.
   Recommendations: Collect additional samples near TPH areas and analyze using techniques for lower DLs. Revise figures and tables to show all DL exceedences and to include the DLs for all respective analytes (i.e., < x mg/kg, where x is the elevated DL).
   ii) Recommendations: Revise Figure 4-4 to show exceedences of B(a)P equivalent (EQ) of ECLR of 10^{-6} (not of 10^{-5}).
   iii) Maximum DLs for SVOCs (and other compounds) as shown on Appendix I Tables do not include maximum values shown in Appendix B: Analytical Results for Soil Samples.
   Recommendations: Please revise DLs on Appendix I tables (for SVOCs and other compounds) to be consistent with other tables.

e) Volatile organic compounds (VOCs). Because of high potential VOC loss with other sampling methods (especially in sandy soils like Site 32 soils), DTSC guidance requires the use of EnCore™-type samplers or chemical preservation in the field (with methanol or sodium bisulfate) for VOC and TPH-purgeable (TPH-p) analyses in soil. Also, Method 5035 is required for VOCs. At Site 32, EnCore™ samplers were used for TPH-p analyses, but glass jars or acetate sleeves were used for VOC analyses by Method 8260B (Table D-1). Therefore, VOC results are considered to be very low-biased. DLs were low over most of the site and VOCs were not detected over most of the site. However, in areas of TPH contamination, DLs were elevated and the presence of VOCs has not been ruled out.

DTSC is concerned regarding the potential for air vapor intrusion into occupied buildings. As noted below (in Attachment I2 Comments), active soil gas samples are recommended for risk assessment for the air vapor intrusion pathway. Passive soil gas samples may be useful for identifying hotspots.

Recommendations: To confirm previous results, collect soil and groundwater for VOC analysis. In addition, collect soil gas samples at selected locations (e.g., TPH areas). For all media, use the sampling and analytical protocols in Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (DTSC, 2005).

Provide an estimation of risks and hazards associated with the maximum DL for naphthalene.

f) Pesticides. Pesticides were measured above screening criteria at three shallow locations on the shoreline. Nearby samples are fairly distant (about 70 feet). Pesticides were stored at a site directly adjacent to Site 32.

Recommendations: Further delineate pesticide contamination. Discuss sources.

g) Metals and other inorganics

i) Arsenic (As) is ubiquitous at the site at elevated concentrations. Distribution and concentrations are consistent with ambient conditions.

ii) Lead. Recommendations: Stepout in the direction of the shoreline. Discuss possible sources for lead (Pb) on T115 (e.g., 994 mg/kg at T115HP004).

iii) Metals in groundwater. Significant exceedences of screening criteria for metals and TPH were measured in groundwater grab samples collected at the shoreline. No wells exist and no wells are proposed. The text argues that no further investigation is needed because 1) high concentrations are due to high turbidity of grab samples, 2) soil near the groundwater/soil interface does not exhibit high concentrations, and 3) soil contaminants will not leach to groundwater (Section 5.3).

However, if groundwater data is not representative due to high turbidity, then representative samples must still be collected in order to characterize the groundwater. Soil samples were not collected from deeper screened intervals of groundwater samples. Consequently, soil and groundwater samples do not correspond to the same intervals (or to the same volumes of media) and results are not directly comparable. TPH in groundwater may be associated with metals and other contaminants (e.g., metals and TPH north of Building 445).

Moreover, groundwater analyses were limited. Few locations were sampled and all groundwater samples were not analyzed for all compounds. For example: no groundwater samples were collected from the southern half of the site. Pesticides and PCBs were analyzed at only three locations and dioxin was not analyzed in any groundwater samples. Therefore, groundwater data are not sufficient to demonstrate whether leaching of compounds or mobilization in groundwater or in TPH occurred.

Recommendations: Install monitoring wells and initiate a monitoring program, particularly near the shoreline and in the TPH area, and analyze for metals and other site contaminants.

iv) Hexavalent chromium has not been analyzed for; however, site activities do not rule out hexavalent chromium (i.e., paint shop). Total chromium (503 ug/L) exceeded screening criteria (50 ug/L) for groundwater.

Recommendations: Analyze groundwater and soil for hexavalent chromium. Discuss potential sources for hexavalent chromium.

v) Manganese was not analyzed for. However, manganese can be a concern, especially for construction workers.

Recommendations: Sample for manganese in groundwater and soil. In the absence of samples, the risks associated with site-wide ambient values should be assumed. Calculate and discuss risks associated with site-wide ambient values for manganese.

h) Pyrotechnics and munitions were stored or used at the site.

Recommendations: Analyze groundwater and soil for perchlorate. Discuss potential sources for perchlorate. Were pyrotechnics used during training activities? Discuss the potential for contamination due to munitions.

i) Tear gas. Recommendations: Provide more information on tear gas (e.g., site usage/storage, chemical properties). Discuss the investigation for tear gas, or provide the reasons an investigation was not conducted. Adjust sampling program, if necessary.

j) The extent of contamination in nearshore areas of Site 32 has not been determined, as discussed in previous comments. In addition, the offshore area has not been investigated (Figure 5, Installation Restoration Site 13, Offshore Sediments, Record of Decision, April 7, 2005). Recommendations: Stepout in nearshore areas and, if nearshore concentrations are high, investigate offshore areas.
k) Discuss associated and/or commingled compounds (e.g., TPH and PCBs, TPH and metals).
l) Since composite samples dilute the concentrations of subsamples, discrete samples are generally preferred for remedial investigations, risk assessment, and confirmation sampling. Composite samples are mentioned in Section 6.0; however, composite samples are not distinguished from other samples in data presentations.
Recommendations: Identify all composite samples by the use of a different sample name (e.g., an identifying prefix or suffix) in all data presentations (i.e., tables and figures). Discuss composite samples within the text when investigations are described, including the number of subsamples and procedures used to make composites (e.g., mixed in field or mixed in the lab).
m) Prior to conducting field work to address data gaps, provide supplemental remedial investigation workplans for DTSC's review.

3) Preliminary remedial screening criteria (PRCs) for soil and groundwater
Recommendations: Provide additional information as requested below so that the appropriateness of RI screening criteria for Site 32, including intended reuses at Site 32, can be evaluated.
a) Exceedence of PRCs is an indication that additional work or evaluation is needed for site characterization. However, stepouts were not performed at all PRC exceedences and human health data gaps still exist (General Comment 2). Moreover, ecological data gaps may exist since ecological concerns were not included in the development of soil PRCs. Chemicals of potential concern (COPCs) for the Human Health Risk Assessment (HHRA) were developed based on limited site data. Hence, the HHRA and the screening level ecological risk assessment (SLERA) may not fully describe potential site risks.
b) Discuss pathways of exposure that were considered during development of PRCs and the appropriateness of the PRCs with regard to Site 32 site conditions, site reuse, and the conceptual site model for Site 32. For example, were ecological risks, threats to groundwater and surface water, and volatization to indoor air considered for soil PRCs?
c) Include a table for soil criteria, similar to Table 4-2 which contains groundwater criteria.
d) Revise soil and groundwater tables to indicate various criteria considered and criteria selected as most conservative (e.g., ambient value, water quality criteria, maximum contaminant levels). Include each compound detected in soil and/or groundwater at TI.
e) Include the letter from the Regional Water Quality Control Board (RWQCB) stating that TI groundwater is not drinking water based on limited yields. DTSC does not support the groundwater potability determination as being the CERCLA remedy for contaminated groundwater. Instead, institutional controls should be the CERCLA remedy.
f) Discuss exposures assumed for TPH criteria (Appendix G).
g) With regard to ecological receptors, PRCs for TPH relate to tidal influence and tidal mixing zones (Appendix G). The concerns regarding proximity to ecological receptors apply for other contaminants as well. Revise figures to include tidal influence and tidal mixing zones.
h) With regard to preferential pathways for migration of TPH (and other compounds), Appendix G notes: "If groundwater discharges directly to storm drains, then groundwater concentrations should be compared directly to PRCs, without consideration of plume stability or tidal mixing effects." (Footnote 7) Discuss preferential pathways. Revise Figure 1-4 to distinguish reaches of utilities which lie below the high groundwater table.
i) Include a figure which shows proposed reuses. Revise text and figures to reflect recent decisions of the City (if any). If specific uses for each area have not been designated, please state this fact and indicate that, in absence of specific reuse designations, the most protective PRCs apply.
j) Reference to another document for information about PRCs (Table 4-2, Footnote a) is not sufficient since this RI Report should be a stand-alone document.

4) Risk assessment (RA) data set
   a) In the RA, the data set was assumed to be homogenous and data was used to develop risks for the site as a whole. The text says that "No localized areas of elevated concentration were identified and the distribution of chemical concentrations can be considered relatively homogenous." (Section 6.1.3.4) However, several areas of higher concentrations of contaminants are shown on figures: PCBs along the northern shoreline, TPH near the transformer pad, dioxins in the center of the site, and TPH and metals north of Building 445 along the shoreline. The RA assumption of homogeneity may result in underestimating of risk at hotspots. For example, the conclusion: "there is no potential for unacceptable health effects from lead" would not apply to a child exposed to the lead hotspot (994 mg/kg). Also, hotspots were not fully delineated (General Comment 2); therefore, the data set may under-represent the extent of contamination. And, because potential source areas and sampling locations have not been linked, some hotspots may have not been discovered.
   Risk distribution figures, showing risks associated with hotspots, were not presented. Risks were not determined with regard to typical residential and industrial plots. Moreover, data density was less than usual for residential reuse.
   Although risks fell within USEPA's "risk management" range (ELCR of 10^{-4} to 10^{-6}) for many compounds, evaluation on the basis of hotspots would result in some areas exceeding USEPA's risk management range. Areas with low data density would be shown as "unknown" risks.
   Recommendations: Provide analyses for the risks at hotspots. Discuss data set limitations.
   b) Two different approaches to ambient values are included in the report. For RI results, TI site-wide ambient values were used as screening criteria (Table 4-3 and Appendices E and F). For the RA, two-population statistical tests were used (as per USEPA and Navy guidance) to compare TI site-wide ambient data to Site 32 site-specific data (Appendix H). High concentrations that were "within ambient" based on results of statistical tests were not included in the RA Method 1. Some high concentrations were not individually evaluated in the RA (e.g., mercury at 4.4 mg/kg); and, based on the RA, no further investigations or evaluation are proposed for the feasibility study (FS). However, additional evaluation or investigation of high concentrations of metals is warranted (e.g., lead at 994 mg/kg and silver at 22.6 mg/kg at T115HP004 and mercury at 4.4 mg/kg at T115HP002), as well as inclusion in the FS.
   Recommendation: Include all metals that exceed TI ambient criteria in the FS.
   c) Recommendation: Because of high concentrations near the Bay margin, erosion of contaminated soil into the Bay should be considered in the screening level ecological risk assessment (SLERA).

5) Conclusions. The report recommends that: "A feasibility study should be performed to evaluate the mitigation of the risk from Aroclor-1260 to potential construction worker and residential receptors." Because of inappropriate COPC elimination, the RI Report does not recommend that the FS evaluate other COPCs, including dioxin, pesticides, metals (including lead), and TPH.
   Recommendations: The FS should consider all COPCs in soil and groundwater, since: 1) linkage between potential sources and the sampling program has not been provided; 2) the data set for soil is relatively small for the site acreage and hotspots may be under-represented; 3) the data set for groundwater is small and is not confirmed by monitoring well samples; and 4) data gaps exist. Also, the FS conclusions would not consider ecological considerations, since an ecological risk assessment was not included and ecological receptors were not considered in soil PRCs.

6) Land use restrictions. Due to the limits of investigation at Site 32, the RI Report should recommend that the FS evaluate several land use restrictions, including the following: 1) no soil disturbance below elevation of groundwater table (because no investigation below groundwater table); 2) no homegrown produce (because the pathway was not considered in RA); 3) installation of vapor barriers (or other engineered or institutional vapor control systems) for areas with incomplete characterization for VOCs; 4) no drinking water (groundwater not characterized and groundwater does not meet RWQCB's minimum yield requirements); and 5) no pumping of groundwater (because of salt water intrusion). Also, because the RI Report is inconclusive with respect to the appropriateness of Site 32 for terrestrial habitats and wetlands creation, blanket ecological restrictions may apply.

SPECIFIC COMMENTS

1) Site History, page ES-1. Include locations of PCB equipment/storage in the site description, including the transformer pad north of Building 463.
2) Section 1.3.1: Preliminary Assessment and Site Inspection. Clarify whether Site 32 was inspected and/or identified during the Preliminary Assessment and Site Inspection (PA/SI).
3) Section 1.3.4: Tidal Mixing Study. Discuss limitations of modeling regarding site utilities and soil heterogeneity (e.g., sand lenses).
4) Section 1.3.6: Dioxin Trenching Investigation. Discuss how trench locations were selected (e.g., random/biased towards incinerator locations)? Use a different symbol for trench samples on figures.
5) Section 2.8.3: Field Duplicates. Field duplicates are used to evaluate the precision (i.e., data variability) of overall sampling and analysis methods: collection of 5 to 10 percent is customary. Explain why field duplicates were collected for groundwater samples but not for soil samples.
6) Section 2.9: Deviations from the SAP. The text says that no deviations were recorded. However, some changes were noted in the report. For example, dioxin was not analyzed at T111HP010. Another boring was advanced so that a deeper sample could be collected at T111HP012. Please summarize all changes.
7) Section 3.2.1: Regional Geology. Include a stratigraphic column showing geologic units and descriptions. Include cross sections of TI and YBI which extend to bedrock.
8) Section 3.3.2: Gradients and Flow Direction. Include the fact that no wells exist on Site 32 and that horizontal gradients are estimated based on elevations from wells located on other sites. On Figure 3-3, include wells used for groundwater elevation monitoring. Discuss vertical gradients and seasonal variation.
9) Section 4.1.1.1: EBS Data Gaps Investigation. Include T115HP009 in the figures and tables of the RI Report.
10) Section 4.1.1.2: Dioxin Trenching. The text should note that "burnt material" was observed at T111HP010, "burnt odor" at T111HP011, and "charcoal" at T111HP031. Also, regarding the last sentence, the log for T009 says "grey + black spotting", which does not necessarily mean "visual observation of burnt material". In fact, although the absence of burnt materials was noted on trench logs, the presence of burnt materials was not recorded on any trench log.
11) Section 4.2: Soil Sample Results. Provide example calculations for benzo(a)pyrene equivalent concentrations (B(a)P EQs) and dioxin toxicity equivalent concentrations (TEQs). Explain how DLs are used in B(a)P EQ and TEQ calculations. Include B(a)P EQs and TEQs on Appendix B tables (and change titles accordingly). Provide a table for B(a)P EQs, similar to Table I-7 (for TEQs).
12) Section 4.2.3: SVOCs. Change the penultimate sentence to: "the B(a)P EQ criteria of 0.62 mg/kg was not exceeded...."
13) Section 4.2.5: Metals. Add a sentence listing other metals measured above ambient levels. Distinguish between TI ambient levels and ambient levels as per the RA process.
14) Section 5.2.4. Discuss preferential pathways.
15) Sections 6.0 and 7.0. Review of risk assessments is deferred to DTSC's toxicologists. This report is not complete because a SLERA is not included (as noted in the text).
16) Section 6.1.1. Results with reporting limits greater than detected concentrations were excluded from RA. As noted in General Comment 2d, TPH contamination is associated with elevated DLs, and subsequent potential underestimation of contamination and risk. Also, as noted in General Comment 2e, the soil sampling and analytical protocols used for VOCs may result in very-low biased results, with subsequent underestimation of contamination and risk.
17) Section 6.1.2: Identifying Chemicals of Potential Concern (COPCs). Nutrients and iron can be toxic if they exist above toxic levels, a condition that has been observed in the Bay Area with respect to iron (e.g., Hunters Point). However, it is not possible to determine whether this condition exists at Site 32 since nutrients and iron have not been analyzed for. That is, the elimination of nutrients and iron as COPCs (Figure 6-1) occurred <u>prior</u> to the investigation. To check the validity of the assumption, future investigations should analyze for nutrients and iron.
18) Section 6.1.3.4. The data set for subsurface soil extends from 0 fbgs to the top of the water table. Use of the water table is problematic since the water table is a variable surface, rising and falling with precipitation, tides, and artificial recharge (e.g., irrigation). Also, it is difficult to devise land use

restrictions by reference to a variable surface. Instead, a unique depth or ground elevation (e.g., the highest elevation of the groundwater table) is recommended.

19) Section 6.2.4. Method 2 is described as "Site-Related". Such phrasing is confusing and suggests that Method 1 is not site-related. Please revise.
20) Section 6.3.5 says that the sample collection strategy was "purposive" and "samples were collected in areas of suspected or known contamination" and that risk is therefore overestimated. However, as discussed in General Comment 1, the logic connecting potential source areas to sampling locations was not provided (with exception of the transformer pad).
21) Section 6.3.1.0 says that historic operations were not associated with hexavalent chromium, but the RI Report has not ruled out past usages of hexavalent chromium (e.g., paint shop). Describe operations in more detail.
22) Section 7.3 argues that compounds at Site 32 are not mobile in groundwater. For example: "Neither TPH as diesel not motor oil are soluble in water and are not considered mobile under groundwater conditions at NAVSTA TI." However, lighter end hydrocarbons are soluble and mobile in water; also, hydrocarbons may move in the subsurface as a separate phase.
23) Section 8.0: Applicable or Relevant and Appropriate Requirements (ARARs)
    a) No ARARs are identified Section 8.0. Please include the list of ARARs supplied by DTSC in 1994 (Section 8.1). Update the list to include changes post-1994.
    b) Section 8.1 says: "This report presents only potential location-specific ARARs" and concludes "no *additional* location-specific ARARs were identified." (Section 8.3) (Emphasis added) Please include all location-specific ARARs previously identified.

Figures

1) Include a figure that shows all VOCs measured in soil and groundwater.
2) Include a figure showing the planned reuses of the area.
3) Include topography of Site 32 and nearby areas on a figure.
4) Figure 3-1. Include an explanation for areas with blue oblique lines in the Legend.
5) Figure 4-13. To be consistent with preceding figures, include groundwater criteria for all metals which have exceeded criteria.
6) Include a figure showing exceedences of ambient groundwater concentrations. Distinguish between TI ambient and RA ambient criteria.
7) At T11HP011, the concentration of zinc is given as 95.5 mg/kg on the Figure 4-13 but as 955 mg/kg on Table 4-4. Please correct the figure.

Tables

1) Tables 4-3 and 4-4. Include statistics on DLs (e.g., number of DLs above ambient levels or screening criteria).
2) Table 4-3. Include thallium.
3) Table 4-4. Include all metals which are listed on Table 4-2 (e.g., aluminum, antimony, beryllium, cadmium).

Appendix A: Borehole Logs [and Trench Logs]

1) Revise title to include trench logs.
2) Include screened intervals for locations where grab groundwater (e.g., Hydropunch©) samples were collected. For groundwater grab samples, distinguish locations where the grab sample was pumped out from those where the temporary screen was left in the ground.
3) The logs indicate very poor recovery below the water table. Were alternative soil sampling methods (for fine sands) considered?
4) Recovery was not recorded for all intervals. Clarify whether recovery was omitted or not determined for all intervals. Also, use consistent notation for recovered intervals (e.g., compare T111HP003, T111HP040, and T115HP002).
5) Visual identification of burnt material was not a sufficient indicator of dioxin contamination during trenching (since no "burnt materials" were noted on logs). On boring logs, "charcoal" (T111HP031) and "burnt odor" (T111HP011) were good (but not sufficient) indicators, since dioxin was measured at locations where these indicators were not observed.

6) Descriptions of materials on some logs are separated by a horizontal line based on increased wetness of the material (e.g., T111HP015). Horizontal lines should be used to indicate changes in the type of material observed, not moisture content. Please revise.
7) Provide legible copies of all logs.
8) Provide global positioning system (GPS) coordinates for all ground penetrations and trenches.
9) Discrepancies were noted (e.g., depths) and all information was not provided on some logs.
   a) Two different values for depth were often presented on the same log. Sometimes, total depth did not include the depth of groundwater samples. Clarify discrepancies for: T111HP005 (depth given as both 5 feet and 7 feet), T111HP021, T111HP022, T111HP023, T111HP025, T111HP026, T111HP037, T111HP040, T115HP001, T115HP002, T115HP004, T115HP006 (depth at 8.0 feet did not include the push to 12.0 feet for groundwater sampling), T115HP007, and T115HP008.
   b) T111HP010. Remarks says: "Not analyzed, submit dioxins from HP011 instead". However HP011 is 75 feet distant from HP010. Explain why the "burnt material in soil" at 1 fbgs in HP0101 was not analyzed for dioxins. Explain why HP010 and HP011 were not both analyzed for dioxins.
   c) T111HP012A. Boring 12B was installed adjacent to 12A. Include both borings on figures.
   d) Sampling Method, Sample Number, and/or Sample Type were not provided for: T11HP001 to 019, T111HP020, T111HP025, T111HP026 (for biased sample collected at 7 fbgs because of "heavy diesel fuel smell" with "sheen" and PID reading of 103 ppm), T111HP036 (explain the "?" descriptor), T111HP039. T111HP040, T115HP001, T115HP002, T115HP005, T111HP006, T1115HP007, and T115HP008.
10) Include a log for 07/10-HP020 (from Figure 2-1).
11) Provide dimensions (depths, lengths, widths) and orientations for trench logs (T001 to T012).
12) Photoionization detector (PID) readings were not taken at all ground penetrations, as required for health and safety.

Appendix B: Analytical Results
1) Distinguish concentrations, equivalent concentrations, and DLs that exceed criteria.
2) Include B(a)P EQs and TEQs on tables.

Appendix D: Quality Control Summary Report
1) Explain why the QAPP reporting goals for dioxins and furans are significantly elevated (2,500 ng/kg).

Appendix E: Background and Ambient Metal Concentrations in Soils (TM: June 19, 1996)
1) Please include documentation of approval of the TM by DTSC and other regulatory agencies.
2) Maximum values on Table 2 do not agree with maximum values on boxplots in Attachment H1.
3) Tables 1 and 2 have been amended by handwritten notes; however, the notes are illegible. Please provide legible copies and explain changes made to the original tables.
4) Provide a clean copy of Figure 1.

Appendix F: Estimation of Ambient Concentrations of Metals in Groundwater (TM: March 30, 2001)
1) Please include documentation of approval of the TM by DTSC and other regulatory agencies.
2) Data from YBI (a natural island) has been combined with data from TI (a manmade island) for ambient calculations. From a geological perspective, it is not appropriate to combine these two data sets, since the geology is different on both islands. From a statistical perspective, two-population tests should be performed to determine if data can be treated as a single population.
3) Groundwater sampling forms are not provided; therefore, it could not be determined if the requirements for low flow sampling have been met.
4) The presence of some high concentrations (i.e., outliers) suggests that some wells are in contaminated areas (e.g., zinc at 2,900J ug/L at 25MW01).
5) It is not clear which data were included in the ambient calculations. For several metals, Table 3 indicates that no outliers were eliminated. However, high concentrations in Appendix B were not included in the count of outliers on Table 3 (e.g., arsenic at 46.4 ug/L (20MW05), lead at 71.4 ug/L (14MW04), mercury 0.57 ug/L (20MW05)). Please clarify which Appendix B results were used for

ambient calculations. Clarify whether bailed results shown on Figures 4 thru 8 were used. Include outliers on Figures 4 thru 35. Distinguish outliers by different symbols.

6) The text says that the fresh water lens (at the top of the water table) shrinks due to evapotranspiration. Does evapotranspiration dominate over preferential flow or over groundwater-to-surface water flow? Extensive surface cover suggests reduced evapotranspiration.
7) There was some uniformity among wells. Wells were screened at similar intervals (usually from 3.5 to 13.5 fbgs). Dedicated pumps were used and samples were drawn from the same depth at each event. However, pump locations varied between wells (from 7 to 11 fbgs). Pumps near the water table may preferentially sample the fresh water lens at the top of the water table. Pumps near the bottoms of wells may sample more saline water (where the saltwater interface is about 13 fbgs).
8) Appendix B shows only detected compounds–for example, results for lead and mercury are generally not shown for low flow samples. Please report the results for all metals analyzed. Also, include the DLs for all non-detects.
9) Figures 1 to 13: Symbols cannot be distinguished and numbers are unclear. Provide legible copies.

Appendix G: TPH Screening Criteria Table. Include Table 2 referred to in Footnote 6.

Appendix H: Calculating EPCs [of Metals] and Conducting Ambient Screening of Soil and Groundwater

1) Review of Appendix H is deferred to DTSC toxicologists.
2) Discrepancies were noted between maximum site-wide values on Appendix H boxplots and Appendix E Table 2. Moreover, with respect to ambient data sets, different approaches were used for different metals. For example, outliers were removed from site-wide data sets for most metals (Appendix E Table 2), but were apparently included for barium (boxplot page 1). Please provide explanations or resolve discrepancies and revise statistics as needed. (Values given in mg/kg.)
   a) Barium: boxplot (1090)/Table 2 (393). Table 2 notes that no values were excluded for barium. However, higher value(s) were used on boxplots when compared to Table 2 – which implies a larger data set. But, n values are identical on Table 2 and Table H-4. If no values were excluded, where did 1090 come from?
   b) Lead: boxplot (51.4)/Table 2 (337). The highest value used in the boxplot is 51.4, compared to 337 on Table 2. That is, on the boxplot, higher values were eliminated and the data set was smaller. The n for Table 2 is 261: the n for the boxplot is 227 (Table H-4). Explain why the highest values were removed (and a smaller data set used) for boxplot calculations.
   c) Mercury: The Site 32 maximum (4.4: boxplot) is greater than the maximum value used to calculate the TI site-wide ambient value (2.4). However, 4.4 is not the maximum detected on site because one value was excluded from the ambient calculation (Table 2). To view the range of values easily, please include outliers from site-wide data sets on boxplots (for mercury and other metals), and distinguish excluded values by a different color or symbol.
   d) Selenium: Boxplot (1.4)/Table 2 (1.2). Table 2 notes that no values were excluded for selenium. A higher value was used on boxplots when compared to Table 2. Is 1.4 a transcription error?
   e) Silver: Two different data sets were used for "background" on boxplots. Please explain.
   f) Thallium: Provide boxplots for thallium and include thallium on Table H-4.
   g) For comparison, include the TI site-wide ambient values on boxplots.
3) Two approaches to ambient determination (TI side-wide vs. RA two-population) resulted in significant differences of categorization. For example: Mercury at 4.4 was significantly above TI site-wide ambient of 0.51 mg/kg, but was excluded because "below or within ambient" for the RA (Table I2.7). Silver at 22.6 mg/kg was above the TI site-wide ambient of 0.45 mg/kg but was "below or within ambient" for the RA (Table I2.7). An analysis of vertical profiles of these metals (and other compounds) indicates that high concentrations are site-related. In addition, TI site-wide ambient determinations were developed in the early 1990s. Appendix H references are generally very recent. Discuss the consequences of comparing data sets (TI site-wide ambient vs. Site 32 site-specific) that were developed using different approaches.
4) Revise boxplots to say "ambient" not "background" since TI site-wide ambient values were used (not YBI background values).
5) Section H.3.0 says: "Results of statistical comparison of soil samples from Site 32 with the ambient data set are provided in Tables H-4 and H-5 *and discussed in Appendix E*." (Emphasis added)

Appendix E does not include a discussion on Site 32. In fact, Appendix E was written prior to collection of soil samples at Site 32. Please revise the text.

6) Change title of Appendix H to include "of Metals".
7) When figures and tables refer to "EPA recommendations", include citations.

Appendix I: Supplemental Information to Human Health Risk Assessment

1) Review of Appendix I and Attachments is deferred to DTSC toxicologists.
2) Table I-2.6: EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Method 2, Site-Wide Combined Surface and Subsurface Soil. With respect to locations of maximum concentrations of B(a)P, Aroclor-1260, 4.4"-DDD, 4,4'-DDT, arsenic and lead, Table I-2.6 is inconsistent with Figures 4-3 to 4-10. Please correct the inconsistencies. Discrepancies regarding maximum DLs were noted previously (General Comment 2e). Please check tables for accuracy.

Attachment I2: Indoor Air Vapor Intrusion Modeling

1) Describe the data set by showing locations and concentrations on a site map.
2) Indoor air vapor concentrations were modeled from soil and from groundwater concentrations. DTSC recommends soil gas samples for modeling air vapor intrusion. For sites where depth to groundwater is less than five feet (as at Site 32), an attempt should be made to collect soil gas samples under existing hardscape (e.g., paving) to evaluate the potential for vapor accumulation.
3) With respect to the finite soil source assumption, DTSC's guidance says: "Without sufficient [soil and soil gas] data, DTSC will not entertain the use of the finite source model to evaluate exposure due to vapor intrusion." (Page 22: DTSC, 2005) Since soil gas data has not been collected at Site 32, use of the finite soil source assumption is precluded. Revise this attachment and Section 6.1.3.4.
4) A crack-to-total area ratio of 0.005 should be used for all scenarios. Please include total residential area and confirm that the crack factor is 0.005 for all scenarios.
5) The well sampling sheets (March to October 2000) show a temperature range of 15 to 24 °C, with a central tendency closer to 18 or 19 °C. Use of maximum temperatures would be more conservative. Provide support for 16.7 °C or revise as needed.
6) Section I2.4: Uncertainty Analysis. As previously noted (General Comment 2e), samples are considered low-biased because of collection and analytical methods used. DTSC guidance says: "Under no conditions should the risk associated with vapor intrusion be conducted with soil matrix samples collected by non-Method 5035A procedures." (Page 15: DTSC, 2005)
7) Section 12.5. "DTSC, 2005" is "Interim Final", not "Final". Please correct.

Attachment I5: Cancer Risks and Noncancer Hazard Estimates, Total Risk

1) Include tables showing selection of COPCs (similar to Appendix I Tables 1-2.5 and 6) so that data eliminated (if any) can be distinguished from data included. Include exposure point concentration tables, as well.

Typos/Errors

1) Page 1-5. On page 1-5, "403 acres" is cited; but on page 1-6, "402 acres" is cited.
2) Table 1-1, Footnote h. Delete "8 to 6".
3) Section 4.1.1.2. Change "ST-009" to "S32-T009".
4) Figure 4-3, T111HP024. Switch locations of 4.7' and 3'.
5) Figure 4-4, T111HP009. Switch locations of 4' and 3'.
6) Table 4-2. The "c" superscript on chromium does not relate to Footnote c.

EH:ckl:TIIR32RIReport.021407

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FROM: Brian K. Davis, Ph.D.
Human and Ecological Risk Division

DATE: February 9, 2007

SUBJECT: Remedial Investigation, Site 32, Former South Storage Yard
PCA: 18040 Site: 201210

BACKGROUND

Document Reviewed: Draft Remedial Investigation Report for Installation Restoration Site 32, Former Training and Storage Area. Naval Station Treasure Island; San Francisco, California. Prepared for the Base Realignment and Closure, Program Management Office West, U.S. Navy. Prepared by SulTech (Sullivan Consulting Group and Tetra Tech EM Inc.), San Diego, California. Dated October, 2006.

Nature of the Facility and Site 32 (based on this and other Navy documents): Naval Station Treasure Island is a closed base located in San Francisco Bay. The facility includes Yerba Buena Island, a natural island of about 147 acres, and Treasure Island, constructed of materials dredged from San Francisco Bay, and encompassing about 403 acres. The U.S. Coast Guard owns 30 acres on Yerba Buena Island. Military activities at Naval Station Treasure Island date from 1866. Naval Station Treasure Island was designated for closure in 1993 and closed on September 30, 1997.

Site 32 is about 2.6 acres, located on the northeastern shore of TI. Site 32 comprises portions of Parcel T115 and of the much larger Parcel T111. Parcel T111 was used for parking vehicles and forklifts, miscellaneous outdoor storage, and hazardous materials/waste storage. Parcel T111 was also used as a tear gas training area and as a storage area for training structures, including two steel training mock-ups and a vessel called the USS Pandemonium.

Buildings (and their uses) at Site 32 included: 42 (pyrotechnics and small arms storage), 56 and 57 (shop and storage), 58 (incinerator and refuse, paint shop), 59

(office work improvement program), 60 (shop and storage), 327 (salvage), 336 (linoleum shop), 337 (mason's locker), 371 (training mock-up), 403 and 404 (incinerators), 445 (forklift maintenance, boat motor storage, general shop activities and offices), 462 (offices and classrooms for instruction in decontamination procedures), and 463 (tear gas training). Buildings 445, 462, and 463 are the only buildings still standing at Site 32. Except for storage/retrieval of landscaping equipment in areas near Building 445, Site 32 is currently unused and unoccupied.

Proposed future land use of Site 32 is "*Residential/Open Space/Publicly Oriented Uses/Shoreline Open Space*". This broad description includes uses ranging from recreational to commercial to hotels to residential.

Scope of Review: The document was reviewed for scientific content related to risk assessment issues. We assume that regional personnel have evaluated the sampling of environmental media, analytical chemistry data, and quality assurance procedures.

GENERAL COMMENTS

1. SITE 32 BOUNDARIES. Please provide an explanation of the Site 32 boundaries. Site 32 is said (Executive Summary; Section 1.2.2) to consist of portions of Parcel T111 and Parcel T115. The map of Site 32 in Figure 1-4 confirms that some parts of both parcels are excluded from Site 32 and conversely Site 32 includes areas outside of either parcel.

2. SITE CHARACTERIZATION.

   A. The Department of Toxic Substances Control (DTSC) Office of Military Facilities (OMF) has done a thorough review of this Remedial Investigation Report for Site 32 (DTSC 2007). This review identifies important issues regarding site characterization. We concur with the OMF concerns, which must be resolved before the risk assessments can be acceptable.

   B. The absence of any discussion of Site 32 Data Quality Objectives (DQOs) in this report suggests that they were not developed for the Site 32 investigations. If DQOs are available, it is important to bring them into consideration.

   C. Of particular concern is the problem with high detection limits for polycyclic aromatic hydrocarbons (PAHs). For example, the detection limit for semivolatile organic compounds (SVOCs), including benzo(a)pyrene, was 39 mg/kg in soil Sample T111HP012 (Appendix B). The U.S. EPA Region 9 residential Preliminary Remediation Goal (PRG) for benzo(a)pyrene is 0.062 mg/kg.

The elevated detection limits may have resulted in a focus on less contaminated areas while overlooking more contaminated areas (Figures 4-3 and 4-4). This needs to be addressed.

D. The absence of analysis for hexavalent chromium is also of particular concern. Hexavalent chromium is a known human carcinogen. There is at least one potential source of hexavalent chromium (paint shop) and a high concentration of total chromium was found in ground water. Hexavalent chromium needs to be an analyte in soil at Site 32.

E. The absence of analysis for manganese is also of concern. Manganese needs to be an analyte in both soil and ground water.

F. The report (Section 4.2.1) states that no volatile organic compounds (VOCs) were detected in soil. This requires further discussion to address whether sample preservation methods were adequate and whether detection limits were sufficiently protective compared to screening criteria.

G. The existence of the *U.S.S. Pandemonium* is mentioned in five locations in this report, with no description of its function. Please add a discussion of its use in training personnel in handling radioactive contamination. Please add a discussion of sampling and analysis for radioisotopes for Site 32.

H. Other comments in DTSC (2007) should also be addressed.

3. GROUND WATER DATA.

A. Ground water sampling at Site 32 was limited to 12 grab samples. Of these 12 samples, only six were analyzed for organic chemicals (Section 6.1.1.2).

B. The text (Sections 6.1.1.2 and 6.1.2) notes the limitations in the data from these samples. The adequacy of the data has been questioned in DTSC (2007).

C. The report (Section 6.1.1.2; Appendix I, Section I.3.2) states that "*Groundwater sampling was conducted at IR Site 32 to define possible effects to groundwater from various chemicals detected in soil and to evaluate if further investigation is warranted at IR Site 32.*"

D. The adequacy of the ground water data could be best determined by consulting the DQOs. If DQOs have been developed, they should be brought into this report to evaluate the ground water data.

E. The text in Appendix I, Section I.3.2 provides the important information that "*Based on the results of the Hydropunch samples and soil data, it was agreed upon by the BCT that no monitoring wells at IR Site 32 were necessary.*"

i. Please provide a reference to the minutes of the BCT meeting at which this agreement was reached.

ii. Please elaborate on what was decided by the BCT and provide a summary of the rationale. What was the basis for determining that monitoring wells were not necessary? Did the BCT conclude that purpose of the ground water sampling as stated in the report (Section 6.1.1.2; Appendix I, Section I.3.2) had been achieved? Did the BCT conclude that additional characterization, such as additional grab samples, was not necessary?

iii. Please provide this information in Section 6.1.1.2 as well as in Appendix I.

4. AMBIENT CONCENTRATIONS OF INORGANIC CHEMICALS IN SOIL.

A. Appendix E is a Technical Memorandum (PRC Environmental, 1996) evaluating background and ambient concentrations of inorganic chemicals in soil. Please provide any evidence of review and approval by the regulatory agencies.

B. The text (Section 1.3.3) distinguishes between "*ambient*" conditions, which are altered by humans in creating Treasure Island from dredged fill, and "*background*" conditions, which are naturally occurring. We concur with the definitions and that "*ambient*" conditions apply at Treasure Island and "*background*" conditions apply at Yerba Buena Island.

C. The text (Section 1.3.3.1) states that for soil "*A one-sided tolerance limit was used to determine reasonable upper levels of ambient concentrations of metals at a site.*" The text (Section 1.3.3.2) states that for ground water ambient concentrations were the 95th percentiles. It appears that the text in Section 1.3.3.1 is incorrect and that the 95th percentiles were used for both soil and ground water. The original soil report in Appendix E and also Tables 1-2 and 1-3 all indicate 95th percentiles, not tolerance limits.

D. For lead in soil, sample numbers, outliers, the maximum concentration, and the 95th percentile all differ between Table 1-1 in the body of the report and Table 2 of Appendix E. The 95th percentile in Table 1-1 is 21 mg/kg, compared to 100 mg/kg in Appendix E.

E. Footnote "*i*" to Table 1-1 states that "*The ambient level for lead was estimated excluding the Installation Restoration Site 12 soil samples which were considered to be affected by contamination.*" Presumably, this accounts for the differences between Table 1-1 and Table 2 in Appendix E.

   i. Please document the decision to revisit the data for lead and state where the details of the re-evaluation can be found.

   ii. Does the decision to re-evaluate lead apply to all sites at Treasure Island or specifically for this report on Site 32?

   iii. Please clarify whether all Site 12 soil data for lead or only a subset were excluded.

   iv. Please explain why Site 12 soil samples were excluded only for lead, and not other inorganic chemicals.

5. AMBIENT CONCENTRATIONS OF INORGANIC CHEMICALS IN GROUND WATER.

   A. Appendix F is a Technical Memorandum (Tetra Tech EM Inc., 2001) evaluating ambient concentrations of inorganic chemicals in ground water. We note that Appendix C to the Technical Memorandum has comments from the regulatory agencies and responses from the Navy. Please provide evidence of approval of the final Technical Memorandum by the regulatory agencies.

   B. Given the important distinction between ambient conditions and background conditions (General Comment 4 B), it is surprising that monitoring wells on Yerba Buena Island were included in this evaluation of ambient concentrations (Figure 1 of Appendix F). Please provide justification.

   C. For a number of inorganic chemicals there were too few detections in ground water to support the evaluation of ambient conditions. Although ambient levels are reported in Table 1-2 (and Table 3 in Appendix F), the values are determined primarily by detection limits and therefore not relevant.

      i. Ambient levels for antimony, beryllium, cadmium, chromium, mercury and selenium are identified as based on detection limits rather than detected concentrations (footnote "*e*" to Table 1-2). The number of detections ranged from zero to only five for these six inorganic chemicals.

ii. Footnote "e" to Table 1-2 states that "*The ambient level was set at or below the minimum reported detection limit.*" The merit of this method is completely unclear.

iii. The probability plots illustrate the inadequacy of the data and the analysis. For example, the plot for cadmium shows the three detected values, ranging from about 0.7 ug/L to 1.4 ug/L, along with 109 nondetections all set at a dummy value of about 0.3 ug/L. The "*95th percentile*" has been assigned a value of 0.27 ug/L. This "*ambient level*" is not useful in evaluating site data. A population comparison between the ambient data and site data is also not useful.

iv. The number of detections in ground water was also small for aluminum (4), cobalt (7), lead (3), silver (6), and thallium (4). The use of ambient levels or population comparisons is very problematic for these chemicals as well.

v. In summary, for many of the inorganic chemicals the ambient data from ground water are inadequate and should not be used in the selection of chemicals of potential concern or otherwise in the risk assessment.

6. HOT SPOT EVALUATION.

A. The text (Section 6.1.1) states that "*Sampling data were assessed spatially, both laterally and vertically, to identify possible data gaps or localized areas of concern (such as 'hot spots').*" Please provide an explanation of how this was done and what conclusions were drawn.

B. The text (Section 6.1.3.4) states that "*The potential for localized areas of elevated concentrations were evaluated horizontally and vertically, and based on historical activities. No localized contamination areas were identified and the distribution of chemical concentrations can be considered relatively homogenous.*"

i. Please provide an explanation of how this evaluation was conducted.

ii. Clearly, the historical activities and the potential sources of contamination are quite disparate for different areas.

iii. The absence of any discussion of hot spots in Appendix I calls into question how thorough this evaluation was.

C. Candidates for hot spots include the findings in soil of 994 mg/kg of lead, 4.4 mg/kg of mercury, and 22.6 mg/kg of silver. Other candidates for hot spots of polychlorinated biphenyls (PCBs) and dioxins were identified in DTSC (2007). See also General Comment 11 F.

D. We recommend that a review of the sample data be done by the Treasure Island team to identify and examine putative hot spots. This should be done after site characterization issues (General Comment 2) have been resolved. However, the team might conclude that hot spots need further delineation.

7. SURFACE SOIL. The report considers surface soil to be zero to two feet below ground surface and subsurface soil to be zero feet to ground water (Section 6.1.1.1; Appendix I, Section I.3.1). We have previously pointed out (DTSC, 2005a, 2005b) that zero to two feet goes beyond what is reasonably surface. Since samples were selected "*...on the basis of the top depth of the reported sample collection interval*" (Appendix I, Section I.3.1), soil from greater than two feet below ground surface has been included as surface soil.

   We accepted that questionable definition of surface soil for risk assessments for Sites 30 and 31 because the issue had not been discussed prior to the development of the data tables, selection of chemicals of potential concern, and determination of exposure point concentrations. However, the present report is dated October, 2006 and should have applied a defensible definition of surface soil. Please revise the risk assessment defining surface soil as zero to six inches or at most zero to one foot.

8. SCREENING VALUES.

   A. DTSC (1994) accepts the use of U.S. EPA Region 9 PRGs only for screening sites. DTSC doesn't accept the elimination of potential concern (COPCs) by comparison to PRGs. As discussed below (General Comment 9), the Navy has insisted that an alternate risk assessment be provided in which PRGs were used to screen chemicals of potential concern (COPCs).

   B. In a recent report, the Navy introduced additional screening values. Since these screening values were only used to identify a subset of COPCs for the discussion of fate and transport, and since this had limited impact on the risk assessment, we did not object to these values.

   C. Unfortunately, the present report has greatly broadened the application of these screening values. The screening values have been used to select COPCs for

presentation of results and conclusions about contamination (Section 4.4). This has resulted in misleading representations of the findings.

D. An example of this is the treatment of polycyclic aromatic hydrocarbons (PAHs) in soil.

   i. Six carcinogenic PAHs are evaluated based on cancer potency relative to Benzo[a]pyrene (B[a]P). This is inappropriate for one of the six PAHs (dibenz(a,h)anthracene), which has its own cancer potency value (4.1 [mg/(kg x day)]$^{-1}$ for both ingestion and inhalation).

   ii. This report presents the B[a]P results in Figure 4-3 with concentrations compared to the residential PRG and the sum of B[a]P equivalents from the other six PAHs in Figure 4-4 with concentrations compared to ten times the residential PRG. This is illogical and confusing.

   iii. Further, the total cancer risk from all seven compounds (B[a]P itself plus the other six PAHs) is ignored in Section 4.

   iv. These flaws are compounded by problems in presentation (Specific Comments 7 and 8).

E. Please remove all screening values, with the exception of U.S. EPA Region 9 PRGs, from the human health risk assessment.

9. RISK ASSESSMENT METHODS.

A. The document uses two different human health risk assessment approaches. Method 1 (Section 6.1.2; Appendix I, Section 4.0) eliminates COPCs based on: (a) comparison to ambient concentrations of inorganic chemicals, (b) comparison to screening concentrations (PRGs), and (c) infrequent detection. Method 1 also uses only U.S. EPA toxicity criteria (Section 6.1.4; Appendix I, Section 6.0). Method 2 eliminates chemicals of potential concern (COPCs) based on solely on comparison to ambient concentrations of inorganic chemicals. Method 2 uses Cal/EPA and U.S. EPA toxicity criteria.

B. We have stated previously that DTSC accepts the elimination of infrequently detected chemicals as COPCs, provided that other factors (toxicity, potential for bioaccumulation, records of historical use, magnitude of the concentrations, persistence in the environment, spatial distribution, and known sources of contamination) are considered. Nonetheless, the Navy has again chosen to apply this criterion only for Method 1, but not for Method 2. However, the report

states (Section 6.3.2) that no chemicals were eliminated as COPCs for Method 1 on the basis of infrequent detection.

C. In past Remedial Investigation Reports for Treasure Island, essentiality as a nutrient was applied as an additional criterion. It appears that nutrients, including iron, were eliminated in the site characterization phase for Site 32 (DTSC, 2007). That is to say that they were not analytes.

D. An additional evaluation was done to assess the total risks and hazards for all detected chemicals (Section 6.1; Appendix I, Section 3.2). Risk and hazard indices were evaluated for inorganic chemicals which were identified as consistent with ambient concentrations. These results were summed with the Method 2 results to provide estimates of total risks and hazards.

   The estimates of total risks and hazards have been relegated to obscurity in Attachment I5 of Appendix I. Please report these results along with the results from Method 1 and Method 2 in the Executive Summary, in Section 6.2, and in Section I.7.0 of Appendix I.

E. The application of Method 1, Method 2, and total risk and hazard have been discussed at length in meetings and through document reviews. We have accepted these approaches. However, we have pointed out that screening chemicals with generic risk-based numbers can result in apparent inconsistencies between the different methods. We have also stated that neither Navy risk assessment guidance nor U.S. EPA guidance requires that the selection of COPCs include screening criteria comparisons. This report incorrectly references U.S. EPA (1989) as supporting the use of screening criteria comparisons. Please remove this reference.

10. RISK ASSESSMENT PRESENTATION.

A. The human health risk assessment is presented in Section 6.0 and in the Appendix I text. Section 6.0 is titled "*Baseline Human Health Risk Assessment for Installation Restoration Site 32*". Appendix I is titled "*Supplemental Information to Human Health Risk Assessment*". This suggests that the intention was to provide an overview of the risk assessment in Section 6.0 and the details of the risk assessment in Appendix I.

B. In fact, much of the text is redundant in the two sections. In some instances, the information in the Section 6.0 text is more detailed (e.g., Section 6.1.3) and in some instances the information in Appendix I text is more detailed (e.g., Section I.3.2 in Appendix I).

i. The description of exposure assessment in Section 6.1.3 is two full pages. In contrast, the one brief paragraph in Appendix I (Section I.5.0) about exposure assessment provides no "*Supplemental Information*".

ii. The discussion of toxicity assessment in Section 6.1.4 lists the hierarchy of toxicity criteria for Method 1 and the hierarchy for Method 2, but has limited information about route-to-route extrapolation and nothing about surrogates. In contrast, Section I.6.0 in Appendix I has detailed descriptions of route-to-route extrapolation and surrogates, but no information about hierarchies.

iii. The discussion of toxicity assessment in Section 6.1.4 explains why oral toxicity criteria were not adjusted for absorbed dose when applied to dermal exposure. Section I.6.0 in Appendix I has no information on toxicity criteria for dermal exposure.

iv. Section 6.1.5 has detailed information about the risk results, while Appendix I has a brief summary.

v. Section 6.3 has considerably discussion of uncertainty, while Appendix I has no discussion of uncertainty.

C. Thus, the reader is compelled to make his own synthesis of the two sections in order to get a complete understanding of what was done. Either the two sections should be combined into one complete description of the risk assessment, or else the text in both sections should be revised to match the intended purposes.

11. SELECTION OF CHEMICALS OF POTENTIAL CONCERN - COMPARISON TO AMBIENT.

A. The comparison of site data to ambient data is difficult to follow in this report because it is scattered. A discussion of the studies of ambient concentrations of inorganic chemicals in soil and in ground water is found in Section 1.3.3. The actual studies of ambient concentrations are found in Appendices E and F. The description of the human health risk assessment (Section 6.0) includes a brief statement without details, about comparing site data to ambient data. The elaboration of the human health risk assessment (Appendix I) provides even less information than Section 6.0. A description of statistical methods is found in Appendix H.

B. Although ambient concentrations of inorganic chemicals in both soil and ground water are discussed in Section 1.3.3 and the two studies of ambient

concentrations are found in Appendices E and F, the risk assessment report (Section 6.1.2) states that the ambient data for Site 32 ground water data were not used in the selection of COPCs. The description of statistical methods (Appendix H) refers to soil, with no reference to ground water.

C. We concur with the decision not to compare ground water site data to the ambient data, though for different reasons than those given in Section 6.1.2. We believe that the utility of the ambient data for ground water is quite limited and the data probably are not useful for any sites (General Comment 5).

D. The results of the comparison of Site 32 soil data to ambient soil data are difficult to follow.

   i. The text in Section H.3.0 of Appendix H states that "*Results of the statistical comparison of soil samples from Site 32 with the ambient data set are provided in Tables H-4 and H-5 and discussed in Appendix E.*" This is incorrect. There is no discussion of Site 32 in Appendix E, and no discussion of Site 32 in Appendix H.

   ii. The box plots in Attachment H1 to Appendix H are informative, but more information is needed. The data are labeled as ambient or site and the tables are identified as Site 32. They should be identified as soil data. It should be stated whether nondetections are included. It should be stated whether outliers are included.

   iii. The reader is left to provide an interpretation based on the tables in Appendix H and throughout the report.

E. The following comments are primarily based on Tables H-4 and H-5 and the box plots in Attachment H1 to Appendix H.

   i. For many inorganic chemicals the Site 32 data are strikingly different from the ambient data. For example, the maximum concentration of antimony is 0.8 mg/kg for the site data and 18.2 mg/kg for the ambient data. This difference is not limited to the maximum concentrations. Similar discrepancies are seen for the 90th percentile, 75th percentile, median, etc.

   ii. Similarly, maximum concentrations for ambient data are far higher than maximum concentrations for Site 32 data for barium, cadmium, chromium, copper, molybdenum, nickel and silver (0 to 2 feet). This calls into question the relevance of the ambient data to Site 32.

F. Nonparametric statistical comparisons of populations must consider outliers. A statistical test can indicate that two data sets are consistent with a single population because the magnitude of individual outliers is not considered. This is illustrated by mercury. A site sample had 4.4 mg/kg of mercury, about twice the maximum ambient concentration and about 10 times the next highest Site 32 concentration. Yet, the statistical analysis determined that mercury is not a COPC. Nor would mercury have been identified as a COPC if the concentration of that sample had been 440 mg/kg or even 44,000 mg/kg. A similar situation pertains for silver and perhaps for cobalt, selenium and zinc. This illustrates the need for hot spot evaluation (General Comment 6).

12. AREAS OF SITE 32. The risk assessment has determined exposure point concentrations based on Site 32 as a single area (Section 6.1.2.1). Once the important issue of hot spot analysis has been addressed (General Comment 6), then subdivisions of Site 32 must be considered. Site 32 is comprised of two parcels. More importantly, Site 32 had multiple uses and multiple sources of contaminants. The distributions of contaminants suggest that it may be appropriate to subdivide Site 32 into smaller exposure areas.

13. EXPOSURE POINT CONCENTRATIONS.

A. Field duplicate samples were treated differently in soil and ground water (Section H.2.0 of Appendix H). For ground water, the "*original measurement*" was included in the data and the "*duplicate measurement*" was excluded. For soil, both samples were included.

B. Inclusion of duplicate samples clearly introduces a bias, the importance of which depends on the frequency of duplicate samples and the magnitude of the differences between the duplicates. The report (Section H.2.0 of Appendix H) provides no rationale for including both duplicates. We recommend including only one of the two duplicate samples for soil and for ground water.

C. Please explain the sense in which one of the two samples is the "*original measurement*" and other is the "*duplicate measurement*". We recommend selecting the higher of the two measurements for soil and for ground water.

14. VAPOR INTRUSION INTO INDOOR AIR.

A. Of the contaminants detected in bulk soil, four PAHs were identified as volatile and therefore of potential concern for inhalation (Section 6.1.2.1). One of those (chrysene) is carcinogenic and the other three (anthracene, phenanthrene and pyrene) are not carcinogenic. Of the contaminants detected in ground water, 4-

methyl-2-pentanone and three PAHs (acenaphthene, fluorene and 2-methylnaphthalene) were identified as volatile and therefore of potential concern for inhalation (Section 6.1.2.2). Carcinogenicity has not been established for any of the four volatile contaminants in ground water. No soil vapor data are available for Site 32.

B. Because of the characteristics of these eight contaminants and the fact that only one of them (chrysene) is carcinogenic, the potential for harm from vapor intrusion into indoor air is likely to be small. This must be taken in the context of demonstrating that the investigation of VOCs in soil was adequate (General Comment 2 F). We did not perform an extensive review of the modeling (Attachment I2 to Appendix I). However, we do have the following comments.

C. The report (Section 6.1.3.4; Appendix I, Section I2.1.1 of Attachment I2) references DTSC's 2003 Vapor Intrusion Model, which is adapted from U.S. EPA's model. Please confirm that the most recent model on the DTSC website was applied.

D. Modeling vapor intrusion into indoor air from bulk soil data was done assuming a finite source (Section 6.1.3.4; Appendix I, Section I2.2 of Attachment I2). The issue of finite versus infinite source has been discussed at length for the Treasure Island sites.

   i. Both U.S. EPA and DTSC have concluded that bulk soil sampling and analysis is unreliable for modeling vapor intrusion into indoor air. There is a high degree of uncertainty associated with the results presented in this report.

   ii. Since there are no soil gas data, the soil cannot be considered fully characterized, as is required for assuming a finite source.

   iii. The uncertainty is further compounded by the absence of actual data from under the existing buildings. U.S. EPA and DTSC have recommended that subslab sampling as an approach for Treasure Island sites.

E. The report (Appendix I, Section I2.2 of Attachment I2) states that "*For indoor air concentrations from groundwater, the infinite source solution was applied.*" A similar statement appears in Section 6.1.3.4. It is misleading to imply that assuming an infinite source was a choice. There is no finite source alternative for ground water.

F. Based on the limited findings of volatile contaminants in soil and in ground water, and on the complications in collecting soil gas samples, we do not recommend a

full investigation into soil gas. It might be prudent to collect some samples from selected areas, or to collect subslab soil gas samples.

G. We do recommend that the bulk soil modeling be revised to assume an infinite source.

H. The Uncertainty Analysis for vapor intrusion (Appendix I, Section I2.4 of Attachment I2) should be revised to provide a balanced discussion of uncertainty.

   i. The introductory paragraph states that "*All of the uncertainties discussed below result in an overestimation of indoor air concentrations, so the vapor intrusion model should be conservative in estimating risks to human health.*" This is true because uncertainties that lead to underestimation are not discussed. They should be.

   ii. The primary uncertainty that may have led to underestimation of indoor air concentrations is the sampling and analysis of bulk soil. The difficulties in sample preservation for volatile compounds are well established in the literature.

15. VOLATILE CONTAMINANTS IN THE TRENCH SCENARIO. Possible exposure to volatile contaminants during trenching activities was evaluated using a model from the Virginia Department of Environmental Quality (Sections 6.1.3.3 and 6.1.3.4; Appendix I, Section I.5.1). We concur with the use of this model. However, the source should be assumed infinite for the reasons given in General Comment 14.

16. RECREATIONAL EXPOSURE ASSUMPTIONS. The recreational scenario was evaluated (Section 6.2; Appendix I, Section I.5.2.3) by comparison to residential exposure factors. This evaluation is superficial.

   A. The evaluation considers only a time factor and a spatial factor. The evaluation assumes that a recreator will visit Treasure Island two days per week. Therefore, the exposure frequency is approximately 100 days per year, compared to 350 days per year for residents. The evaluation assumes that a recreator will spend less than ten percent of his visit at Site 32, since Site 32 is about three acres and Treasure Island is about 400 acres. The evaluation concludes that the exposure of the recreator is approximately 1/35 of the exposure of the resident, based on these two factors.

   B. Since recreation is specifically identified (Section 1.2.4) as a potential future land use of Site 32, this scenario may warrant more careful consideration.

i. The Reuse Plan identifies hotels and resort, and museums and cultural institutions as possible recreational uses of Site 32 (Section 1.2.4). Such activities might entail minimal exposure.

ii. The Reuse Plan identifies recreation areas (including golf), and festivals, markets, and fairs as possible recreational uses of Site 32 (Section 1.2.4). Such activities may result in considerable exposure.

C. A golf course or a hiking and running trail might well be used by a recreator two days per week or more, and provide significant exposure.

D. The evaluation assumes that the recreator will come to Treasure Island from elsewhere. It is more likely that the recreator would live on Treasure Island (e.g., Site 12) and will use the putative facilities at Site 32.

E. The evaluation assumes that the recreator goes randomly to areas of Treasure Island, arriving at Site 32 in proportion to its size. This is unlikely. The recreator will go to the area with recreational facilities.

F. In general, we concur that a recreator is likely to have less exposure than a resident. We recommend a more compelling evaluation.

17. SUBCHRONIC REFERENCE DOSES. The text (Section 6.1.4) states that "*...chronic RfDs were used to evaluate both chronic and subchronic exposures since few subchronic RfDs have been developed.*" We concur with the use of chronic reference doses (RfDs) in all cases. As a point of information, U.S. EPA headquarters has withdrawn all subchronic reference doses and reference concentrations from IRIS because of inconsistencies in their derivation (U.S. EPA, 2003).

18. ROUTE-TO-ROUTE EXTRAPOLATION OF TOXICITY CRITERIA. The text (Section 6.1.4) states that "*When route-specific toxicity values were not available, route-to-route extrapolations were used to derive toxicity values for organic chemicals, but not for inorganic chemicals...*" A similar statement appears in Section I.6.1 of Appendix I.

A. Extrapolation of toxicity criteria from ingestion to inhalation or from inhalation to ingestion is inappropriate for inorganic chemicals.

B. Oral toxicity criteria should be applied to dermal exposure for both organic and inorganic chemicals. It appears (Tables I-6.1 through I-6.8) that this was done in

this risk assessment. Please clarify the text in both Section 6.1.4 and Section I.6.1 of Appendix I.

19. DIOXIN TOXIC EQUIVALENCY FACTORS (TEFs). The text (Section I.6.4 in Appendix I) states that TEFs from the 1998 World Health Organization were used in the risk assessment. Please use the current human and mammalian toxic equivalency factors (TEFs) of dioxins and dioxin-like compounds from the World Health Organization (2005). This will entail changes in the TEFs for octachlorinated dibenzodioxins, pentachlorinated dibenzofurans, and octachlorinated dibenzofurans.

20. RISK CHARACTERIZATION.

    A. More summary tables are needed to summarize risk characterization in both Section 6.1.5 and Section I.7.3 of Appendix I. Although the information is provided in exquisite detail in the U.S. EPA RAGS Part D tables in Appendix I, the reader should not have to search through those tables and generate his own summary. Further, because of the detail in the Part D tables a very small font has been used making them difficult to read.

    B. The summary tables should show risks and hazards for each receptor by exposure route and medium, and should show total risks and hazards.

    C. The summary tables should show results for Method 1, Method 2 and total risks and hazards.

21. UNCERTAINTY ANALYSIS.

    A. The first paragraph of Section 6.3.1 includes the statement that "*Hence, the uncertainty associated with the characterization of groundwater is low.*" The second paragraph contradicts that statement with "*Grab groundwater samples provide chemical results that may not be representative of in-situ conditions for the following reasons:...*" If the ground water samples may not be representative of in-situ conditions, then there is considerable uncertainty in the characterization of ground water.

    B. Section 6.3.2 begins with the statement that "*The primary uncertainty associated with the COPC selection process is the possibility that a chemical may be inappropriately identified as a COPC for evaluation in the risk assessment.*" No rationale is provided for this statement. We think the statement is incorrect.

        i. There are two possible errors in the process of selecting COPCs. First, a chemical may be included as a COPC when in fact it isn't a contaminant.

Second, a chemical may be excluded as a COPC when it fact it should be included in the risk assessment.

ii. If a chemical is included as a COPC when in fact it isn't a contaminant, two subsequent levels of the decision-making process provide opportunities for correction. At the level of risk assessment, risk and hazard estimates associated with the false positive COPC may be insignificant, thus not triggering unnecessary remediation. At the level of risk management, estimated risks and hazards associated with the false positive COPC might have risks and hazards only slightly greater than ambient levels, a situation also unlikely to result in triggering unnecessary remediation.

iii. In contrast, there is no mechanism for correcting the error of excluding a chemical as a COPC when it fact it should be included in the risk assessment. Once the chemical has been eliminated, it is gone from the process.

iv. Therefore, the "*primary uncertainty*" is in incorrectly excluding a chemical as a COPC.

C. Section 6.3.2 also includes the statement that "*The ambient comparison criterion is not likely to result in the inadvertent exclusion of chemicals as COPCs.*" Again no rationale is provided for this statement. This statement is also incorrect. Every statistical method has both Type 1 and Type 2 errors associated with it.

D. We quote Section 6.3.6 in its entirety. "*The exposure variables used to estimate chemical intake are standard upper-bound estimates. All default exposure parameters are expected to err on the conservative side, rather than underpredicting unforeseen human health risks. In general, considerable variation may occur in the activity patterns and physiological response of individuals. It is possible that the exposure variables used in this evaluation do not represent actual exposure conditions.*"

i. This discussion ignores the concept of Reasonable Maximum Exposure (RME). Of course individuals vary in their activity patterns and physiologies. The goal of RME is to protect most of the individuals in a population, not just to protect the average individual.

ii. It is not correct that "*All default exposure parameters are expected to err on the conservative side…*" Some default exposure parameters (body weight) are average values and not intended to be "*conservative*". Some default exposure parameters are known to underestimate potential risks and hazards

for a substantial fraction of the population. The best (or worst) example of this is the failure to consider pica behavior in children.

22. ECOLOGICAL RISK ASSESSMENT.

A. The report (Section 7.0) states that a screening ecological risk assessment is being conducted. When this is complete, it will be reviewed by Dr. J. Polisini of DTSC. In the meantime, we have some comments on the overview of ecological risk assessment included in this report (Section 7.0).

B. The report (Section 7.1) notes that the terrestrial habitat is currently of poor quality. We concur, but the risk managers should consider that future land use (Section 1.2.4) may change the nature of Site 32, generating areas of good terrestrial habitat.

C. The report (Section 7.1) notes that there is potential risk to aquatic receptors through transport of contaminants from ground water to the bay. Site 32 is located at the water's edge.

i. The report (Section 7.3) lists 11 inorganic chemicals found in ground water at concentrations exceeding the screening criteria and ambient levels. However, the report (Sections 7.3 and 7.4) asserts that "*These chemicals were a result of suspended particulates in the grab groundwater samples...*" and concludes that none is a COPC for aquatic receptors.

ii. It seems likely that the suspended material has influenced the measurements of inorganic chemicals, but to what extent? It would seem that the ground water data are insufficient to determine whether there is a potential risk to aquatic receptors. See General Comment 3.

SPECIFIC COMMENTS

1. Section 1.4. As shown in Figure 6-2, another important component of a conceptual site model is the exposure pathways. This should be added to the list in Section 1.4.

2. Figure 6-2. The figure includes a notation that "*Groundwater is not a current or potential drinking water source at Site 33.*" This reference should presumably be to Site 32 rather than Site 33.

3. Figure 2-1. We appreciate the seven copies of Figure 2-1 that were included in the report.

4. Figure 3-1. The figure is referenced as "*Modified from Schloker (1971)*". Please add this reference to the report's reference list (Section 9.0).

5. Section 4.0. The penultimate sentence in the second paragraph should be modified to note that Figures 4-1 through 4-11 pertain to soil.

6. Section 4.2. The text states that "*Metals and dioxin results also were compared with NAVSTA TI ambient concentrations for soil (see Table 4-3 and Appendix E).*" This is incorrect. There are no ambient concentrations for dioxins and furans in soil in either Table 4-3 or Appendix E.

7. Figures 4-3 and 4-4. These two figures are ambiguous.

   A. Figure 4-3 is titled "*Benzo(a)pyrene in Soil*", while Figure 4-4 is titled "*Benzo(a)pyrene Equivalent in Soil*". However, at the top of the text, both figures are labeled "*Benzo(a)pyrene in Soil*".

   B. Figure 4-3 correctly states that the residential PRG is 0.062 mg/kg, but Figure 4-4 incorrectly states that the residential PRG is 0.62 mg/kg.

8. Table 4-3. This table uses "*BAP(eq)*", defined in the footnotes as "*Benzo(a)pyrene equivalency*". The text in Section 4.2 and the Acronyms and Abbreviations section uses "*B(a)P EQ*")", defined as "*Benzo(a)pyrene equivalent*". The abbreviation and the definition should be consistent throughout the document.

9. Page 6-11, penultimate paragraph. The text explains that for future land use scenarios, it was assumed that all surface cover at the site would be removed, exposing the soil. The text then states that "*This approach is considered conservative since most of IR Site 32 is currently paved and does not reflect current conditions.*" This assertion seems to overlook the difference between current exposure scenarios and future exposure scenarios. It is precisely the impermanence of paving and building structures that requires future scenarios. Please remove the sentence.

10. Section 6.1.3.5 and Appendix I, Section I.5.2. The definitions of reasonable maximum exposure (RME) are contradictory in these two sections. The text in Section 6.1.3.5 correctly states that most of the individuals in a population are protected by RME assumptions, but highly sensitive individual are not protected. The text in Section I.5.2 of Appendix I incorrectly states that "*The RME case represents the highest exposure reasonably expected to occur at the site and is calculated using the EPC and RME exposure parameters.*"

11. Appendix H, Tables H-4 and H-5. Please include a statement of the null hypothesis in the footnotes.

12. Appendix I, Section I.4.1. The text references "*DTSC 1992*" for comparison of site concentrations of inorganic chemicals to ambient concentrations. The correct reference is DTSC (1997), as shown in the references to this memorandum.

13. Appendix I, Section I.5.2.2.1. While we concur with the inhalation rates cited in this section, we recommend that the same units be used for all receptors. Currently, the inhalation rates are reported as cubic meters per hour for construction workers, adult residents, and child residents, but as cubic meters per day for commercial/industrial workers.

CONCLUSIONS

1. A major concern is the adequacy of site characterization for Site 32. Risk assessment results cannot be considered meaningful until a consensus is reached that site characterization is completed.

2. The issue of hot spots must be addressed.

3. The ambient concentrations of inorganic chemicals in ground water have limited utility.

4. Surface soil must be redefined with defensible depths.

5. Screening values in the risk assessment should be limited to U.S. EPA Region 9 PRGs.

6. Consideration needs to be given to subdividing Site 32 into smaller exposure areas.

7. Although vapor intrusion into indoor air may not be a major concern at Site 32, we remain in disagreement with some of the methods applied in modeling.

8. The presentation in the report needs improvement, as discussed in the comments.

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