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October 5, 2007

Mr. Thomas L. Macchiarella, Code BPMOW.TLM
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REVIEW OF THE DRAFT TECHNICAL MEMORANDUM, SECOND SAMPLING EVENT RESULTS, SUBSLAB SOIL GAS INVESTIGATION OF BUILDINGS 14, 113, 162, 163A AND 398, ALAMEDA POINT, ALAMEDA, CALIFORNIA

Dear Mr. Macchiarella:

The Department of Toxic Substances Control (DTSC) has reviewed the Draft Technical Memorandum, Second Event Results, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, dated August 13, 2007 (Second Event Tech Memo). The Second Event Tech Memo was prepared by SulTech, a Join Venture of Sullivan Consulting Group, and Tetra Tech EM Inc., for the Naval Facilities Engineering Command Southwest.

The Second Event Tech Memo presents the results of the September 2006 sampling of the subslab investigation for volatile organic compounds in soil gas beneath the concrete slab-on-grade floors of Buildings 14, 113, 162, 163A, and 398, located in Operable Unit 2B at Alameda Point, as well as the results of resampling two soil gas proves inside Building 163A on March 7, 2007. Comments from the DTSC Geological Services Unit (Ms. Michelle Dalrymple and Mr. Dan Gallagher) are attached to this letter, as well as comments from the DTSC Human and Ecological Risk Division.

During the July 17, 2007 Base Realignment and Closure Cleanup Team the Navy remedial project manager stated that indoor air monitoring will be conducted at Building 163A. One of the Navy's recommendations in the Second Event Tech Memo is to resample soil gas probes located inside Building 163A, and the text further states that additional sampling will be conducted as part of other ongoing projects at the site. Please include a clear recommendation that indoor air sampling will occur inside Building 163A.

The attenuation factor used for modeling risk from indoor air has been the subject of internal discussion within DTSC. We are providing initial concurrence with the attenuation factors that the Navy used in modeling risk from indoor air. However, the results of the indoor air monitoring that will be completed in Building 163A provide an opportunity to calibrate the attenuation factors used for modeling by comparing concentrations in soil gas to concentrations actually measured in the building, thus providing an empirically-based attenuation factor. If the results from measuring indoor air indicate that the attenuation factor used in modeling was not protective at Buildings 14, 113, 162, and 398, then risks should be recalculated using the empirically derived attenuation factor.

If you have any questions, please contact me at (916) 255-6449.

Sincerely,

Dot Lofstrom

Dot Lofstrom, P.G.
Project Manager
Office of Military Facilities

Attachments

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GSU Comments on the
Draft Technical Memorandum, Second Sampling Event Results
Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California dated August 13, 2007

1. General Comment. GSU requests that supporting field documentation such as daily field logs and purging and sampling records be provided. Please also provide the analytical data package from the laboratory including chain-of-custody records. In addition, GSU requests that the output files from the vapor intrusion modeling be provided. This information may be provided on a compact disk in the Draft Final Technical Memorandum as was done for the first round of sampling.

2. Section 3.1 – Leak Testing Results. Overall, the quality of the data from the second round (September 2006) appears to be improved over the first round (January 2006) as evidenced by the much lower rate of ambient air intrusion (at least one order of magnitude lower). GSU questions whether the improvement can be attributed to the change in purge methods from syringes to Summa canisters. Please discuss the reason(s) for the change in purge methods, and the possible reason(s) for the lower leak rate detected in September 2006.

3. Section 4.6 – Uncertainty Analysis. It is stated in the third paragraph that over time, concentrations can decrease as chemicals move from one medium to another and from location to location within a particular medium. It is further stated that the overall available mass of a chemical may decrease as the chemical is lost through transformation or degradation processes, and that concentrations to which receptors are exposed would, therefore, decrease over time. However, it should be noted that the source of trichloroethylene (TCE) beneath Building 163A is unknown and may be related to soil sources beneath the building. Immobile soil contamination can act as a continuing source to soil vapor for many years. In addition, it should be noted that the chemicals that were detected in soil vapor were TCE and cis-1,2-dichloroethylene (cis-1,2-DCE) which ultimately degrade to vinyl chloride (a more toxic and volatile compound). Therefore, while TCE and cis-1,2-DCE concentrations and mass may decrease over time, vinyl chloride concentrations and mass may increase over time. Please revise this discussion to reflect this information.

4. Section 6.0 – Recommendations. GSU agrees with the re-sampling of probes in Building 163A and requests that the timing of the sampling be September/October 2007 to coincide with the timing of the dry season samples collected previously.

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

Department of Toxic Substances Control

Linda S. Adams
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MEMORANDUM

TO: Dot Lofstrom, Senior Engineering Geologist
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FROM: James M. Polisini, Ph.D.
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DATE: September 21, 2007

SUBJECT: DRAFT TECHNICAL MEMORANDUM SECOND SUBSLAB SOIL GAS SAMPLING BUILDINGS 14, 113, 162, 163A, AND 398, NAVAL AIR STATION ALAMEDA (NASA)
[SITE 201209-18 PCA 18040 H:23]

BACKGROUND

HERD reviewed the document titled *Draft Technical Memorandum Second Sampling Event Results Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California,* dated July 13, 2007. This document was prepared by SulTech, A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc., of San Diego, California.

A Remedial Investigation (RI) was conducted at Operable Unit 2B (OU-2B) (SulTech, 2005) at NASA (Alameda Point). The Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) sites that make up OU-2B are Site 3 – the Abandoned Fuel Storage Area; Site 4 – Building 360 (Aircraft Engine Facility); Site 11 – Building 14 (Engine Test Cell); and Site 21 – Building 162 (Ship Fitting and Engine Repair). The buildings being investigated for the subslab soil gas investigation include Buildings 14, 113 (located within Site 21), 162, 163A (located within Site 4), and 398 (located within Site 21).

In 1930, the U.S. Army acquired the original base property from the City of Alameda and began construction activities in 1930. In 1936, the Navy acquired title to the land from the Army and began building an air station. Construction of the Base included filling tidelands, marshlands, and sloughs with dredge materials from the San Francisco Bay. Naval Air Station Alameda (NASA) was an active naval facility from 1940 to 1997. Base operations included aircraft, engine, gun and avionics maintenance; engine overhaul and repair; fueling activities; and metal plating, stripping and painting activities.

GENERAL COMMENTS

Naphthalene should be added to the list of analytes in future subslab soil gas sampling. Although EPA Method TO-15 recoveries of naphthalene may be variable (Hayes, et al., 2005), naphthalene can apparently be accurately measured by EPA method TO-15 being used in this investigation as long as correct naphthalene standards with appropriate moisture content are used.

SPECIFIC COMMENTS

1. Given the extensive area of NASA with low level soil concentrations of Polycyclic Aromatic Hydrocarbons (PAHs), previously studied (Section 1.5.1, page 4), naphthalene should be added to the list of analytes for future soil gas sampling. Naphthalene can apparently be accurately measured by EPA method TO-15 being used in this investigation (**http://www.airtoxics.com/literature/AirToxics8260vTO15.pdf**) as long as correct naphthalene standards with appropriate moisture content are used.

2. Based on the total VOC concentration and photoionization detector (PID) screening, all 46 samples collected during the September 2006 sampling required dilution (Section 3.4, page 15; Table 3) prior to analysis by EPA method TO-15, resulting in reporting limits exceeding those specified in Table B-1 of the Sampling and Analysis Plan (SAP). However, it appears that dilution caused detection limits to exceed both sets of screening criteria, especially in samples 162SG-15 and 163SG-02 with dilution factors of 35 and 199 respectively. Concentrations of six VOCs exceeded the ESL and the CHHSL in the March 2007 re-sampling of Building 163A (Section 3.4, page 15). This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.

3. The extent of Volatile Organic Compound (VOC) contamination in soil, groundwater and Non-Aqueous Phase Liquid (NAPL) (Section 1.5.1, page 6) as indicated by soil gas VOC concentrations, is presented as two bounded areas encompassing all or a portion of the buildings evaluated in this Technical Memorandum (Figure 3). If groundwater samples are available in this area, the sample locations, without sample results, should be presented on the figure. Otherwise, HERD recommends that samples be collected between the two bounded areas (e.g., between Building 162 and Building 398) to determine whether there are two distinct groundwater VOC plumes.

4. The non-default model inputs to the Johnson and Ettinger model appear appropriate site-specific values (Section 4.3, pages 17 and 18; Table 18). This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractors.

5. The industrial/commercial scenario risk-based screening criteria are the San Francisco Regional Water Quality Control Board (SFRWQCB, 2005) Environmental Screening Levels (ESLs) and the Office of Environmental Health Hazard Assessment (OEHHA) California Human Health Screening Levels (CHSSLS) (Section 2.6, page 10 and Table 4). These industrial/commercial scenario air concentrations exceed the residential (unrestricted use) risk-based concentrations presented in the ESL reference and the U.S. EPA Region 9 Preliminary Remediation Goal (PRG) tabulation. The results of the subslab soil gas sampling should be incorporated into a complete HHRA which includes a residential (unrestricted use) scenario for any future risk assessment documents that include areas of the groundwater VOC contamination investigated in this report.

6. All VOCs detected in soil gas at each occupied building at Operable Unit (OU)-2B were evaluated for the indoor air pathway (Section 4.1, page 16). No screening process was employed to reduce the number of Contaminants of Potential Concern (COPCs). This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractors.

7. The site-specific attenuation factors (Table 19) are within the range of default attenuation factors recommended for existing and future buildings (DTSC, 2005; Table 2). However, HERD was unable to exactly duplicate the calculations. Please forward the Johnson and Ettinger model DATAENTER and INTERCALC work sheets for Building 163A as well as the complete Building Parameter (Section 4.3.2, page 17) 'adjustment' calculations for the Building 163A volume. The work sheets and volume 'adjustment' for Building 163A can be furnished informally by e-mail to **jpolisin@dstc.ca.gov**.

8. The cancer risk and non-cancer hazard values presented in the text (Section 4.5, pages 20 and 21), are those presented in the detailed table (Table 19). This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractors.

9. Inhalation Cancer Slope Factors (CSFs) and Reference Doses (RfDs) (Table 19) were checked and found to be correct. The more conservative U.S. EPA National Center of Environmental Assessment (NCEA) cancer slope factor (CSF) of 0.4 $(mg/kg\text{-}day)^{-1}$ is used for trichloroethylene (TCE) rather than the less protective OEHHA TCE CSF of 0.007 $(mg/kg\text{-}day)^{-1}$. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractors.

10. The U.S. EPA statistical program for calculating the Exposure Point Concentration (EPC) has been updated from the ProUCL 3.0 used to estimate the groundwater EPC (Section 4.3.3, page 18) to ProUCL 4 (http://www.epa.gov/esd/tsc/software.htm). EPCs need not be recalculated for this investigation, but future HHRA documents should utilize the updated version.

11. The statistical methods applied (Helsel, 2005) to calculate the Exposure Point Concentration (EPC) using samples reported as 20 to 85 percent non-detect (Tables 12 through 17, footnote b) have not yet been validated by HERD. However, given the relative small difference between the maximum concentration and the calculated EPC using these methods HERD accepts the application of these methods for this investigation.

CONCLUSIONS

Naphthalene should be included in future subslab soil gas sampling in the area of the groundwater VOC contamination investigated in this report.

This assessment of current inhalation risk in an industrial scenario provides a focused evaluation of the inhalation exposure pathway under current conditions. The HHRA of the area of Operable Unit 2B influenced by the VOC contamination should also include a residential (unrestricted use) scenario to evaluate whether land use restrictions are necessary as part of any final remedial action.

REFERENCES

Department of Toxic Substances Control. 2005. Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air. December 15, 2004 (Revised February 7, 2005).

Hayes, Heidi C., Diane J. Benton, Sarbjit Grewal and Noor Khan. 2005. A Comparison between EPA Compendium Method TO-15 and EPA Method 8260B for VOC Determination in Soil Gas. A&WMA Symposium on Air Quality Measurement Methods and Technology April 19-21, 2005, San Francisco, California. [http://www.airtoxics.com/literature/AirToxics8260vTO15.pdf]

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SulTech, 2005. Final Operable Unit 2B Remedial Investigation Report, Sites 3, 4, 11, and 21, Alameda Point, Alameda, California. Prepared for Base Realignment and Closure Program Management Office West. August 5.

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DOR: 8/16/2007 RCD: 9/15/2007 DOC: 9/21/2007

Comments from Dan Gallagher, Senior Engineering Geologist, on the
Draft Technical Memorandum, Second Sampling Event Results
Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California
Prepared by SulTech, A Joint Venture of Sullivan Consulting Group
and Tetra Tech EM, Inc., dated August 13, 2007

SOIL GAS SAMPLES

As indicated by the soil gas sampling results in Appendix B, 36 of 46 sampling results had a leak check compound concentration of 10 ug/L or greater. While Benton and Shafer (2006) attempted to quantify leak volumes, it is impossible to determine the concentration of the leak detection compound as it enters the soil gas sampling system and hence it is impossible to know the amount of sample dilution based on the observed concentration of the compound in the sample. This can only be done if the entire soil gas sampling system is enclosed within a shroud or tent. Nonetheless, the sampling results from January 2006 are biased low. While these sampling results were not integrated into the risk assessment, some of the sampling results of January 2006 had higher contaminant concentrations than the other sampling events (see comment below). Likewise, of lesser concern, although still significant, 10 of 46 samples in Appendix A had a leak check compound concentration of greater than 1 ug/L. The occurrence of the leak check compound in these samples, which were used to quantify the risk for the buildings, should have been discussed in the uncertainty section.

JOHNSON AND ETTINGER MODELING

Making a reasonable prediction of vapor intrusion into a building with the Johnson and Ettinger model is challenging. Hers, et al. (2003) states that, "when quality site-specific data is available for both soil properties (e.g., moisture content) and building properties (e.g., ventilation rate, mixing height), it may be possible to reduce the uncertainty in attenuation factor to approximately one order of magnitude." Due to the inability of the Johnson and Ettinger model to predict any better than one order of magnitude, a sensitivity analysis of the model should be included in the uncertainty section of the report so that appropriate risk management decisions can be made. The input parameters that should be evaluated, at a minimum, are soil volumetric water content, soil volumetric air content, total porosity, and soil gas advection rate. DTSC recommends that the sensitivity analysis be conducted in a similar manner to that described by Johnson (2002).

ATTENUATION FACTORS

Subslab Soil Gas Samples. Pursuant to DTSC (2004), subslab attenuation factors should not be determined by the Johnson and Ettinger (2001) model. When evaluating vapor intrusion with subslab soil gas samples, a subslab attenuation factor of 0.01 should be used in lieu of fate and transport modeling. The use of a default attenuation factor for subslab evaluations is advocated by USEPA (2002) and DTSC adopted a similar approach in our vapor intrusion guidance document. The default subslab attenuation factor of 0.01 is derived from USEPA's empirical database (Hers, et al., 2005).

Open Field Soil Gas Samples. No evaluation of the future building scenario was conducted using the soil gas results from the open areas at the site. For soil gas samples collected away from buildings in open areas, the soil gas concentration nearest the contaminant source should be used for modeling purposes. As noted by Abreu et al. (2005) and Abreu et al. (2006), soil gas samples should be collected right above contaminant sources when the sources are within 10 feet (3 meters) of the surface. For deep contaminant sources, soil gas samples should be collected at least 10 feet (3 meters) below grade. Deeper sampling would be needed for buildings with basements. Determining the exposure point concentrations from these depths is warranted due to building depressurization which causes vapors to accumulate under foundations at higher concentrations than those observed in open field measurements.

STATISTICAL EVALUATION

Tables 6 –11 provide a statistical evaluation of data for the September 2006 or March 2007 sampling events. However, the data from the January 2006 sampling event was not integrated into the statistical evaluation. Even though numerous samples from January 2006 sampling event were compromised as indicated by the leak check compound, in many instances, the highest concentration of subsurface contaminants were observed during this sampling event. The below table summarizes these observations.

BUILDING	SAMPLE	CHEMICAL	CONCENTRATION (ug/m^3)
14	014SG-08-001	Tetrachloroethene	760
14	014SG-11-002	Tetrahydrofuran	670
162	162SG-21-001	Tetrahydrofuran	280
163A	163SG-02-001	Tetrahydrofuran	160
398	398SG-06-001	1,2-Dichloropropane	190
398	398SG-06-001	2,2,4-Trimethylpentane	630
398	398SG-06-001	Benzene	100

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Abreu, L. D. V., and P. C. Johnson. 2005. Effect of Vapor Source - Building Separation and Building Construction on Soil Vapor Intrusion as Studied with a Three-Dimensional Numerical Model. Environmental Science and Technology, v. 39, no. 12, p. 4550 - 4561.

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