UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

N00221_001313
MARE ISLAND
SSIC NO. 5090.3.A

January 29, 2009

Mr. Michael Bloom
Dept of the Navy
Base Realignment and Closure
Program Management Office
1455 Frazee Road, Suite 900
San Diego, CA 92108-4301

RE: Review of the Draft Field Summary Report and Vapor Intrusion Risk Evaluation for Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo California, January 6, 2009

Dear Mr Bloom:

Enclosed are EPA's comments on the Draft Vapor Intrusion Risk Assessment for Mare Island Installation Restoration Site 17 and Building 503 Area. We have done our best to meet the expedited review schedule in support of the City's redevelopment plans, and look forward to expeditious resolution of the remaining concerns as described in the attached comments. We believe these issues can be resolved while continuing to move forward with the removal action in order to meet the City's construction schedule. In particular, the issues identified with building 759 can be addressed through separate follow on action that would allow the primary removal action to proceed on schedule.

For future consideration, when you are submitting a document requesting an expedited review, please provide two hard copies in addition to electronic versions to assist us in meeting your review schedule. Our review was delayed a week largely due to the need to make additional copies for the toxicologist's review.

If you have any questions, please contact me at (415) 972-3150.

Sincerely,

Carolyn d'Almeida
Remedial Project Manager

cc: Chip Gribble, DTSC
Paisha Jorgensen, RWQCB

Enclosure

Review of
Field Investigation Summary Report and Vapor Intrusion Risk Evaluation
for Installation Restoration Site 17 and Building 503 Area
Former Mare Island Shipyard
Vallejo, California
January 2009

The measurements of soil gas constituents and the associated vapor intrusion (VI) risk evaluation presented in the Field Investigation Summary Report and Vapor Intrusion Risk Evaluation for Installation Restoration (IR) Site 17 and Building 503 Area (Report) are critical for planning the future land use and development of the site; the results suggest that some land use restrictions will be required because of the VI risk values are above 10^{-6} over a majority of the site that then eliminates unrestricted land reuse option (hypothetical residential land reuse) from consideration. Even if "hot spot" remediation is conducted and a paved lot is constructed over the remaining contaminated areas, the lateral movement of contaminants in the gas phase and in groundwater may continue to pose an unacceptable human health risk. The Navy's transfer of the land to any future land owner should specifically address such restrictions. The comments below focus on the vapor intrusion risk evaluation.

GENERAL COMMENTS

1. The Human Health Risk Assessment (HHRA) evaluated Phase 2 active soil gas (ASG) sampling data to support an assessment of the possible VI exposure pathway at the IR Site 17 and Building 503 Area (the Site). These data supplement and help clarify environmental conditions at the Site. However, some ASG samples were collected at shallow soil depths (i.e., less than 10 feet below ground surface [bgs]), which were not overlain by a confining layer (e.g., pavement). There is uncertainty as to the utility of these data. At shallow soil depths (where there is no confining layer,) the data cannot be used to reflect the potential for subslab vapor pooling under an existing structure. Specifically, soil gas equilibrium exchange with atmospheric air and biotransformation may underestimate analytical results. Typically, soil gas samples collected from depths shallower than 5 feet bgs are not suitable as the basis for quantitative risk evaluations. The occurrence of groundwater at the Site ranging from 3 to 9 feet bgs has complicated the collection of relevant data and compromised the defensibility of modeling future indoor air concentrations. The HHRA should recognize these uncertainties.

2. Importantly, the current multimedia data set and results of the VI risk evaluation do not support a case for unrestricted site use. While the Navy can implement "hotspot" removal at locations where ASG sampling data indicate significantly elevated cancer risks (i.e., above 10^{-4}, the upper end of EPA's acceptable risk management range), the actual extent of impacted media is unknown. A defensible dataset, predicated on multiple lines of evidence to accurately predict current or future indoor air concentrations, does not appear to exist. Based on the available site data and HHRA findings, the implementation of land use or institutional controls (LUCs/ICs) likely will be required for the Site; otherwise potentially extensive site-wide remediation will be required to achieve unrestricted land reuse. Examples of applicable LUCs/ICs include legally enforceable and transferable restrictive covenants on the deed of the subject property prohibiting the construction of confined or semi-confined structures such as slab-on-grade buildings or multi-level parking garages; and requiring future use of on-site or adjacent buildings to include direct monitoring programs and/or mitigation systems, such as a sub-grade vapor venting system. The deed for the property must disclose the presence of contamination and specify the land use limitations, exposure pathways, and receptor populations intended to be protected.

3. The Report indicates that the VI exposure pathway is likely incomplete under current and future conditions at the Site based on the absence of occupied buildings and planned future site use as a paved parking lot or structure. However, it should be noted that Building 759 is immediately adjacent to the western site boundary and houses at least one tenant, Earthquake Protection Systems, Inc. (451 Azuar Drive, Building 759, Mare Island, Vallejo, CA 94592). As required by California Assembly Bill 422 (approved on October 13, 2007), HHRAs must include "the development of reasonable maximum estimates of exposure to volatile organic compounds that may enter structures that are on the site or that are proposed to be constructed on the site and may cause exposure due to accumulation of those volatile organic compounds in the indoor air of those structures." The proximity of Building 759 to ASG sampling locations where generated data indicate an elevated risk – including IR17SG002, located about 100 feet from the building and where risk estimates exceed 10^{-4} – coupled with the fact that paving constitutes a confining layer extending from the source area to Building 759 - indicates the potential for harmful levels of volatile organic compounds to enter overlying indoor space(s). Depending on undefined transport pathways, the existing pavement cover could exacerbate vapor plume migration and sub-grade soil gas concentrations beneath or adjacent to Building 759. Shallow groundwater, utility lines (present and planned) constituting preferential flow pathways, the presence of a current occupant, the potential presence of free product on the water table, the distance from the recorded source area, and the nature of Building 759's construction (slab-on-pilings) all tend to complicate a modeling exercise to predict indoor air concentrations. Multiple lines of evidence are necessary to assess current exposures attributable to Building 759 as a result of VI. Additional information to be considered include shallow soil gas samples collected from beneath the existing building footprint, crawlspace air, and indoor air monitoring. These data can be reviewed to establish building-specific attenuation factors as well as the identification of any indoor confounding sources.

4. Soil and groundwater data collected during the Phase 1 and 2 sampling events were not adequately incorporated into the current risk evaluation. HHRAs must evaluate cumulative risk; that is, combined risks from multiple exposure media and pathways. Please revise the HHRA to evaluate and discuss cumulative risks from VI and other potential complete exposure pathways from all relevant media sampled during the Phase 1 and 2 investigations. An update to the previous HHRA, prepared as part of the remedial investigation of the Site (SulTech 2006) and which focused on direct contact pathways, should include the recent Phase 2 soil and groundwater data sets in the evaluation of the hypothetical future resident, commercial/industrial worker, and construction worker exposure scenarios. Please define the direct and indirect exposure pathways with regard to at-risk populations. Please note that indoor workers, whose predominant exposures may be attributable to indirect pathways related to VI, may also be exposed via direct contact pathways to contaminants arising from outdoor soil. The variable of mass fraction of soil in indoor dust (M_{sd}) from USEPA's Integrated Exposure Uptake Biokinetic Model (IEUBK) can be used to represent the fraction of indoor dust derived from outdoor soil. The default value of M_{sd} recommended by USEPA is 0.7 g soil/g dust.

5. Volatilization of constituents from groundwater into the vadose zone is likely a source of observed soil gas constituents, but an evaluation of this relationship does not appear to have been provided to help characterize the source of soil gas, and which can be important for decisions of remediation vs institutional controls. For example, soil gas sample IR17SG024 is shown as having a significant risk in a future hypothetical resident scenario (Figures E-2 and E-3) and which is apparently collocated with groundwater monitoring well location IR17TW03 where the highest chlorinated ethene concentrations are located (Table 9). However Table 9 lists monitoring well

17W15 as having the maximum groundwater concentrations of benzene, ethylbenzene, toluene and xylenes (BETX) but the figures depicting risk evaluation results (E-2 through E-5) do not indicate soil gas is a significant concern near this location. All soil and groundwater analyses should be thoroughly compared to the observed soil gas measurements to evaluate whether the sources of contamination reside in the groundwater and/or vadose zone soils, and include the possible transport of vapors and possibly groundwater through infrastructure conduits.

6. The Site includes a small part of the adjacent wetland, which is not evaluated in the HHRA. Please indicate in the Report how potential impacts from historic site activities on this excluded area will be evaluated.

SPECIFIC COMMENTS

1. **Section E4.1.3, Toxicity Criteria, Page E-10:** The last bullet in this section indicates that the EPA toxicity criteria for trichloroethylene (TCE) are undergoing review (EPA 2001). While this statement is still accurate – that toxicity data for TCE is still being reviewed under the Integrated Risk Information System (IRIS) program – reference should be made to the *Interim Recommended TCE Toxicity Values to Assess Human Health Risk and Recommendations for the VI Pathway Analysis*, recently issued by Office of Solid Waste and Emergency Response (OSWER, 2009), which formally recommends the use of California Environmental Protection Agency inhalation unit risk and oral slope factor. Formally, USEPA has moved away from implementation of simple route-to-route extrapolation for use in assessment of inhalation exposures and relies exclusively on promulgated inhalation unit risks and reference concentrations. The current assessment is then based on a dated approach, utilizing converted toxicity criteria in the form of inhalation reference doses and inhalation slope factors for all contaminants. Any revision of the current assessment should take the updated approach into account.

2. **Section E4.2, Step 2: Calculation of Risk-Based Concentrations for Soil Gas, Page E-10; and Table E-7: Attenuation Factors for Soil Gas-to-Indoor Air:** The second step of the HHRA involves calculation of site-specific attenuation factors (α_{sg}) as part of deriving soil gas risk-based concentrations (RBC-SGs). The general equation used to calculate α_{sg} is correct. However, it should be noted that the site-specific α_{sg} values presented in Table E-7 are at least an order of magnitude less conservative than EPA default α_{sg} values for use in a screening level assessment such as has been presented. Default values are pertinent for use in assessing future exposure conditions. For example, default α_{sg} values for a residential building scenario typically range from 1E-01 to 1E-02, compared to the site-specific factors used in the HHRA, which are in the 1E-03 to 1E-04 range. It should also be realized that such uncertainties can be critical when modeling over such short transport pathways. This uncertainty should be investigated further, for example, by comparing soil gas concentrations beneath a building and actual indoor air concentrations inside the building.

3. **Table E-9, Chemical-Specific Properties for Use in the Johnson and Ettinger Vapor Intrusion Model:** According to Section E4.2 (Page E-11), Table E-9 presents chemical and physical properties for seven chemicals that were not represented in the Department of Toxic Substances Control's (2003) adaptation of the Johnson and Ettinger model. However, the referenced table only lists properties for six of the seven chemicals. Please revise Table E-9 to include ethanol.

REFERENCES

California State Assembly. 2007. Bill No. 422, Chapter 597, "An act to amend Section 25356.1.5 of the Health and Safety Code, and to add Section 13304.2 to the Water Code, relating to hazardous substances." October 13.

Department of Toxic Substances Control (DTSC). 2003. "Johnson and Ettinger (1991) Model for Vapor Intrusion into Buildings." Version 3.0-Modification 1. July.

Office of Solid Waste and Emergency Response. 2009. *Interim Recommended TCE Toxicity Values to Assess Human Health Risk and Recommendations for the VI Pathway Analysis*. Memorandum from Susan Parker Bodine, Assistant Administrator; to Regional Administrators. January 15.

SulTech. 2006. *Final Remedial Investigation for IR17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California.* January 27.