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Subject: Draft Work Plan for the Soil Vapor Extraction (SVE) Pilot Test at Installation Restoration Program (IRP) Site 16, Former Marine Corps Air Station (MCAS) El Toro, California

Mr. Pizskin:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject draft work plan dated May 2005. We have a number of comments to offer on the document as presented. While many of the comments request additional details into the plans for the pilot test, EPA understands that the Navy has operated SVE systems at other sites at MCAS El Toro and that many of our comments on this work plan may cover issues that have been addressed through the operation of those systems. We offer the attached comments for your consideration.

If you should have any questions/concerns, please contact me at 415-972-3349.

Sincerely,

Rich Muza

Rich Muza
Remedial Project Manager
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Comments on the Draft Work Plan for the SVE Pilot Test at IRP Site 16 Former MCAS El Toro

GENERAL COMMENTS

1. The Draft SVE Pilot Test WP (including Appendix A, the Draft Sampling and Analysis Plan [SAP]) include discussion on several areas which describe the types of wastes which might either be generated during the investigation (i.e., Investigation Derived Wastes [IDW]) or as wastewater generated by the moisture separator associated with the SVE system operation. These include soil cuttings; personal protective equipment (PPE) such as tyvek, gloves, paper towels, etc.; and decontamination liquids as well as the water from the moisture separator. However, throughout the Draft SVE Pilot Test WP these discussions do not consistently take all of these "wastes" into account. For example, the Draft SVE Pilot Test WP (page 6-5) discusses only the wastewater from the moisture separator while Section 4.2.3 (i.e., Waste Characterization Sampling on page 4-9 of Appendix A) mentions all of these wastes (except the decontamination liquids, which are discussed in the subsequent section) but no details on characterization are provided. As well, no discussion is provided regarding the management and/or disposal of the spent carbon from the SVE system during or after the Pilot Test. Finally, the discussion in Section 12 (Management and Disposal of Investigation Derived Waste) apparently is solely focused on true IDW and does not include a discussion of the wastewater generated from the SVE moisture separator or the spent carbon from the filters. It is recommended that the Draft SVE Pilot Test WP provide a clear and consistent approach regarding the management and disposal of wastes generated during these activities.

2. During startup testing, it is recommended that the surface barometric pressure is collected any time a subsurface vacuum measurement is collected. To assess how the subsurface responds to surface pressure changes subsurface and surface barometric pressure data should be collected on an hourly basis (using automated equipment if possible) for at least a week prior to beginning the pilot test. Subsurface pressures, which lag surface pressures, can change by several inches of water column on a daily basis which is likely to be more than the effect of the SVE extraction wells at distances of more than about 100 feet from the extraction wells. Hence, this data will be vital for interpreting the actual effective radius of remediation of the SVE extraction wells.

3. The Draft SVE WP appears to be missing significant details and procedures that are necessary components of an effective SVE system. It is recommended that the Draft SVE WP be revised to include details regarding:

   - Provide a drawing of the above-ground piping showing low spot drains for any condensate that forms in the lines (condensate is not to be allowed to drain back into the boring).
   - Provide a surface completion drawing for the SVE extraction and monitoring point wells.

- Provide details on how surface features, if any, will be protected from traffic (e.g., by bollards). If the surface completions are to be installed in well vaults, provide specifications for the well vaults.

- Provide a testing and monitoring schedule. Ideally, each of the well screens should have a vacuum applied to it in isolation (ie., none of the other screens would have a vacuum applied to them) for at least 4 hours (or until the well field vacuums stabilize, whichever is longer) while vacuums are measured in all of the monitoring points and the other SVE extraction well screens.

- Because of the VOC and TPH concentrations in the site vadose zone, it is not impossible that the initial soil gas concentrations will be an explosive mixture (the lower explosive limit for trichloroethylene, for example, is 8%). The Draft SVE WP should address potential safety concerns regarding explosive soil gas mixtures.

- Provide the ionization potential of the photoionization detector (PID) lamp to be used for air monitoring during the pilot test and provide assurance that it is high enough to detect all of the expected VOCs.

- It appears, based on Figure 5 that the SVE extraction screens will be installed within the low permeability strata between 80 and 100 feet below ground surface (bgs). If that is the intention, it is recommended that continuous sampling be conducted in the extraction well boreholes between 70 and 110 feet bgs so that the actual extent of the strata can be determined. In addition, when installing these screens, the geologist conducting the work should assure that the sand pack around the screen does not extend to within five feet, in either direction, of the boundary of the low permeability strata (assuming the purpose is to extract soil gas only from the low permeability strata).

- The US Army Corps of Engineers (USACOE) Soil Vapor Extraction and Bioventing Manual [2002] indicates that SVE extraction well casings should be a minimum of 4 inches in diameter versus the 2 inch diameter casings proposed in this work plan. Provide additional justification for using 2 inch diameter casings. If 2-inch diameter casings are believed to be acceptable, a one-inch diameter piezometer should be installed within the sand pack of at least one well screen to verify that vacuum losses through the screen are acceptable.

- The screen lengths of the monitoring points are too long if the primary purpose of these wells is to measure vacuums. Consider using much smaller screen lengths in the monitoring points, especially for the screens installed in the low permeability strata between 80 and 100 feet bgs. If the long screens are used, confirm that sampling procedures are put into place to assure that the monitoring points are properly purged prior to sampling.

- To avoid confusion regarding which casing is which (some boreholes will have up to five stickups) field personnel should permanently mark the top of each casing as it is installed. Provide procedures to be used by field personnel to differentiate the multiple casings to be installed in each boring.

SPECIFIC COMMENTS

1. **Section 3.7.2, Page 3-5** -- This section presents information regarding the prior sampling conducted at the IRP Site 16. This includes soil sampling for total petroleum hydrocarbons (TPH) diesel (TPHd) and gasoline (TPHg). These data indicate that TPH levels were elevated to a depth below ground surface of approximately 100 feet bgs, but were virtually non-detect (i.e., less than 1 milligram per kilogram [mg/kg]) at depths below 110 feet bgs. These data are hard to understand based on the data provided in the Draft SVE WP in that there is no discussion of any confining layer which might limit downward migration. However, it is possible that the sample intervals and limited number of samples below 110 feet bgs could account for what appears to be anomalous data. When soil gas data becomes available for the deep SVE screens, it is recommended that a comparison of this data to the VOC and TPH data from the soil borings be made and an assessment of whether the conceptual site model and the current vertical delineation of contaminants need to be revised be completed.

2. **Section 5.1, Page 5-3** -- ASTM D425, which measures irreducible water content, will not provide a meaningful number for in-situ effective porosity as it is conducted on a reconstituted specimen. In addition, EPA does not support the use of the Walkley-Black Method for total organic carbon [U.S. EPA, 2002] but prefers SW846-Method 9060. It is recommended that the Draft SVE WP be revised accordingly to address these noted concerns.

3. **Section 5.2, Page 5-5** -- The first paragraph discusses the well installation procedures and the plans for grading activities within the pit area to raise the elevation/grade of the area to better control runoff and/or infiltration. However, the limited information presented does not address several issues that should be considered when conducting these activities. These include:

   - When the topography is changed, what reference elevations will be used to determine the depth of the well screens for all of the wells to be installed. It is assumed that all of the current depths are based on the present areal elevations, however, this grading is slated to occur prior to initiating the borings/well installation.

   - As noted above, the grading activities are likely to have some impacts on the overland (surficial) flow in the area. As a result of the lack of detail, it is uncertain what impacts (if any) these activities will have on the SVE Pilot Test. As noted, the activities will include defined drainage features or other features that might prevent or limit erosion and potentially subsequent infiltration of rainfall or other overland flow

It is recommended that the Draft SVE WP be revised to provide additional information regarding the concerns noted above.

4. **Section 5.2, Page 5-7** -- The assumption that well screens that vary between 5 and 30 feet and are installed in variable soils (from sandy to clayey strata) will all produce the same air flow rate seems overly optimistic. Please consider that different air flow rates are likely to result and that some of these flow rates may cause excessive frictional losses in the well screens.

5. **Section 6.3.5, Page 6-4** -- This section discusses steps to be taken to initiate activities on the SVE system and to subsequently determine the optimal operating parameters (i.e., well vacuum). However, while it is noted that there will be some ongoing adjustments needed, there does not appear to be a system in place (ie., defining "optimal" values on the associated forms) to ensure that the field personnel are aware of what well vacuum measurements may be problematic or in need of adjustment. It is recommended that criteria to be used by start-up personnel to optimize system performance (eg., balancing well vacuums, mass extraction rates, flow rates, etc.) be included in the SVE Pilot Test WP.

6. **Section 6.3.6, Page 6-5** -- The discussion provided on the top of the page discusses the characterization sampling of the wastewater from the moisture separator but also states that the waste will be disposed of as "non-hazardous waste" by a licensed waste disposal contractor. This statement is misleading and should be revised to indicate that the condensate will be disposed of based on the results of the characterization. It is recommended that the Draft SVE Pilot Test WP be revised to delete or modify this statement accordingly.

7. **Section 6.5, Page 6-7 & Appendix A, Section 4.1.2, Page 4-7** -- The last bullet on page 6-7 in this section states that vapor samples will be collected at the monitoring points before start up of the system. In addition, the subsequent text indicates that following SVE system startup, vapor samples will be collected at all twelve monitoring points on a quarterly basis (also noted in the last bullet on page 4-7, Appendix A). However, based on the nature of this activity (ie., pilot test scheduled for an approximate 90 day duration), this frequency does not appear appropriate. Please note that the USACOE Soil Vapor Extraction and Bioventing Manual [2002] provides the following guidance for the conduct of pilot-scale SVE tests:

> *(1) Pilot tests may range from several days to weeks in duration, or longer in some instances. Most SVE systems typically show an initial "spike" in effluent concentration, which rapidly declines to a subsequent baseline concentration. The initial spike is commonly representative of initial soil gas concentrations, resulting from equilibrium partitioning into a relatively static air phase. The subsequent baseline concentration represents equilibrium partitioning into a dynamic air phase, which is thought to be limited by diffusion from relatively stagnant areas into zones*

of more mobile airflow. The difference between the initial spike and the subsequent baseline concentrations depends upon numerous factors, including the rate of airflow, the volatility of the contaminants, biodegradation rates, the proportion of stagnant to mobile soil gas zones, and the degree of interconnectedness between those zones. Since the latter considerations are almost impossible to predict, pilot tests are commonly performed to evaluate sustainable baseline concentrations.

It is apparent that a single baseline (prior to startup) and then further soil gas sampling after 90 days of operation will capture none of this behavior while sampling only the influent to the SVE system will not provide any data on the effectiveness of individual wells. It is recommended that the Draft SVE Pilot Test WP be revised to incorporate sampling and testing of extracted soil gas immediately after system startup and at periodic intervals throughout the test. Alternatively, some of this testing may be conducted in the field using Tedlar bags and PIDs, though the PID data should be confirmed in a fixed laboratory for some subset of the data points.

8. **Section 6.6, Page 6-8** -- The discussion on this page includes information regarding the field forms to be employed during these activities. However, the discussion regarding the information reportedly included on Form 1 appears to be inconsistent with the information sought on the form. Specifically, the last two bullets (ie., Sample Numbers and Laboratory Readings) include elements which are not evident on Form 1. It is recommended that the text of this section, or Form 1, be revised to address this apparent discrepancy. In addition, Form 2 notes that it is to be used for recording data from the two monitoring points, while the form is actually going to be used to collected data from the 12 discrete monitoring points, which are included within 2 sets of well nests. It is recommended that clarification be provided as to the use and title of Form 2. Lastly, this section alludes to the presence of Calibration Forms related to the ongoing calibration of the field instruments as per manufacturer's instructions and notes that these forms will be placed in the field binder. However, a copy of the "Calibration Form" was not included within the Draft SVE Pilot Test WP. It is recommended that a copy of the Calibration Form be provided for review.

9. **Appendix A, Section 1.3, Page 1-5** -- The text of this section indicates that information regarding the specific roles, activities, and responsibilities are defined in this section as well as on Figure 3 and in Table 1. However, while the Figure and Table do provide some information regarding the project organization, these data are incomplete. Additional information is needed to show either the specific individual and their qualification or, at a minimum, the required qualifications for the specific personnel instead of listing it as "TBD". As well, the lines of reporting should be clarified as it is unclear what is meant by the dashed lines, something that would likely be clarified in detailed text which described the specific lines of reporting for key positions (ie., QA-related positions as noted on Figure 3). Also, the last entry on Table 1 (ie., Field Team Leader/Site H&S Officer) does not appear on Figure 3 or at least not with the same title as on Table 1. It is recommended that the Draft SVE Pilot Test WP be revised to include additional details regarding the project organization, including filling in the current gaps

by noting personnel or required qualifications for specific positions, and to modify the Figure/Table as needed.

10. **Appendix A, Section 4.1.1, Pages 4-3 to 4-5** -- A table titled "Summary of Soil Matrix Sampling" is included here, however, this table is not numbered nor is it listed in the Table of Contents for Appendix A. In addition, several elements of the table are either confusing or missing, including:

    - The information for the 105 - 130 foot bgs depth interval for VEW-1D/1E/1F (Specifically VEW-1F) are missing from the table.

    - The "total soil samples" column is confusing in the context of this table. It is noted in other text sections that multiple samples (at five-foot intervals along the screen depth) will be collected and the sample with the highest PID reading will be analyzed at a laboratory. These appear to be inconsistent ways to denote the same information and the column might be better renamed as something like "total screened interval soil samples collected for PID analysis", which better represents the column entries.

    - The annotation provided for the samples proposed for geotechnical analysis are inconsistent. One of the samples include a "**" notation while the other two do not. In addition, the notes at the end of the table only indicate analysis for the Walkley Black Method and ASTM methods D5084 and D2216. This is consistent with information on page 6-2, but not with that on Page 4-8 which also includes ASTM Method D425M. (Note: ASTM D425 will not likely provide a meaningful number for in-situ effective porosity as it is conducted on a reconstituted specimen. In addition, EPA does not support the use of the Walkley-Black Method for total organic carbon [U.S. EPA, 2002] but prefers SW846-Method 9060.)

    It is recommended that the table starting on Page 4-3 be revised to address the issues noted above. In addition, when clarifying the discrepancy related to the ASTM methods to be used, please ensure that all other applicable sections of the Draft SVE Pilot Test WP are revised accordingly.

11. **Appendix A, Section 4.2.1, Page 4-7** -- This section briefly describes the procedures to be used in the collection of the soil cores and subsequently the VOC samples using the Encore sampling device. As presented, it is not entirely clear the sequence in which these activities are expected to occur. The text notes that three 6-inch sleeves will be used but only indicates that two of these will be capped and iced, potentially for later analysis. The discussion also indicates that at some interim point between extraction of the sleeves and their capping that the requisite Encore samples will be collected for VOC analysis. However, it is not clear which of the sleeves will be used for the VOC/Encore samples or the PID analysis which will determine the samples to be analyzed at the fixed laboratory. This means that it is assumed that all intervals will have associated VOC samples collected using the Encore samplers regardless of whether it is later determined to be the

interval sent for laboratory analysis. It is recommended that the text of this section and all other associated sections be revised to more clearly define the procedures for VOC soil sample collection.

12. **Appendix A, Page 4-8** -- The Draft SVE Pilot Test WP does not indicate how/whether the monitoring points will be purged prior to the collection of related samples. It is recommended that the SAP be revised to provide a discussion of how the monitoring points will be purged prior to sampling. In addition, please provide further guidance to field personnel on collecting vapor samples from the extraction wells. The extraction wells will be under varying degrees of vacuum, and, therefore, collecting vapor samples from them using a vacuum box will be difficult unless the SVE system is turned off and the wells are allowed to equilibrate with atmospheric conditions.

13. **Appendix A, Table 4** -- This table includes information on the specific analytical procedures, analytes, and the related reporting limits and in some instances the associated Region 9 Preliminary Remediation Goals (PRGs) for specific constituents. However, based on a cursory review of this information versus the recent PRGs table, it is not apparent which criteria were applied when listing the associated PRGs for the constituents listed on this table as they do not appear to correlate, notwithstanding the change of units (ie., from mg/kg to ug/kg). In addition, it appears that the 2002 PRGs values were used instead of the more appropriate 2004 PRGs values. It is recommended that Table 4 be revised to correct these apparent discrepancies and to reflect the use of the 2004 PRGs values.

MINOR COMMENTS

1. Section 5.2, Page 5-5 & Figures 7 & 8 -- The well installation for both the vapor extraction wells and the monitoring wells discussed in this section and shown on Figures 7 and 8 includes the use of a course aquarium sand filter pack adjacent to the screened intervals and a distinct 5-foot layer of bentonite chips between the screens. The figures appear to indicate that the sand filter pack will be placed at least a few feet above the screened intervals before the bentonite chips are placed, however, there is no discussion to specifically note how far above the screens that the sand filter pack will be placed. In addition, while it is assumed that the bentonite chip layers will be hydrated prior to placement of the next interval's sand filter pack, these specific details are not noted in the text. It is recommended that the Draft SVE Pilot Test WP be revised to further clarify the requirements for placement of the sand filter pack and to assure that the bentonite chips will be hydrated prior to completing the next interval.

2. Figure 6 -- This figure includes a modest volume of information regarding the site layout, the historical sampling location, and the proposed location for the vapor extraction and monitoring wells, all of which are further defined in the Figure Legend. However, the figure also includes several different notations (eg., 335.0 GS and 332.91 FS) which are not otherwise defined. As presented, these notations appear to define the elevation of the ground surface (GS) and potentially the foundation surface (FS) but are not defined in the legend. It is recommended that Figure 6 be revised to include these additional details.

3. Appendix A, Section 7.1.1, Page 7-1 -- The discussion of the use and collection of field duplicates and matrix spike/matrix spike duplicates (MS/MSD) samples appears appropriate based on the ratios presented (ie., 1 duplicate per 10 environmental samples and 1 MS/MSD per 20 environmental samples). However, it should be clarified that these percentages relate to each matrix as well. While it is expected that an appropriate number of quality control samples will be collected for each matrix, it may be appropriate to clarify that in the associated text. It is recommended that the Draft SVE Pilot Test WP be revised accordingly.

References

U.S. Army Corps of Engineers, 2002. Engineering and Design Manual, Soil Vapor Extraction and Bioventing. EM 1110-1-4001, 3 June.

U.S. EPA, 2002. Methods for the Determination of Total Organic Carbon in Soils and Sediments. Brian A. Schumacher, Ph.D., U.S. Environmental Protection Agency Environmental Sciences Division, National Exposure Research Laboratory, Las Vegas, NCEA-C- 1282 EMASC-001, April.