DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

AUG 0 1 2006

MEMORANDUM FOR SEE DISTRIBUTION

FROM: AFRPA Western Region Execution Center
3411 Olson Street
McClellan CA 95652-1003

SUBJECT: Final Technical Memorandum: Bldg. 243 (PRL S-8 and PRL S-15) SVE START Drilling: DSR 1864-3

1. The Air Force is pleased to submit the Final McClellan AFB Technical Memorandum that describes the modifications to the previously approved Final Soil Vapor Extraction START Sites (2002) Field Sampling Plan (FSP), November 2002. The modifications are to the section of the plan that addresses building 243, sites PRL S-8 and PRL S-15. This technical memorandum includes the relevant portions of the original FSP as an attachment and a response to comments received from DTSC on the draft version.

2. It is anticipated that the field effort will be completed in early August, the EECA completed by December 2006. and the resulting treatment system installed by January 2007.

4. Technical team members should be available for the first TRIAD telecon to determine extraction well location and screened intervals on Monday morning, 7 August 2006. Details will be provided by email.

5. If you have any questions or concerns, please contact Mr. Ken Smarkel at (916) 643-0830. ext 235.

STEVEN K. MAYER, PE
BRAC Environmental Coordinator

Attachment:
Final Technical Memorandum: Bldg. 243 (Prl S-8 and PRL S-15) SVE START Drilling

RESPONSES TO COMMENTS ON THE BUILDING 243 (PRL S-8 AND PRL S-15) SVE START DRILLING TECHNICAL MEMORANDUM, FORMER McCLELLAN AFB

Item	Reference	Reviewer	Comment	Response
GENERAL COMMENTS				
1.		U.S. EPA (Yvonne Fong)	No comments received.	However, Rich Howard of TechLaw, Inc., an EPA contractor, informally reviewed a previous version of the document and provided feedback to the Air Force that was incorporated into the current version.
1.		CA RWQCB	California Regional Water Quality Control Board, Central Valley Region (Regional Water Board) staff reviewed the subject document (Tech Memo), submitted on 22 June 2006. The purpose of the Tech Memo is to describe the modifications to the previously approved Final Soil Vapor Extraction START Sites Field Sampling Plan (FSP), dated November 2002. The modifications are to the section of the plan that addresses Building 243 (Sites PRL S-8 and PRL S-15). Regional Water Board staff has reviewed the Tech Memo and concur with the proposed modifications.	No response necessary.
1.		DTSC (Kevin Depies)	The document indicates that the potential for elevated volatile organic compounds in shallow soil gas (SSG) are part of the reason for conducting this START analyses, and presents the Air Force's SSG Preliminary Cleanup Goals. Please note that DTSC does not agree with the Air Force's SSG PCGs as discussed in several prior letters on the Breakout Shallow Soil Gas (BSSG) Feasibility Study (FS) and Draft Final BSS Record of Decision (ROD) and the Initial Parcel #2 ROD. Note, that all of our decisions will be based on the EPA proposed comprise PCGs documented in the BSSG FS.	Comment noted.
2.		DTSC (Kevin Depies)	It is unclear to us why the selected detection limits are so much higher than the laboratory is capable of attaining. A reporting limit of 0.5 parts per million volume is significantly higher than soil gas levels DTSC will apply towards the evaluation of risk and the need for cleanup.	The reviewer may be confusing the capabilities of a fixed laboratory and a portable, onsite laboratory. A fixed laboratory is capable of much lower detection limits because of more sensitive equipment used in a controlled environment. The reporting (0.5 ppmv) and detection (0.2 ppmv) limits being used for this project are standard for portable laboratory equipment used for onsite analyses. They are considered adequate to meet the objective of this project, which is to determine whether SVE is appropriate in the Building 243 area.

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3.		DTSC (Kevin Depies)	In prior discussions, we have maintained that to better evaluate the potential for SSG migration into a building, for a given boring, a sample should be collected immediately below the foundation base. For this evaluation to be complete, we recommend sampling be done at this depth from borings drilled within Building 243.	Nearly all of the RI data show higher VOC concentrations at approximately 10-12 feet bgs compared with 6-7 feet bgs in the same boring. This is shown on Figure 1 for PCE in RI borings B243SB016, B243SB019, B243SB029, and B243SB030, among others. These data imply even lower concentrations shallower, immediately below the foundation base. When the building foundation is cored and the borings hand-augered for utility clearance, a photoionization detector (PID) will be used to assess VOC concentrations immediately below the foundation.
4.		DTSC (Kevin Depies)	The investigation work proposed appears to be specifically focused towards meeting only the objectives of evaluating the need for SVE. This differs from what the Air Force does otherwise for most McClellan field efforts where data gathering methods may be adjusted to meet the needs of various McClellan environmental activities. For example, detection levels are unduly high and will not meet the need of the Remedial Investigation (RI) and Feasibility Studies for sites PRL S-8 and PRL S-15. Additionally, it's not clear what is being done for this work, but prior boring logging methods used for the SVE program at McClellan frequently did not meet RI or FS standards. For efficiency, we recommend that adjustments to the plan be made to meet the needs of other McClellan work underway (e.g, use lower detection levels, follow RI boring logging techniques, collect samples immediately below the building foundation base).	Additional soil samples for non-VOCs are being collected in Bay G as part of this effort. However, the reviewer is correct in that the work proposed is specifically focused towards meeting objectives of evaluating the need for SVE. The RI for this area is considered complete, a Feasibility Study is not considered necessary for a VOC removal action where SVE is the presumed remedy. The shallow soil gas issues may require further evaluation in the future, but the data acquired during this investigation should allow some assessment. It should be noted that any vapor wells installed will be sampled using much lower detection limits that may satisfy the reviewer's concerns.

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5.		DTSC (Kevin Depies)	There are several instances where the plan identifies the potential for further activities than those specifically proposed. These are presented in vague terms such as "may result in step out borings" (page 1, 4th paragraph), "might be drilled to groundwater" (page 2, 4th paragraph), "might also be collected" (page 2, 4th paragraph), and "likely be included" (page 2, 6th paragraph). This approach for discussing a field investigation is unusual and should be avoided. While we support a flexible plan that allows for decisions to be made in the field to adjust sampling locations and/or the need for collecting further data, the criteria for making these decisions should be made clear. The last referenced vague term ("likely to be included") refers to how the data will be reported. In addition to the need to have this information visible to all parties (including the general public), but especially since the Air Force has converted the SVE quarterly reports into mostly a 'data dump' with useful interactive tables and figures, the results of the investigation should be presented in a stand alone document that can be placed in regulatory files and the Administrative Record.	The vague terms are used to allow for flexible decision-making because every contingency cannot be foreseen and therefore the criteria for these decisions cannot be perfectly developed. However, as has been discussed, it is the Air Force's intention to include the regulators in the decision-making process. As for reporting, the Air Force is still considering how best to document this work. We understand the reviewer's concerns but would rather use vague terms than commit to a process that may be too rigid to change with changing conditions.
6.		DTSC (Kevin Depies)	The reporting units of parts per million by volume (ppmv) differ from the Building 243 START FSP and most other McClellan documents which use parts per billion by volume (ppbv). To avoid confusion and maintain consistency, we recommend you use ppbv units.	The McClellan SVE program normally uses ppmv for most reporting, however we will consider using ppbv.

RESPONSES TO COMMENTS ON THE BUILDING 243 (PRL S-8 AND PRL S-15) SVE START DRILLING TECHNICAL MEMORANDUM, FORMER McCLELLAN AFB

Item	Reference	Reviewer	Comment	Response
SPECIFIC COMMENTS				
1.		DTSC (Kevin Depies)	Table 3. The rationale for proposed boring B40 and it's potential conversion to an extraction or monitoring well is unclear to us. It is being placed near a previous boring that had very low-to-no VOCs detected (previous boring B2), yet the nearest previous boring to the east (B27R located approximately 150 feet away) had very high concentrations. It would seem more logical to place proposed boring B40 near or closer to previous boring B27R instead of previous boring B2 as proposed.	This boring was located outside of Bay G because of the potential logistical problems of drilling in this bay that do not exist in the other bays, in particular a basement area. This is also why Table 3 (boring/well rationale) states that this boring may be used as an SVE well if proposed boring B243SB037 cannot be drilled in Bay G. Otherwise, proposed boring B40 will be used to assess the extent of the VOCs found at 10.8 feet bgs in previous boring B27R, since previous boring B2 did not have a sample collected at that depth. An SVM well here will then be used to monitor SVE progress.
2.		DTSC (Kevin Depies)	Page 3, First Bullet. Please explain why no fixed gasses will be collected. If they are "unnecessary for the SVE system design" as indicated, then why were they in the initial START document?	The START FSP proposed fixed gases analyses primarily to assess potential explosive conditions in the suspected landfill areas (e.g., PRL 8) that were also to be drilled and evaluated for SVE as part of the work described in the document. This is not a concern in the Building 243 area.

URS

TECHNICAL MEMORANDUM

TO: Base Closure Team (BCT)

FROM: Ken Smarkel, Mitretek Systems, AFRPA SVE Remedial Project Manager

DATE: 31 July 2006 (revised from 21 June 2006 version)

RE: Bldg 243 (PRL S-8 and PRL S-15) SVE START Drilling

INTRODUCTION

The purpose of this technical memorandum (tech memo) is to outline soil vapor extraction (SVE) START drilling, sampling, and well installation tasks at volatile organic compound (VOC) sites PRL S-8 and

PRL S-15 in and around Building 243 at the former McClellan Air Force Base. This work was presented in the *Soil Vapor Extraction START Sites (2002) Field Sampling Plan* (START Field Sampling Plan [FSP], Jacobs, 2003), finalized in March 2003. The relevant text sections from that document are included as Attachment 1. The purpose of the proposed tasks is to assess whether SVE should be implemented in this area and, if appropriate, to install SVE wells.

The project objectives include confirming the detectable presence/extent of VOCs identified in soil gas samples during previous remedial investigation (RI) activities. Of greatest importance are those VOCs that exceeded calculated depth-specific groundwater maximum contaminant level (MCL)-equivalent concentrations in the previous samples and are, therefore, more likely to impact groundwater (Jacobs, 2003). Soil gas MCL-equivalent concentrations and their derivation are discussed in the *Addendum to the Basewide SVE Removal Action Work Plan* (URS Group, Inc., 2004). Depth-specific MCL-equivalent concentrations for a variety of VOCs are discussed and presented in the *Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report, October – December 2005* (URS Group, Inc., 2006). The two documents cited also discuss and present shallow soil gas (SSG) preliminary cleanup goals (PCGs) developed for VOCs in the subsurface shallower than 15 feet below ground surface (bgs) that may pose an unacceptable indoor air inhalation health risk. An additional objective of this project is to assess any detectable SSG VOC contamination.

The work will be performed as described in the START FSP, except for the deviations discussed in this tech memo. The reader is referred to the attachments and the START FSP for details.

The borings will be drilled to 100 feet bgs using hollow-stem augers. Soil gas samples will be collected at nominal depths of 5, 10, 15, 20, 40, 60, 80, and 100 feet bgs (eight samples per boring) and analyzed for VOCs by an on-site laboratory using Method M18MS. Boring conversion to SVE or soil vapor monitoring (SVM) wells will be based on the soil gas analytical results and professional judgment, as described in the START FSP. Soil gas VOC concentrations greater than 10 parts per million by volume (ppmv) in any sample that are not considered bounded by existing data may result in step-out borings drilled within 100 feet of the initial sample to better define contamination extent, as described in the START FSP.

In general, the borings containing the highest and most extensive soil gas VOC concentrations will be constructed as SVE wells, with a screen interval located to remediate those VOCs. Similarly, SVM wells

installed around an SVE well to monitor remediation progress will also generally be screened at intervals containing elevated soil gas VOC concentrations.

Analytical results and well construction decisions will be discussed with the regulatory agencies during the fieldwork.

The laboratory reporting limit and the detection limit are expected to be 0.5 and 0.2 ppmv, respectively. These limits are considered sufficient for the DQOs and to determine whether construction of an SVE well is appropriate, especially since tetrachloroethene (PCE), the main VOC of concern, has an SSG PCG of 1.0 ppmv and no depth-specific MCL-equivalent concentration less than 0.422 ppmv.

If soil gas VOC concentrations exceeding depth-specific MCL-equivalent concentrations are found at greater than 80 feet bgs in a boring, that boring might be drilled to groundwater (estimated at 110 to 120 feet bgs) where a HydroPunch groundwater sample will be collected. Sampling of groundwater is likely at boring B243SB036 (Figure 1), based on deep soil gas VOCs in nearby RI boring B243SB020. If groundwater VOC concentrations are present in a HydroPunch sample collected at B243SB036, a HydroPunch sample might also be collected at boring B243SB044 to evaluate the southern extent of that groundwater contamination.

START, EE/CA EVALUATIONS

The need for SVE will be assessed by evaluating the data collected during this effort using START evaluation criteria discussed in the START FSP and SVE feasibility criteria presented in the *Basewide Engineering Evaluation-Cost Analysis for Soil Vapor Extraction, General Evaluation Document* (Basewide SVE EE/CA, McClellan AFB, 1993). In particular, for the START evaluations, the soil gas data will be analyzed using the depth-specific VLEACH screening procedure described in the START FSP to assess the potential impact to groundwater. However, a formal START analysis will not be performed if the data clearly indicate that SVE is appropriate, a result that is expected based on the RI data.

The drilling results and the above evaluations will be documented in a technical memorandum, which will likely be included with an SVE Quarterly Vadose Zone Monitoring Report (although it could be published as a stand alone document, to be determined by the Air Force). All data collected, including boring and well construction information, will be submitted to the Air Force in their Environmental Restoration Program Information Management System (ERPIMS) format.

FSP DEVIATIONS

The following deviations from the START FSP are proposed:

- While the START FSP proposed analyzing some soil gas samples (mostly shallower than 20 feet bgs) by Method MTO-3, this analytical method will not be used. The specific analytes from this fuels analytical method are included in the M18MS analysis and the total petroleum hydrocarbons information, deemed necessary only for SVE system design, will be acquired from soil gas samples collected after well installation and analyzed by Method TO-15/TVH.

- No soil gas samples will be analyzed for fixed gases, as proposed in the START FSP, because these analytes are deemed unnecessary for SVE system design.
- Soil gas samples will be collected per Standard Operating Procedure (SOP)-054 (for vapor wells) and SOP-055 (for downhole samples), not per SOP McAFB-017. The latter SOP has been replaced by the other two.
- All borings will likely be drilled and sampled to at least 100 feet bgs, unless prevented by unforeseen conditions. The FSP stated that most borings would be drilled to 40 feet bgs and then evaluated for deeper drilling, based on soil gas sample results.
- Some boring and SVE/SVM well locations and rationale have been changed. Current boring and well location rationale is discussed in the sections below.
- No air permeability testing is proposed unless soil types logged in the borings appear to be significantly different than typical McClellan soils. Otherwise, design parameters used for other McClellan SVE sites will be considered applicable.
- No soil samples will be analyzed for physical properties unless soil types logged in the borings appear to be significantly different than typical McClellan soils. Otherwise, these parameters will be assumed to be similar to typical McClellan soils.

BUILDING 243 DATA

VOCs detected at Building 243 above depth-specific groundwater MCL-equivalent concentrations in RI soil gas samples collected from approximately 6 to 101 feet bgs included:

- PCE, to 170 ppmv, at 10.8 feet bgs;
- cis-1,2-Dichloroethene (DCE12C), to 25 ppmv, at 5.8 feet bgs; and
- Trichloroethene (TCE), to 12 ppmv, at 7.8 feet bgs.

Table 1 shows the depth-specific MCL-equivalent concentrations for these VOCs.

Table 1

Depth-Specific Soil Gas MCL-Equivalent Concentrations (ppmv)

Analyte	Depth Interval (feet bgs)					
	0-10	10-30	30-50	50-70	70-90	90-105
PCE	27	4.9	2.7	1.9	1.1	0.42
DCE12C	7.4	1.6	1.0	0.77	0.47	0.20
TCE	17	3.2	1.9	1.3	0.76	0.31

Some shallow PCE concentrations also exceed both residential and industrial SSG PCGs. Table 2 shows the residential and industrial SSG PCGs for the above VOCs.

TABLE 2

Air Force Shallow Soil Gas Preliminary Cleanup Goals for VOCs (ppmv)

Analyte	Residential Scenario	Industrial Scenario
PCE	1.0	7.1
DCE12C	100	830
TCE	2.9	22

Figure 1 shows that there are two separate soil gas plumes:

- One approximately centered on RI boring B243SB016 in Bay D in PRL S-15; and
- One approximately centered on RI boring B243SB028R in Bay G in PRL S-8.

PCE is the dominant contaminant, with the greatest concentrations (>10 ppmv), mostly between approximately 5 and 40 feet bgs. The exceptions were PCE at 36 and 16 ppmv at approximately 80 and 100 feet bgs, respectively, in RI boring B243SB020.

Figure 1 also shows PCE concentrations and the proposed Building 243 boring and SVE/SVM well locations. Figure 2 shows the ratio of PCE concentrations to the depth-specific MCL-equivalent values. Figure 3 shows the ratio of shallow PCE concentrations to the SSG PCG. The boring and SVE/SVM well location rationale is presented in Table 3.

TABLE 3

Building 243 Boring and SVE/SVM Well Location Rationale

Site	Boring	Rationale
Bldg 243 (PRL S-8)	B243SB034	Characterize the northern extent of VOCs found in RI borings B243SB029 and B243SB033, north of Bay G.
Bldg 243 (PRL S-8)	B243SB035	Characterize the eastern extent of VOCs found in RI boring B243SB025, east of Bay F.
Bldg 243 (PRL S-15)	B243SB036	Characterize the western extent of VOCs found in RI borings B243SB016 (Bay D) and B243SB020 (Bay E). Possibly collect a HydroPunch groundwater sample. Possibly convert to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB039.

TABLE 3

Building 243 Boring and SVE/SVM Well Location Rationale

Site	Boring	Rationale
Bldg 243 (PRL S-8)	B243SB037	Confirm the presence of VOCs found in Bay G RI borings B243SB027R and B243SB028R. Convert to an SVE well to remediate those VOCs.
Bldg 243 (PRL S-8)	B243SB038	Confirm the presence of VOCs found in RI borings B243SB029, B243SB030, and B243SB033, north of Bay G. Possibly convert to an SVE well to remediate those VOCs, or to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB037.
Bldg 243 (PRL S-15)	B243SB039	Confirm the presence of VOCs found in Bay D RI boring B243SB016. Convert to an SVE well to remediate those VOCs.
Bldg 243 (PRL S-8)	B243SB040	Confirm the presence of VOCs found in RI boring PS08SB002, west of Bay G. Possibly convert to an SVE well if boring B243SB037 cannot be converted, otherwise convert to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB037.
Bldg 243 (PRL S-8)	B243SB041	Characterize the eastern extent of VOCs found in Bay G RI boring B243SB028R. Convert to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB037.
Bldg 243 (PRL S-15)	B243SB042	Characterize the northern extent of VOCs found in Bay E RI boring B243SB020. Convert to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB039.
Bldg 243 (PRL S-15)	B243SB043	Characterize the eastern extent of VOCs found in RI B243SB016 (Bay D) and B243SB020 (Bay E). Convert to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB039.
Bldg 243 (PRL S-15)	B243SB044	Characterize the southern extent of VOCs found in the Bay C and D borings. Possibly collect a HydroPunch groundwater sample. Convert to an SVM well to monitor cleanup progress of the proposed SVE well at boring B243SB039.

REFERENCES

Jacobs, 2003. *Soil Vapor Extraction START Sites (2002) Field Sampling Plan.* Final. March.

Jacobs Engineering Group, Inc., 2000. *Installation Restoration Program (IRP). Interim Basewide Remedial Investigation Report, Parts 2E-2H – Remedial Investigation Characterization Summaries 2.* Final. June.

McClellan Air Force Base, 1993. *Basewide Engineering Evaluation-Cost Analysis for Soil Vapor Extraction, General Evaluation Document.*

URS Group, Inc., 2006. *Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report, October – December 2005.* March.

URS Group, Inc., 2004. *Addendum to the Basewide SVE Removal Action Work Plan.* Final. November.

TABLES

Table 1 – Depth-Specific Soil gas MCL-Equivalent Concentrations (ppmv)
Table 2 – Air Force Shallow Soil Gas Preliminary Cleanup Goals for VOCs (ppmv)
Table 3 – Building 243 Boring and SVE/SVM Well Location Rationale

FIGURES

Figure 1 – Building 243 PCE Concentrations
Figure 2 – Building 243 PCE Depth-Specific MCL Comparison
Figure 3 – Building 243 PCE SSG PCG Comparison

ATTACHMENTS

Attachment 1 – Building 243 (PRL S-8, PRL S-15) Field Sampling Plan (from START FSP)