Hornecker, Lynn M (EFDSW)

From: Hornecker, Lynn M (EFDSW)
Sent: Friday, October 04, 2002 11:30 AM
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Subject: Navy Responses to RWQCB Comments, UST Cluster 2, NASA Crows Landing Flight Facility

Hello Jim,

The Navy responses to RWQCB comments dated 18 September 2002 are attached.

We will notify you at least 72 hours in advance of planned soil sampling activities at UST Cluster 2.

Please do not hesitate to call if you have questions.

CLRTCUSTCluster2Int RptRWQCB3Oc...

V/R
Lynn Marie Hornecker
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4 October 2002

Date: 3 October 2002

RESPONSE TO COMMENTS FROM THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, CENTRAL VALLEY REGION
Subject: Interim Data Summary, UST Cluster 2 Soil Vapor Extraction Testing
NASA Crows Landing Flight Facility, Crows Landing, California (IT Corporation, July 2002)

Comment	Response
Comments dated 18 September 2002 prepared by James L. Barton, R. G., Associate Engineering Geologist, California Regional Water Quality Control Board, Central Valley Region, Sacramento, California. **Subject:** ***Transmittal, Interim Data Summary, UST Cluster 2 Soil Vapor Extraction Testing, NASA Crows Landing Flight Facility, Crows Landing, California***	
We have reviewed the Interim Data Summary, *UST Cluster 2 Soil Vapor Extraction Testing, NASA Crows Landing Flight Facility, Stanislaus County* (Report), received 25 July 2002. The Report provides the historical analytical and remedial action data and the conceptual model for Underground Storage Tanks (UST) Cluster 2. The Report also proposes six soil sampling locations to further evaluate the effectiveness of the soil vapor extraction (SVE)/biosparging remedial system (system). The system was used as an SVE system to remove Total Petroleum Hydrocarbons (TPH) as gasoline (TPH-g) as diesel (TPH-d), as jet fuel (TPH-j), as motor oil (TPH-o), and benzene-toluene-ethylbenzene-xylenes (BTEX) from the vadose zone soils. The Report states that the system operated as designed from 31 January to 2 June 2000. The Navy conducted performance testing in SVE mode until 24 September 2000. Between 26 September and 23 October 2000, the influent and individual SVE extraction wells were tested for average TPH vapor concentrations (TVPH) using flame ionization detector (FID), photo ionization detector (PID), and an oxygen analyzer to evaluate rebound effects in the vadose zone. Influent vapor was collected in SUMMA canisters and analyzed for TVPH monthly in a laboratory. The Report states that TVPH concentrations decreased significantly in all but two extraction wells, CL2-BV-01 and CL2-BV-02. Those wells showed significant rebound in concentrations, up to 2,530 parts per million by volume (ppmv) TVPH.	The interim report submitted for review was intended to provide preliminary data on SVE performance evaluation testing and propose soil sample location to verify the effectiveness of the SVE testing. Because the only previous soil sampling was conducted before the SVE/biosparge system operated, the proposed soil sampling will also evaluate the effectiveness of both the SVE/biosparge operation as well as the SVE performance evaluation testing. Preliminary data for the SVE/biosparge system operation and previous soil analytical data was provided for reference as an attachment to the interim report. As stated in the interim report, the SVE performance evaluation testing was conducted from 26 June through 4 December 2001. During system operation, samples from individual wells and the SVE system influent were analyzed weekly in the field for TVPH by FID and PID and for oxygen by an oxygen analyzer. Samples were collected monthly from the SVE system influent in SUMMA canisters for off-site laboratory analysis. The system was shut down from 26 September 2001 through 3 October 2001 (a typo in the report) for rebound testing. No sampling was conducted during the shutdown. When the system was restarted, samples were collected from each wellhead in SUMMA canisters for off-site laboratory analysis. Following rebound testing the system operated through 4 December 2001 with field analysis conducted weekly. Before the system was shut down on 4 December 2001 samples were collected at each wellhead for off-site laboratory analysis. The off-site analytical results for samples collected after rebound testing (3 October) and at the end of the SVE performance evaluation testing (4 December) are included in the table on Page 3 of the report. Significant decreases in TVPH were observed in wells CL2-BV-01 (initial concentrations greater than 4000 ppmv to final concentration less than 500 ppmv) and CL2-BV-02 (initial concentrations greater than 6000 ppmv to final concentrations less than 1000 ppmv) based on field data. Rebound was noted in both wells but it was not determined to be "significant" (less than 350 ppmv) relative to initial concentrations.

Comment	Response
General Comments	
In our letter dated 25 September 1998, we provided additional comment specifically to finalize the *Final Corrective Action Plan, Underground Storage Tank Sites, UST Cluster 1, Cluster 2, 109 and 117, Navy Auxiliary Field, Crows Landing, California,* (CAP, 30 June 1998). On 2 November 1999, we received the performance testing protocols and decision tree (Figure 3) for *UST Cluster 2, NASA Crows Landing Flight Facility, Draft Long-Term Performance Monitoring Plan* (Monitoring Plan, dated 1 November 1999). On 16 November 1999, a *Draft Corrective Action Plan Addendum, UST Cluster 1, Cluster 2, 109 and 117, Navy Auxiliary Field, Crows Landing, California* (Addendum) was issued, which was never finalized. The meeting minutes for the 20 January 2000 RPM Meeting state that all agencies agreed to use the Monitoring Plan decision tree (Figure 3) during the remediation at UST Cluster 2. The Report, however, states that the UST Cluster 2 performance testing was done in accordance with the protocol specified for UST Cluster 1 in *Soil Vapor Extraction Optimization for the Remediation of UST Cluster 1 and Site Verification Activities at Various Sites, NASA Crows Landing Flight Facility, Revision 2* (Work Plan), dated 4 May 2001. The Work Plan does not include Figure 3. Rebound testing described in the Report contradicts the protocol given in Figure 3. Figure 3 states that when wellhead vapor concentrations are below 2,500 ppmv and at asymptotic conditions, then the system would be shut down for one week, restarted, and evaluated for rebound effects. Additionally, if any wellhead in the system rebounds to 2,500 ppmv or more, then the SVE system would be restarted and run until TVPH soil gas concentrations dropped below 2,500 ppmv. System operation would continue until all wellheads showed minimal rebound effects. The Report states rebound was evaluated after two system failures occurred during a period of 53 days. System shutdown occurred on the day following the second system failure. Contradictions to the decision tree in Figure 3 include the following:	The attached table provides a history of the documents and activities related to UST Cluster 2. The Navy proposes to utilize cost-effective and efficient treatment strategies wherever practicable. SVE was not included in the final CAP but was added during the design phase to collect and remove the volatile petroleum hydrocarbons based on the results of pilot testing. The SVE system was installed and operated in conjunction with the biosparging system from 31 January 2000 through 2 June 2000 and removed approximately 3,200 pounds of petroleum hydrocarbons. Vapor concentrations measured during the SVE/biosparge system operation indicate that the system had reached asymptotic conditions and levels were low enough at each wellhead to switch to biovent mode. SVE proved to be cost effective at removing contamination during the initial SVE/biosparge system operation. The majority of the contamination at UST Cluster 2 had a relatively high volatility, which was not consistent with assumptions made in the CAP. SVE performance evaluation testing was conducted to further evaluate the effectiveness of SVE and to minimize the spread of contaminants in the vadose zone. Revision 1 of the work plan included Attachment 5 "UST Cluster 2 Soil Vapor Extraction Testing" that provided the details for the SVE performance evaluation testing. A draft of the work plan was submitted for comments on 10 October 2000, and comments were received from the RWQCB on 19 October 2000. No comments were provided pertaining to the UST Cluster 2 SVE testing. The decision tree for determining when to switch the SVE/biosparge system to biovent/biosparge mode does not apply to the SVE performance evaluation testing and it was not included in the work plan. Rebound testing was conducted as part of the SVE performance testing. The system was shut down for one week on 26 September 2001 and restarted on 3 October 2001. The text contains a typo that indicates the system was restarted on 23 October; this is incorrect. The charts in Attachment 3 and system operating hours provided in the text are correct. TVPH concentrations were measured in the field before and after the system was shut down. The TVPH concentrations did rebound in wells CL2-BV-01 (900 ppmv to 1250 ppmv by FID) and CL2-BV-02 (1550 ppmv to 1850 ppmv by FID). The concentrations did not double during the rebound testing and the rebound was small relative to the initial concentrations in each well. SUMMA canister samples were collected from each well following the rebound testing and were relatively consistent with the field results (1290 ppmv for CL2-BV-01 and 2530 ppmv for CL2-BV-02).

Comment	Response
• Rebound testing lasted one month, not one week; • TVPH concentrations increased above decision tree levels in well CL2-BV-02 to 2,530 ppmv by FID after one month, but the system was not restarted; • CL2-BV-01 and CL2-BV-02 showed significant increases (double the FID concentrations at shutdown) during the rebound testing, yet the system was not restarted; Regional Board staff did not approve the deviations from Figure 3. Please provide the rationale for deviation from the approved Monitoring Plan in the Draft Closure Plan for UST Cluster 2.	After the rebound testing the system continued to operate for two months. The final concentrations from each wellhead, measured from samples collected in SUMMA canisters, were lower than the levels prior to the shutdown for rebound testing (CL2-BV-01 – 671 ppmv, CL2-BV-02 – 1310 ppmv). Soil samples will be collected to evaluate the effectiveness of the SVE performance evaluation testing and the initial SVE/biosparge system operation. A final remedial approach for soil at UST Cluster 2 (to continue the corrective action or propose closure) will be determined based on the results of the soil samples. A closure report will be submitted to the RWQCB for approval when it is determined that the corrective action goals have been met and will include sufficient evidence.
Specific Comments	**Response**
1. Page 3, second table of soil sample locations: a) The table shows that verification soil sample depths vary between 22 feet and 35 feet below ground surface (bgs). The table uses four different vertical depth spacing variations (5, 8, 10, and 13 feet) at six locations. The text does not explain the rationale for the wide variation in soil sample spacing. b) The most recent available groundwater data (February 2002) shows that the winter water table at the site varies from 37 to 43 feet bgs. Groundwater levels typically drop during the dry summer months. The Report, Attachment 1 Historical Soil Analytical Data cross-sections (A-A' and B-B') show that soil staining extended down to almost 50 feet bgs at CL2-MW-02, CL2-MW-05 and CL2-SP/BV-01. Therefore, we request that the Navy take additional soil samples at depths greater than 35 feet, down to the groundwater table, using either a 5-foot vertical sample spacing, or at depths correlating to know TPH-d concentrations from previous investigations. See Specific Comments 3, 4 and 5.	The rationale provided for the sample depth spacing is included on the sampling forms in Attachment 4 of the interim report. Samples will be collected at the depth below the former tank excavation and at the historic water level. The depth of the former tank excavation was not consistent across the site and the proposed depth of the sample is consistent with historical records and previous sample locations. The majority of previous deep soil samples were collected from approximately 35 to 37 feet bgs. Historic groundwater data indicates that where A-zone wells (screened from 28 to 38 feet bgs) showed detectable levels of TPH in groundwater, nested B-zone wells (screened from 41 to 51 feet bgs) were non-detect. It is likely that the majority of the contamination in the vadose zone is smeared in the soil above the historical water level within the A-zone screen range and not at the current water level within the B-zone screen range. The historical water level shown on the drawings in Attachment 1 of the report is approximately 34 feet bgs. A soil sampling depth of 35 feet bgs was chosen to gather information on contaminant levels just below historical water levels and is consistent with previous sample locations. All proposed soil borings will be extended to a depth of 40 feet bgs to allow for logging the soil above the water table. Additional samples may be collected, up to the depth of the current water table, if field observations indicate significant contamination below the proposed sample depth of 35 feet bgs. Previous indications of soil staining are not consistent with analytical results. The sample from 36 feet bgs at location SB2-1, SB2-2, and SB2-11 indicated soil staining but had non-detectable concentrations of extractable THP. Soil staining is not a good indicator for directing soil sampling to verify TPH concentrations in soil.

Comment	Response
2. Appendix A, Site-Specific Groundwater (and Soil) Sampling Form (Forms): The Forms show that samples will be analyzed for volatile organic compounds (including benzene-toluene-ethylbenzene-xylenes), TPH-d, TPH-g, TPH as jet fuel, and TPH as motor oil. We request that the soil sample(s) with the highest TPH concentration(s) also be analyzed for TPH using the Waste Extraction Test (WET) with a centrifuge separation preparation (not paper filtration), to allow Regional Board staff to evaluate leachability and the remaining threat to water quality from any remaining petroleum hydrocarbons.	Historical data presented in Attachment 1 of the interim report provides the results from five samples that were analyzed for TPH using the CCR Title 22 WET with deionized water in addition to TPH without WET preparation. The results indicate that the leachability of the extractable TPH at UST Cluster 2 was minimal. To verify previous results, a minimum of two samples with the highest TPH concentrations will be analyzed for TPH-d using CCR Title 22 WET with deionized water and centrifuge separation. Because the WET aerates the sample during preparation, the extract will not be analyzed for gasoline. The data will be used as necessary in determining the risk to potential receptors from petroleum hydrocarbons remaining in soil.
3. Appendix A, Site-Specific Groundwater Sampling Form (Forms): One Form proposes a sample location near former soil sample location SB2-9 with proposed soil sample depths of 22 and 35 feet bgs. The Report cross-section C-C' shows that contamination does not exist below 33 feet bgs at SB2-9. Please change the proposed 35 foot depth sample (CL2-GP-01) to 32 feet bgs.	Previous soil samples were collected at location SB2-9 at depths of 22 feet bgs and 36 feet bgs. The data indicates contamination detected at 22 feet (above the historic water level) and non-detectable at 36 feet bgs (below the historic water table). The extent of contamination that is indicated on the figure in Attachment 1 of the interim report is arbitrary. The proposed sample depth (35 feet) is at the historic water level, which is consistent with the rationale for the investigation at other locations at UST Cluster 2 (see response to Specific Comment 1). Additional samples may be collected, up to the depth of the current water table, if field observations indicate significant contamination.
4. Appendix A, Site-Specific Groundwater Sampling Form (Forms): One Form proposes a sample location near former soil sample location SB2-2A. The Report does not provide a cross-section with depth-specific data, or data in Table 4-4, for SB2-2A. Without data for SB2-2A, we cannot evaluate the new proposed sample location. A nearby location, SB2-2, was non-detect at all soil sample depths. The Report cross-section A-A' shows that nearby monitoring well CL2-MW-02 reported TPH-d in soil at 27 feet bgs (2700 mg/kg), 36 feet bgs (2900 mg/kg), and 42 feet bgs (3250 mg/kg). Please switch this sample location to a location closer to CL2-MW-02, to evaluate soil at an area of higher reported TPH-d concentrations.	The lateral extent of the plume is approximately 100 feet by 80 feet. As shown in the figure included in Attachment 4 of the interim report, sample locations 2, 3, and 4 are all located within approximately 20 feet of CL2-MW-02 to verify the concentration of petroleum hydrocarbons in the soil. Piping from the corrective action treatment system and above ground structures limit the placement of sample locations. Sample location 3 was specifically located approximately 15 feet downgradient of monitoring well CL2-MP-02A, where high petroleum hydrocarbon concentrations were found in groundwater at the historic groundwater surface. Data from a sample collected from that location will be used verify the TPH concentrations at the historic groundwater surface where previous data from SB2-2A was unavailable.

Comment	Response
5. Appendix A, Site-Specific Groundwater Sampling Form (Forms): One Form proposes a sample location near former soil sample location SB2-6, at 25, 30, and 35 feet bgs. SB2-6 soil analysis reported the highest concentration of TPH-d (5200 mg/kg) at 40 feet bgs. Please add a 40 foot depth sample, and move this proposed location to a new location between SB2-6 and CL2-SP/BV-01 (4600 mg/kg at 25 feet bgs). If you decide to keep the original proposed location near SB2-6, then add an additional sample location and sample depths as requested.	The deepest sample collected from the former location SB2-6 was from a depth of 38 feet bgs, which was approximately 4 feet below the historic groundwater surface when the samples were collected. Saturated soil samples do not represent contaminants in the soil but include contaminants in the soil and the groundwater. If a high concentration of contaminants was present at the groundwater surface when the sample was collected (which is likely based on the TPH concentrations in soil at the 30 foot depth) it is possible that sampling methods disturbed the sample and impacted the sample results. The proposed sample depth (35 feet bgs) is below the historic groundwater surface and the data collected will be used to verify TPH concentrations where the highest concentrations are most probable based on previous results. All proposed soil borings will be extended to a depth of 40 feet bgs to allow for logging the soil above the water table. Additional samples may be collected, up to the depth of the current water table, if field observations indicate significant contamination below the proposed sample depth of 35 feet bgs. Proposed sample location 5 is 5 feet downgradient of the former sample location SB2-6 and less than 15 feet from CL2-BV-01. Placement of the proposed sample location is limited by piping and surface structures related to the corrective action treatment system. An additional sample located between SB2-6 and CL2-BV-01 is not necessary the verify TPH concentrations in the area based on the scale of the site.
We concur with the UST Cluster 2 soil sampling proposal, if modified as requested in our comments. We believe it would be beneficial to discuss SVE Start/Stop Criteria and closure criteria for UST Cluster 2 prior to conducting the fieldwork, to ensure that the data collected are adequate to support any decisions.	Soil sampling is scheduled to be conducted in October 2002. As requested, the RWQCB and NASA will be notified more than 72 hours prior to the start of fieldwork. Selected samples will be tested for TPH-d by CCR Title 22 WET using deionized water in addition to analysis included in the interim report. All proposed soil borings will be extended to a depth of 40 feet bgs to allow for logging the soil above the water table. Additional samples may be collected, up to the depth of the current water table, if field observations indicate significant contamination below the proposed sample depth of 35 feet bgs. No additional changes will be made to the sampling proposed in the interim report.

Historical Activities
UST Cluster 2 (USTs CL-7, CL-8, & CL-9)
NASA Crows Landing Flight Facility

Activity	Date	Comment
Tanks constructed	1952	CL-7, CL-8, and CL-9 (210,000 gallon each – reportedly used to store JP-4 and JP-5)
Tanks taken out of service	1965	
Naval Auxiliary Landing Field Crows Landing, Underground Storage Tank (UST) Closure Investigation, US T Clusters 1 and 2 (PRC 1991)	1990	Soil samples collected during monitoring well installation.
Groundwater monitoring	1994 – 1998	Routine monitoring results for various UST Cluster 2 wells were published in quarterly and annual groundwater monitoring reports.
Tanks removed	Fall 1994	Impact discovered at dry well adjacent to east side of each tank and at a vent pipe at the north edge of tank CL-9.
Underground Storage Tank Problem Assessment Report, UST Cluster 1, Cluster 2, 109, and 107 (PRC 1997)	1995 - 1996	Summary of soil and groundwater investigations conducted through 1996.
Biovent and biosparge pilot testing	June 1997	Biovent testing included extraction and injection mode.
Naval Auxiliary Landing Field Crows Landing, California, Final Corrective Action Plan, Underground Storage Tank Sites UST Cluster 1, Cluster 2, 109, and 117 (TtEMI 1998)	1998	Bioventing and biosparging proposed for corrective action at UST Cluster 2. Initial operation of SVE was not warranted due to lower concentration of BTEX and lighter end petroleum hydrocarbons. Soil cleanup goals defined to ensure that chemical of concern remaining in the vadose zone will not cause leachate concentrations that discharge to groundwater to exceed applicable groundwater cleanup levels.
UST Cluster 2 NASA Crows Landing Flight Facility Design Basis Report, Revised Definitive Design (TtEMI 1999)	April 1999	Included SVE for initial system operation to expedite soil cleanup because of high concentrations of petroleum hydrocarbons in soil gas during pilot testing. Decision tree added as guidance to determine when SVE operation to be converted to biovent operation. Does not define soil sampling or analysis.
UST Cluster 2 NASA Crows Landing Flight Facility Draft Long-Term Performance Monitoring Plan (TtEMI 1999)	1 November 1999	Never finalized.
UST Cluster 2 NASA Crows Landing Flight Facility Draft Operation and Maintenance (O&M) Manual (TtEMI 1999)	5 November 1999	Never finalized.
NASA Crows Landing Flight Facility, Draft Corrective Action Plan Addendum, Underground Storage Tank Sites, UST Cluster 1, Cluster 2, 109, and 117 (TtEMI 1999)	16 November 1999	Never Finalized. Provides minimal information on UST Cluster 2 (status of construction only).
Corrective action system installation	May – December 1999	

Historical Activities
UST Cluster 2 (USTs CL-7, CL-8, & CL-9)
NASA Crows Landing Flight Facility

Activity	Date	Comment
Corrective action system operation	31 January–2 June 2000	Operated in SVE/biosparge mode. 3,200 pounds petroleum hydrocarbons removed by SVE.
Soil Vapor Extraction Optimization for the Remediation of UST Cluster 1 and Site Verification Activities at Various Sites Work Plan, Revision 1 (IT 2000)	October 2000	Attachment 5, "UST Cluster 2 Soil Vapor Extraction Testing" provides plans for SVE performance evaluation testing at UST Cluster 2 to further evaluate effectiveness of continued SVE operation.
Groundwater monitoring	November 2000 - present	Routine monitoring results for various UST Cluster 2 wells were published in quarterly and annual groundwater monitoring reports.
SVE Performance evaluation testing	26 June 2001 – 4 December 2001	Field measurements of TVPH weekly. Samples collected from SVE influent for off-site analysis monthly. Final samples collected from each well head for off-site analysis at system shutdown.
Rebound testing	26 September 2001 – 3 October 2001	Samples collected from each wellhead for off-site analysis when system restarted after rebound testing.
Proposed soil sampling	October 2002	To be conducted to verify concentrations of petroleum hydrocarbons in soil after SVE/biosparge operation and SVE performance evaluation testing.

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