APPENDIX B-2

Data Quality Evaluation Reports – Soil
Second and Third Quarter 2011

THIS PAGE INTENTIONALLY LEFT BLANK

B-2. DATA QUALITY EVALUATION REPORTS – SOIL SECOND AND THIRD QUARTER

1. LABORATORY DATA QUALITY SUMMARY, SECOND QUARTER 2011 SOIL SAMPLING, APRIL – JUNE 2011

This laboratory data quality summary describes the findings of the review of data from the Second Quarter 2011 soil vapor monitoring well installation soil sampling event and is provided to document the quality of the analytical data used in the *Quarterly Pre-Remedy Monitoring and Site Investigation Report for April – June 2011, Bulk Fuels Facility (BFF) Spill, Solid Waste Management Units ST-106 and SS-111* (U.S. Army Corps of Engineers [USACE], 2011a). This report addresses soil sampling data collected during Second Quarter 2011, but addresses only the data for soil samples that were collected from May 19 to June 16, 2011. Sampling procedures and overall quality control (QC) and quality assurance protocols for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event are presented in the *Quality Assurance Project Plan (QAPjP), BFF Spill, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico* (USACE, 2011b).

During the period from May 19 through June 16, 2011, 52 soil samples, 6 field duplicates, 4 field blanks, 4 equipment rinse blanks, and 8 trip blanks were collected and submitted to Gulf Coast Analytical Laboratories, Inc. (GCAL), Baton Rouge, Louisiana, for analyses. The laboratory holds a current U.S. Department of Defense (DoD) Environmental Laboratory Accreditation Program certification to perform the listed analyses.

Soil boring samples were analyzed for the following list of parameters:

- Volatile organic compounds (VOCs) – U.S. Environmental Protection Agency (EPA) SW8260B;
- Semivolatile organic compounds (SVOCs) – EPA SW8270D;
- Total petroleum hydrocarbons (TPH)-gasoline range organics (GRO) (C6-C10) – EPA SW8015B;
- TPH-diesel range organics (DRO) (C10-C28) – EPA SW8015B; and
- Lead – EPA SW6010C.

All analytical results obtained for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event were submitted in sample delivery groups (SDGs) 211061111, 211052503, 211061625, 211061705, 211061803, 211060401, and 211060718 (Appendix B2 – Table 1, provided at the end of this report). Appendix B2 – Table 2 to this report summarizes the location identification (ID), the sample ID, sample purpose, date of collection, GCAL's sample ID, and the specific analytical program for each sample collected during the Second Quarter 2011 soil vapor monitoring well installation soil sampling event. An EPA Level III data review was performed on analytical results for the seven SDGs. The review was performed in accordance with the guidelines and control criteria specified in the following documents:

- The site-specific BFF Spill QAPjP (USACE, 2011b);
- *DoD Quality Systems Manual for Environmental Laboratories (QSM), Version 4.2* (DoD, 2010);
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA, 2006) (SW-846, 2006 and updates);
- USACE EM 200-1-10, *Environmental Quality – Guidance for Evaluating Performance-Based Chemical Data* (USACE, 2005);
- *USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008); and
- *USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Superfund Data Review*, Final (EPA, 2010).

The following QC elements were included in the EPA Level III data review:

- Sample preservation and sample extraction and analysis holding times;
- Laboratory method blanks;
- Initial and continuing calibration blanks (metals only);
- Surrogate recoveries (organic analyses);
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) recoveries;
- Matrix spike (MS)/matrix spike duplicate (MSD) recoveries;
- Relative percent differences (RPDs);
- Initial calibration and verifications;

- Continuing calibration verifications (CCVs);
- Inductively coupled plasma (ICP) interference check samples (metal analysis only);
- ICP serial dilution (metal analysis only);
- Internal standards;
- Field blanks; and
- Field duplicates.

Analytical data were reviewed in terms of precision, bias, representativeness, comparability, and completeness as follows:

- *Bias* is demonstrated by recovery of target analytes from fortified blank and sample matrices, LCS/LCSD, and MS/MSD samples, respectively. For organic methods, bias is also demonstrated through recovery of surrogates from each field and QC sample. The recovery of target analytes from fortified samples is compared to the acceptance criteria defined in the QAPjP (USACE, 2011b) and DoD QSM (DoD, 2010). When the acceptance criteria are not available in the QAPjP or DoD QSM, results are compared to the laboratory in-house control limits. When these criteria are not met, the data are flagged accordingly.

- *Precision* is expressed as the RPD between the results of replicate sample analyses: sample duplicates, LCSDs, and MSDs. When analyte RPDs exceed the acceptance criteria, the data are flagged accordingly.

- *Representativeness* of the samples submitted for analysis is ensured by adherence to standard sampling techniques and protocols.

- *Comparability* of sample results is ensured through the use of approved sampling and analysis methods.

- *Completeness* is expressed as a ratio of the number of usable data results to the total of analytical data results.

The following sections present EPA Level III data review findings. The discussion summarizes data quality outliers and their potential impact on the data quality and usability of analytical results. Appendix B2 – Table 3 (provided at the end of this report) presents definitions of data qualification and reason codes applied to the analytical results.

1.1 Reason Codes

1.1.1 Sample Preservation, Sample Extraction and Analysis Holding Times (Reason Code H)

The sample coolers and samples were received intact at the laboratory within the required 0 to 6 degrees Celsius (°C) and in compliance with EPA and Standard Method preservation requirements with the exception of SDG 211060401. Cooler temperatures for SDG 211060401 were recorded at 13.1 and 7.0°C. Based on professional judgment, TPH-GRO, TPH-DRO, VOC, and SVOC results reported for samples SB0214, SB0215, SB0216, SB0217, SB0218, SB0219, SB0220, SB0221, SB0222, SB0223, SB0224, and SB0225 were qualified as estimated ("J" or "UJ") due to the elevated cooler temperatures at time of receipt. The results may be biased low. Preserving TPH-GRO and VOC fractions in TerraCore® samplers prior to shipment reduced the impact of elevated cooler temperatures on the de-volatilization of target analytes in the impacted samples. Sample holding times were evaluated by comparing the sample collection dates to the sample extraction and analysis dates. Extraction and analysis holding times were reviewed for all samples to determine the validity of the sample results. No holding times were exceeded.

1.1.2 Laboratory Method Blanks (Reason Code B1)

The field sample results were evaluated with respect to the laboratory method blank prepared and analyzed for each analytical batch and for each analytical method. Positive results in the laboratory method blanks for EPA Methods SW8260B and SW8270D were observed and are summarized in Table 1.1-1 as follows:

Table 1.1-1. Summary of Laboratory Method Blank Contamination and Impacted Data

Analytical Method	Laboratory QC Batch Number	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	MB951794	m,p-Xylenes	1.12	4.00	"U" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0195, SB0199
		Ethylbenzene	0.293	2.00	"U" qualified for analyte in SB0188, SB0189, SB0191, SB0192, SB0194, SB0199
		Toluene	0.478	2.00	"U" qualified for analyte in SB0186, SB0191, SB0192, SB0193, SB0194, SB0196, SB0197, SB0198
		o-Xylene	0.262	2.00	"U" qualified for analyte in SB0188, SB0195, SB0199
		Xylenes (Total)	1.38	6.00	"U" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0195, SB0199
SW8260B	MB953624	Methylene chloride	1.31	5.00	None
		Toluene	0.527	2.00	"U" qualified for analyte in SB0214, SB0215, SB0221, SB0222, SB0224, SB0225
SW8260B	MB955563	m,p-Xylenes	1.37	4.00	"U" qualified for analyte in SB0227, SB0228
		Xylenes (Total)	1.37	6.00	"U" qualified for analyte in SB0227, SB0228
		Methylene chloride	1.24	5.00	None
		Toluene	0.316	2.00	"U" qualified for analyte in SB0226
SW8260B	MB956434	Chloroform	0.622	2.00	"U" qualified for analyte in SB0174
		Toluene	0.348	2.00	"U" qualified for analyte in SB0173, SB0176, SB0177, SB0178, SB0179, SB0180, SB0183
SW8260B	MB957919	1,2,4-Trichlorobenzene	0.428	2.00	None
		1,2,3-Trichlorobenzene	0.623	2.00	None
		Toluene	0.334	2.00	"U" qualified for analyte in SB0201, SB0204
SW8270D	MB957949	bis-(2-Ethylhexyl)phthalate	117	330	"U" qualified for analyte in SB0201, SB0202, SB0203, SB0205, SB0206
SW8260B	MB959553	Methylene chloride	2.02	5.00	None
SW8260B	MB959080	Methylene chloride	1.79	5.00	None
		Benzene	0.747	2.00	"U" qualified for analyte in SB1744
		Toluene	0.287	2.00	None
SW8260B	MB959553	Methylene chloride	2.02	5.00	None

LOQ Limit of quantitation
ppb Parts per billion

Based on the DoD QSM requirements (DoD, 2010), laboratory method blank levels are considered acceptable when contaminant levels in the blank are less than one-half the LOQ for target analytes and less than the LOQ for common laboratory contaminants, such as acetone, toluene, and methylene chloride. Table 1.1-1 summarizes method blank contamination and impacted sample results. As a result of the blank detections, the impacted results were qualified as non-detected (U). The detected concentrations in the samples are less than or equal to five times the corresponding level detected in the blank. The detected result for toluene was also qualified as non-detected (U) at the LOQ when the detected sample result was less than 10 times the blank level. The blank qualification has no impact on the data usability.

1.1.3 Initial and Continuing Calibration Blanks (Reason Code B2)

In addition to the laboratory method blank for metals, initial and continuing calibration blank results were reviewed to ensure that the instrument was free of contamination prior to the analyses. Positive results in the laboratory initial and continuing calibration blanks for EPA Method SW6010C were observed and are summarized in Table 1.1-2 as follows:

Table 1.1-2. Summary of Laboratory Initial and Continuing Calibration Blank Contamination and Impacted Data

Analytical Method	Instrument ID (Date) Blank Type	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW6010C	ICP5 (06/21/11) ICB	Lead	1.90	5.00	None
SW6010C	ICP5 (06/21/11) CCB	Lead	1.50	5.00	None

ICB Initial calibration blank
CCB Continuing calibration blank

No qualification of the data is required based on contamination detected in the ICB and CCB. Detected concentrations of lead in the associated samples are greater than five times the corresponding levels detected in the ICB and CCB.

1.1.4 Surrogate Recoveries (Reason Code S)

Surrogate standards are organic compounds added to field and laboratory QC samples for organic analysis to evaluate matrix effect and method performance on an individual sample basis. Biased surrogate recoveries were noted for EPA Methods SW8260B, SW8270D and SW8015B, summarized in Table 1.1-3 as follows:

Table 1.1-3. Summary of Surrogate Recovery Outlier and Impacted Data

Analytical Method	Sample	Surrogate Recovery Outlier (%)	Control Limit (%)	Qualifier
SW8270D	SB0186	Nitrobenzene-d5 (0%)	35-100	None
		2-Fluorobiphenyl (0%)	45-105	None
		Terphenyl-d14 (0%)	30-125	None
		Phenol-d5 (0%)	40-100	None
		2-Fluorophenol (0%)	35-105	None
		2,4,6-Tribromophenol (0%)	35-125	None
SW8015B	SB0216	o-Terphenyl (0%)	67-120	None
SW8015B	SB0172	o-Terphenyl (0%)	67-120	None
SW8015B	SB0185	o-Terphenyl (0%)	67-120	None
SW8015B	SB0204	o-Terphenyl (0%)	67-120	None

In sample SB0186 for SVOC analysis, elevated internal standard area counts were reported for perylene-d5. Sample SB0186 was diluted at a “10x” dilution factor and, consequently, all surrogate recoveries were diluted out. Sample SB0186 SVOC results reported for the 10x dilution were not qualified for surrogate recoveries reported outside QC criteria.

In samples SB0172, SB0185, SB0204, and SB0216 for TPH-DRO, elevated TPH-DRO concentrations were observed. In order to bring the sample result within the range, samples SB0172, SB0185, SB0204, and SB0216 were diluted at a dilution factor of 10x or greater. Data qualification was not applied to the TPH-DRO results because of the required dilutions.

Except as noted, surrogate recoveries in other samples analyzed for VOCs, SVOCs, TPH-GRO, and TPH–DRO meet the acceptance criteria.

1.1.5 Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries (Reason Codes L and D1)

The LCS is an aliquot of analyte-free matrix spiked with target analytes that is prepared with each analytical batch for each analytical method. The recovery of target analytes from the LCS analysis is a measurement of method performance in an interference-free sample matrix. LCS recovery biases were reported for EPA Methods SW8260B and SW8270D, presented in Table 1.1-4 as follows:

Table 1.1-4. Summary of LCS/LCSD Recovery and RPD Outliers and Impacted Data

Analytical Method	Laboratory QC Batch Number	LCS/LCSD Recovery/RPD Outliers (%)	Control Limit (%)	Qualifier
SW8270D	457121	Pyridine (43% RPD)	0-30	"UJ" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
SW8270D	457722	Anthracene (106%/ok)	55-105%	None
		Hexachlorocyclopentadiene (119%/ok)	48-116%	None
SW8270D	457826	Hexachlorocyclopentadiene (ok/121%)	48-116%	None
		3,3'-Dichlorobenzidine (36% RPD)	0-30	"UJ" qualified for analyte in SB0226, SB0227, SB0228
		4-Chloroaniline (56% RPD)	0-30	"UJ" qualified for analyte in SB0226, SB0227, SB0228
		Aniline (43% RPD)	0-30	"UJ" qualified for analyte in SB0226, SB0227, SB0228
SW8270D	458251	Pyridine (35% RPD)	0-30	"UJ" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0180, SB0181, SB0182, SB0183, SB0184, SB0185
SW8270D	458485	Acenaphthylene (ok/107%)	45-105%	None
		Anthracene (107/112%)	55-105%	None
		Aniline (58% RPD)	0-30	"UJ" qualified for analyte in SB0179
		Hexachlorocyclopentadiene (ok/119%)	48-116%	None
		Pyridine (37% RPD)	0-30	"UJ" qualified for analyte in SB0179
		m,p-Cresols (ok/107%)	40-105%	None

Table 1.1-4. Summary of LCS/LCSD Recovery and RPD Outliers and Impacted Data (Concluded

Analytical Method	Laboratory QC Batch Number	LCS/LCSD Recovery/RPD Outliers (%)	Control Limit (%)	Qualifier
SW8270D	458656	4-Chloroaniline (40% RPD)	45-105%	"UJ" qualified for analyte in SB0200, SB0201, SB0202, SB0203, SB0204, SB0205, SB0206
		Acenaphthylene (107/112%)	45-105%	None
		Anthracene (107/111%)	55-105%	None
		Aniline (32% RPD)	0-30	"UJ" qualified for analyte in SB0200, SB0201, SB0202, SB0203, SB0204, SB0205, SB0206
		m,p-Cresols (ok/111%)	40-105%	None
SW8270D	458727	Anthracene (109/107%)	55-105%	None
SW8270D	458852	Anthracene (112/116%)	55-105%	None

Table 1.1-4 summarizes LCS/LCSD outliers and impacted sample results. Impacted results were qualified as estimated (J) or estimated non-detections (UJ). This data qualification was applied to all samples in the non-compliant batches. As shown in Table 1.1-4, the reported LCS recovery biases do not significantly deviate from their respective lower or upper control limits, and therefore the data usability is not affected. In addition, high LCS recovery biases were noted for other VOC and SVOC analytes in several batches. Because these analytes were not detected in any samples, the sample results are not affected by the high LCS recovery biases, and no data qualification is warranted.

1.1.6 Matrix Spike/Matrix Spike Duplicate Recoveries (Reason Code M)

The MS and MSD samples are a portion of a field sample spiked with target analytes that are prepared with each analytical batch. The MS/MSD results are used to evaluate any bias introduced into the method due to matrix interference and to measure bias and precision for each analytical batch. In accordance with the QAPjP requirements (USACE, 2011b), the MS/MSD samples are to be collected at a rate of 1 per 20

soil samples. Table 1.1-5 identifies the site-specific MS/MSD samples collected during the Second Quarter 2011 soil vapor monitoring well installation soil sampling event.

Table 1.1-5. Site-Specific MS/MSD Samples and Corresponding Analytical Suite

Well Location	Sample Number	MS/MSD Analysis
KAFB-106121	SB0190	VOCs, SVOC, TPH-GRO, TPH-DRO, Metals
KAFB-106123	SB0217	VOCs, SVOC, TPH-GRO, TPH-DRO, Metals
KAFB-106120	SB0173	VOCs, SVOC, TPH-GRO, TPH-DRO, Metals
KAFB-106122	SB0200	Metals
KAFB-106122	SB0206	SVOC
KAFB-106122	SB0207	VOCs, SVOC, TPH-GRO, TPH-DRO, Metals
KAFB-106122	SB0211	TPH-DRO

KAFB Kirtland Air Force Base

The RPDs between the MS and MSD recoveries meet the precision acceptance criteria for all the listed analyses; however, numerous MS/MSD RPD values for VOCs are unusable due to the different amount of spike added for each MS and MSD sample. Table 1.1-6 summarizes MS/MSD outliers and impacted sample results.

Table 1.1-6. Summary of MS/MSD Recovery Outliers and Impacted Data

Analytical Method	Spiked Sample	MS/MSD Recovery Outliers (%)	Control Limit (%)	Qualifier
SW8260B	SB0190	1,1,2,2-Tetrachloroethane (ok/141%)	55-130	None
		1,2,3-Trichloropropane (ok/142%)	63-130	None
		1,2,3-Trichlorobenzene (56%/ ok)	60-135	“UJ“ qualified for analyte in SB0190
		1,2,4-Trichlorobenzene (60%/62%)	65-130	“UJ” qualified for analyte in SB0190
		1,2-Dibromo-3-chloropropane (ok/142%)	40-135	None
		2-Hexanone (147%/534%)	45-145	None
		4-Isopropyltoluene (67%/66%)	75-135	“UJ” qualified for analyte in SB0190
		Hexachlorobutadiene (23%/19%)	55-140	“UJ” qualified for analyte in SB0190
		n-Butylbenzene (58%/57%)	65-140	“UJ” qualified for analyte in SB0190
SW8270D	SB0190	Pyridine (RPD 34%)	RPD ≤30	“UJ “ qualified for analyte in SB0190
SW6010C	SB0190	Lead (71%/73%)	80-120	“J-“ for analyte in SB0190

Table 1.1-6. Summary of MS/MSD Recovery Outliers and Impacted Data (Concluded)

Analytical Method	Spiked Sample	MS/MSD Recovery Outliers (%)	Control Limit (%)	Qualifier
SW8260B	SB0217	1,2-Dibromo-3-chloropropane (139%/137%)	40-135	None
		1-Chlorohexane (144%/ok)	60-135	None
		2,2-Dichloropropane (137%/ok)	65-135	None
		Chloromethane (136%/ok)	50-130	None
		Dichlorodifluoromethane (141%/ok)	35-135	None
		Vinyl chloride	60-125	None
SW6010C	SB0217	Lead (78%/75%)	80-120	“J-“ for analyte in SB0217
SW8260B	SB0173	1,1,1,2-Tetrachloroethane (69%/67%)	75-125	“UJ” for analyte in SB0173
		1,1,1-Trichloroethane (68%/66%)	70-135	“UJ” for analyte in SB0173
		1,1-Dichloroethane (72%/69%)	75-125	“UJ” for analyte in SB0173
		1,1-Dichloroethene (ok/62%)	65-135	“UJ” for analyte in SB0173
		1,1-Dichloropropene (ok/67%)	70-135	“UJ” for analyte in SB0173
		1,2,3-Trichlorobenzene (55%/51%)	60-135	“UJ” for analyte in SB0173
		1,2,4-Trichlorobenzene (57%/44%)	65-130	“UJ” for analyte in SB0173
		1,2,4-Trimethylbenzene (61%/57%)	65-135	“J-” for analyte in SB0173
		1,2-Dichlorobenzene (69%/65%)	75-120	“UJ” for analyte in SB0173
		1,3,5-Trimethylbenzene (62%/56%)	65-135	“UJ” for analyte in SB0173
SW8260B (continued)	SB0173 (continued)	1,3-Dichlorobenzene (67%/61%)	70-125	“UJ” for analyte in SB0173
		1,4-Dichlorobenzene (68%/59%)	70-125	“UJ” for analyte in SB0173
		1-Chlorohexane (52%/47%)	60-135	“UJ” for analyte in SB0173
		2-Chlorotoluene (66%/63%)	70-130	“UJ” for analyte in SB0173
		4-Chlorotoluene (70%/65%)	75-125	“UJ” for analyte in SB0173
		4-Isopropyltoluene (52%/45%)	75-135	“UJ” for analyte in SB0173
		Benzene (71%/68%)	75-125	“J-” for analyte in SB0173
		Chlorobenzene (70%/66%)	75-125	“UJ” for analyte in SB0173
		Chloroform (ok/69%)	70-125	“UJ” for analyte in SB0173
		Ethylbenzene (67%/62%)	75-125	“J-” for analyte in SB0173
		Hexachlorobutadiene (27%/20%)	55-140	“UJ” for analyte in SB0173
		Isopropylbenzene (60%/52%)	75-130	“UJ” for analyte in SB0173
		Styrene (73%/61%)	75-125	“UJ” for analyte in SB0173
		Tetrachloroethene (64%/58%)	65-140	“UJ” for analyte in SB0173
		Toluene (62%/61%)	70-125	“UJ” for analyte in SB0173
		Trichloroethene (71%/67%)	75-125	“UJ” for analyte in SB0173
		Xylene (total) (66%/60%)	75-125	“UJ” for analyte in SB0173
		m,p-Xylenes (67%/62%)	80-125	“UJ” for analyte in SB0173
		n-Butylbenzene (51%/40%)	65-140	“UJ” for analyte in SB0173
		n-Propylbenzene (61%/55%)	65-135	“UJ” for analyte in SB0173
		o-Xylene (66%/58%)	75-125	“UJ” for analyte in SB0173
		sec-Butylbenzene (50%/44%)	65-130	“UJ” for analyte in SB0173
		tert-Butylbenzene (52%/49%)	65-130	“UJ” for analyte in SB0173
SW6010C	SB0173	Lead (71%/73%)	80-120%	“J-“ for analyte in SB0173
SW6010C	SB0200	Lead (57%/63%)	80-120%	“J-“ for analyte in SB0200
SW8260B	SB0207	m,p-Xylenes (79%/ok)	80-125%	“UJ” for analyte in SB0207
SW8270D	SB0207	Dibenz(a,h)anthracene (RPD=31%)	RPD≤30	“UJ” for analyte in SB0207
SW8015B	SB0207	TPH-DRO (302%/-68%); (RPD=104%)	50-124% RPD≤40	“J “ for analyte in SB0207

Impacted results were qualified as estimated (J+ or J-) or estimated non-detections (UJ). This data qualification was applied only to the MS/MSD parent samples. As shown in Table 1.1-6, the reported MS/MSD recovery biases do not significantly deviate from their respective lower or upper control limits, and therefore the data usability is not affected. In addition, high MS/MSD recovery biases were noted for other VOCs and SVOCs analytes. Because these analytes were not detected in the parent sample, the sample results are not affected by the high MS/MSD recovery biases, and no data qualification is warranted. Except as noted, the MS precision and bias results are acceptable for all other analyses.

1.1.7 Initial Calibration (Reason Code G)

Instrument calibration is performed for VOC, SVOC, TPH-GRO, TPH-DRO, and metal analyses according to the EPA method requirements. The linear analytical range is established for each method by analysis of standards prepared at increasing concentrations that cover the expected sample concentrations. The acceptability of the initial calibration is determined by calculation of a percent relative standard deviation or linear coefficient. The initial calibration results are acceptable for all the listed methods, with the exception of the average relative response factor (RRF) for VOC analysis, summarized in Table 1.1-7 as follows:

Table 1.1-7. Summary of Initial Calibration Outliers and Impacted Data

Analytical Method	Instrument Number	ICV Outliers (RRF)	Control Limit (RRF)	Qualifier
SW8260B	MSV9 [2110527]	Acrolein (0.01312)	0.1	"R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
		Acrylonitrile (0.05097)	0.1	"R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
		Bromochloromethane (0.09997)	0.1	"R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
		2-Butanone (0.08938)	0.1	"J/R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199

Table 1.1-7. Summary of Initial Calibration Outliers and Impacted Data (Concluded)

Analytical Method	Instrument Number	ICV Outliers (RRF)	Control Limit (RRF)	Qualifier
SW8260B	MSV9 [2110604]	Acrolein (0.01876)	0.1	"R" qualified for analyte in SB0214, SB0215, SB0216, SB0217, SB0218, SB0219, SB0220, SB0221, SB0222, SB0223, SB0224, SB0225
		Acrylonitrile (0.03766)	0.1	"R" qualified for analyte in SB0214, SB0215, SB0216, SB0217, SB0218, SB0219, SB0220, SB0221, SB0222, SB0223, SB0224, SB0225
		Bromochloromethane (0.09650)	0.1	"R" qualified for analyte in SB0214, SB0215, SB0216, SB0217, SB0218, SB0219, SB0220, SB0221, SB0222, SB0223, SB0224, SB0225
SW8260B	MSV7 [2110609]	Acrylonitrile (0.03519)	0.1	"R" qualified for analyte in SB0226, SB0227, SB0228
SW8260B	MSV6 [2110612]	Acrolein (0.02996)	0.1	"R" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0179, SB0180, SB0181, SB0182, SB0183, SB0184, SB0185
		Acrylonitrile (0.06105)	0.1	"R" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0179, SB0180, SB0181, SB0182, SB0183, SB0184, SB0185
SW8260B	MSV9 [2110616]	Acrolein (0.02007)	0.1	"R" qualified for analyte in SB0200, SB0201, SB0202, SB0203, SB0204, SB0205, SB0206
		Acrylonitrile (0.04712)	0.1	"R" qualified for analyte in SB0200, SB0201, SB0202, SB0203, SB0204, SB0205, SB0206
SW8260B	MSV11 [2110619]	Acrolein (0.02557)	0.1	"R" qualified for analyte in SB0207, SB0208, SB0209, SB0210
		Acrylonitrile (0.06261)	0.1	"R" qualified for analyte in SB0207, SB0208, SB0209, SB0210
SW8260B	MSV7 [2110624]	Acrolein (0.02615)	0.1	"R" qualified for analyte in SB0213
		Acrylonitrile (0.06370)	0.1	"R" qualified for analyte in SB0213
SW8260B	MSV11 [2110619]	Acrolein (0.02557)	0.1	"R" qualified for analyte in SB0211, SB0212, SB1744
		Acrylonitrile (0.06261)	0.1	"R" qualified for analyte in SB0211, SB0212, SB1744

ICV Initial calibration verification

Immediately after the initial calibration for each method, an ICV was conducted at the mid-point of instrument calibration range by using a second source calibration standard to verify the accuracy of the initial calibration. Except as noted, the ICV results meet the acceptance criteria for all other analyses.

1.1.8 Continuing Calibration Verification (Reason Code C)

Routinely during sample analysis, the stability of the analytical system is monitored by analysis of continuing calibration standards at concentrations near the mid-point of the linear range. Percent differences between the RRF in the initial calibration and the RRF in the CCV exceed the acceptance criteria for VOC and SVOC analyses. The continuing calibration outliers that resulted in data qualification are summarized in Table 1.1-8 as follows:

Table 1.1-8. Summary of Continuing Calibration Verification Outliers and Impacted Data

Analytical Method	Instrument Number	CCV Outlier (RRF/%)	Control Limit	Qualifier
SW8260B	MSV9 [2110527]	Acrolein (0.01341)	0.1	"R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
		Acrylonitrile (0.05144)	0.1	"R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
		2-Butanone (0.08899)	0.1	"J/R" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
		Acetone (31.4%D)	± 20%	"J/UJ" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190, SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198, SB0199
SW8260B	MSV9 [2110527]	Acrolein (0.01651)	0.1	"R" qualified for analyte in SB0214, SB0215, SB0221, SB0222, SB0223, SB0224, SB0225
		Acrylonitrile (0.03510)	0.1	"R" qualified for analyte in SB0214, SB0215, SB0221, SB0222, SB0223, SB0224, SB0225
		Bromochloromethane (0.08995)	0.1	"R" qualified for analyte in SB0214, SB0215, SB0221, SB0222, SB0223, SB0224, SB0225
		Bromomethane (24.4%D)	± 20%	"UJ" qualified for analyte in SB0214, SB0215, SB0221, SB0222, SB0223, SB0224, SB0225
SW8260B	MSV7 [2110609]	Acrylonitrile (0.03222)	0.1	R" qualified for analyte in SB0226, SB0227, SB0228
		Methylene chloride (30.0%)	± 20%	"UJ" qualified for analyte in SB0226, SB0227, SB0228

Table 1.1-8. Summary of Continuing Calibration Verification Outliers and Impacted Data (Concluded)

Analytical Method	Instrument Number	CCV Outlier (RRF/%)	Control Limit	Qualifier
SW8260B	MSV11 [2110613]	Acrolein (0.02380)	0.1	"R" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0179, SB0180, SB0181, SB0182, SB0183, SB0184
		Acrylonitrile (0.05992)	0.1	"R" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0179, SB0180, SB0181, SB0182, SB0183, SB0184
		Carbon disulfide (-22.4%)	± 20%	"UJ" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0179, SB0180, SB0181, SB0182, SB0183, SB0184
		Acrolein (0.02412)	0.1	"R" qualified for analyte in SB0185
		Acrylonitrile (0.05915)	0.1	"R" qualified for analyte in SB0185
		Vinyl acetate (-20.9%)	± 20%	"UJ" qualified for analyte in SB0185
SW8270D	MSSV6	Di-n-octylphthalate (20.6%)	± 20%	"UJ" qualified for analyte in SB0179
SW8260B	MSV11 [2110621]	Acrolein (0.02410)	0.1	"R" qualified for analyte in SB0207
		Acrylonitrile (0.06818)	0.1	"R" qualified for analyte in SB0207
SW8260B	MSV7 [2110624]	Acrolein (0.02816)	0.1	"R" qualified for analyte in SB0213
		Acrylonitrile (0.06855)	0.1	"R" qualified for analyte in SB0213
SW8260B	MSV11 [2110621]	Acrolein (0.02540)	0.1	"R" qualified for analyte in SB1744
		Acrylonitrile (0.05946)	0.1	"R" qualified for analyte in SB1744
		Trichlorofluoromethane (20.4%)	± 20%	"UJ" qualified for analyte in SB1744

Analytes with initial calibration and CCV RRFs of less than 0.1 and not detected above the laboratory's detection limit (DL) in the associated samples were qualified with "R" as rejected, which is due to the poor sensitivity of the method at low levels for these analytes. The R-qualified data are determined to be

unreliable at the laboratory's LOQ. Except as noted in Table 1.1-8, the continuing calibration results are acceptable for all other analyses.

1.1.9 Interference Check Samples (Reason Code O)

The ICP interference check sample (ICS) verifies the interelement and background correction factors. An ICS was analyzed at the beginning of each analytical sequence. All ICS results are within the established control limits.

1.1.10 Inductively Coupled Plasma Serial Dilution (Reason Code A)

The ICP serial dilution determines whether significant physical or chemical interferences exist due to sample matrix. Table 1.1-9 summarizes ICP serial dilution exceedances and impacted sample results.

Table 1.1-9. Summary of ICP Serial Dilution Outliers and Impacted Data

Analytical Method	Sample	Analyte	Initial Sample Result (mg/kg)	Serial Dilution Result (mg/kg)	Percent Difference (%)	Qualifier
SW6010C	SB0190	Lead	7.15	7.91	10.6%	"J" qualified for analyte in SB0190
SW6010C	SB0217	Lead	7.56	9.49	25.5%	"J" qualified for analyte in SB0217
Serial dilution outlier reason code is "A"						

mg/kg Milligrams per kilogram

1.1.11 Ambient Blanks/Field Blanks (Reason Code K2)

Ambient blanks serve as a check on environmental contamination from airborne contaminants at a sampling location. The ambient blank is prepared by pouring distilled water into a clean sample container in the field and exposing this blank in the field at the time of sample collection and at a particular location. No ambient blanks were collected during the Second Quarter 2011 soil vapor monitoring well installation soil sampling event.

Field blanks are prepared in the actual sample containers and are kept with the investigative samples throughout the sampling event. A field blank is prepared by filling the sample container with distilled, organic-free water, exposing it to field conditions by adding preservatives, and in general treating it as a normal sample. At no time after their preparation are the sample containers opened before they reach the laboratory. Table 1.1-10 summarizes field blank contamination and impacted sample results.

Table 1.1-10. Summary of Field Blank Contamination and Impacted Data

Analytical Method	Field Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	SB8018-FB	Bromodichloromethane	2.95	2.00	None
		Bromoform	1.25	2.00	None
		Chloroform	1.83	2.00	None
		Dibromochloromethane	4.27	2.00	None
SW8260B	SB8015-FB	Chloroform	0.980	2.00	None
SW8260B	SW8020-FB	Acetone	0.882	5.00	"U" qualified for analyte in SB0173
		Bromodichloromethane	0.402	2.00	None
		Chloroform	0.864	2.00	"U" qualified for analyte in SB0174
		Dibromochloromethane	0.360	2.00	None
		Trichloroethene	2.53	2.00	None
SW8260B	SW8021-FB	Chloroform	1.21	2.00	None

As a result of the field blank detections, the impacted results were qualified as non-detected (U). The detected concentrations in the associated samples are less than or equal to five times the corresponding levels detected in the blanks.

1.1.12 Trip Blanks (Reason Code K3)

Trip blanks were prepared by the laboratory and stored with the soil samples collected for VOC analysis. One trip blank sample was shipped with each cooler containing VOC samples submitted to the laboratory. From May 19 through June 16, 2011, eight trip blanks were submitted for the Second Quarter 2011 soil sampling event. Table 1.1-11 summarizes trip blank contamination and impacted sample results.

Table 1.1-11. Summary of Trip Blank Contamination and Impacted Data

Analytical Method	Trip Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	SB8030-TB	Acetone	5.27	5.00	"U" qualified for analyte in SB0187
		Toluene	1.24	2.00	"U" qualified for analyte in SB0186, SB0187, SB0188, SB0189, SB0190
		m,p-Xylene	0.428	4.00	"U" qualified for analyte in SB0186, SB0187, SB0189, SB0190
		Xylene (Total)	0.428	6.00	"U" qualified for analyte in SB0186, SB0187, SB0189, SB0190
SW8260B	SB8031-TB	Toluene	1.13	2.00	"U" qualified for analyte in SB0191, SB0192, SB0193, SB0194, SB0195, SB0196, SB0197, SB0198
SW8260B	SB8033-TB	Acetone	1.19	5.00	"U" qualified for analyte in SB0226, SB0227, SB0228
		Toluene	0.764	2.00	U" qualified for analyte in SB0226
SW8260B	SB8034-TB	Acetone	1.30	5.00	"U" qualified for analyte in SB0173, SB0178, SB0180, SB0184
		Toluene	0.991	2.00	"U" qualified for analyte in SB0172, SB0173, SB0174, SB0175, SB0176, SB0177, SB0178, SB0179, SB0180, SB0181, SB0182, SB0183
		m,p-Xylenes	0.334	4.00	"U" qualified for analyte in SB0172, SB0173, SB0175, SB0181
		Xylenes, Total	0.334	6.00	"U" qualified for analyte in SB0175, SB0181
SW8260B	SB8035-TB	Acetone	1.10	5.00	"U" qualified for analyte in SB0202, SB0205, SB0206

1.1.13 Equipment Rinse Blanks (Reason Code K1)

Equipment rinse blanks are designed to check for contamination from sampling equipment, and the results of the equipment rinse blanks are used for evaluating the efficiency of equipment decontamination procedures.

During the Second Quarter 2011 soil vapor monitoring well installation soil sampling event, four equipment rinse blanks were collected. These four equipment rinse blank samples were prepared by rinsing the sampling equipment with the distilled water obtained from the laboratory and then collecting the final rinse water into appropriate sample containers. Equipment rinse blank samples were analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO, and metals. Table 1.1-12 summarizes rinsate blank contamination and impacted sample results.

Table 1.1-12. Summary of Rinsate Blank Contamination and Impacted Data

Analytical Method	Equipment Rinse Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	SB8028-RB	Bromodichloromethane	2.75	2.00	None
		Bromoform	1.20	2.00	None
		Chloroform	1.80	2.00	None
		Dibromochloromethane	4.12	2.00	None
SW8015B	SB8028-RB	TPH-DRO	462	126	None
SW8260B	SB8030-RB	Chloroform	1.52	2.00	None
SW8015B	SB8030-RB	TPH-DRO	54.9	129	None
SW8260B	SB8029-RB	Acetone	1.88	5.0	"U" qualified for analyte in SB0173, SB0178, SB0179, SB0180, SB0184
		Bromodichloromethane	0.407	2.0	None
		Chloroform	0.781	2.0	"U" qualified for analyte in SB0174
		Dibromochloromethane	0.353	2.0	None
		Trichloroethene	2.63	2.0	None
SW8270D	SB8029-RB	bis-(2-Ethylhexyl)phthalate	0.976	10.0	None
		Di-n-octylphthalate	0.318	10.0	None
SW8015B	SB8029-RB	TPH-DRO	147	132	None
SW8260B	SW8031-RB	Chloroform	1.19	2.00	None

1.1.14 Internal Standards (Reason Code I)

All spiked internal standards recoveries meet QC criteria.

1.2 Field Duplicates

In accordance with the site-specific BFF Spill QAPjP (USACE, 2011b) requirements, field duplicate samples are to be collected at a minimum rate of 10% of the total number of soil samples. Field duplicate

samples are evaluated by calculating the RPD between the sample and its corresponding duplicate sample. The RPD is calculated using the following equation:

$$RPD = |(S-D)/[(S+D)/2]| \times 100$$

where:

S = sample result
D = duplicate result

Acceptable precision control criteria are established at less than or equal 50% for soil samples. The RPD is calculated between pairs of field duplicate samples when both results are reported above the LOQ.

Six duplicate pairs were collected for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event. Therefore, the 10% field duplicate frequency requirement was met. Field duplicate samples are collected in immediate succession after the initial parent samples are collected employing identical recovery techniques. The duplicate pairs were collected and analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO, and metals. Table 1.2-1 summarizes field duplicate results and impacted data.

Table 1.2-1. Summary of Field Duplicate Results and Impacted Data

Analytical Method	Analyte	KAFB-106121 Sample ID: SB0193 and Concentration (ppb)	KAFB-106121 Duplicate ID: SB0194 and Concentration (ppb)	RPD%	Control Limit
SW8260B	2-Butanone	1.61 (value <LOQ)	Non-detect	NC	<50%
	Acetone	2.59	1.67 (value <LOQ)	NC	<50%
	Benzene	0.476 (value <LOQ)	0.424 (value <LOQ)	NC	<50%
	Toluene	1.09	0.903	18.8%	<50%
	Ethylbenzene	Non-detect	0.287 (value <LOQ)	NC	<50%
SW8270D	bis(2-Ethylhexyl)phthalate	42.7 (value <LOQ)	41.0 (value <LOQ)	NC	<50%
SW8015B	TPH-DRO	10500	8230	24.2%	<50%
SW6010C	Lead	0.00433	0.00502	14.7%	<50%

Table 1.2-1. Summary of Field Duplicate Results and Impacted Data (Continued)

Analytical Method	Analyte	KAFB-106123 Sample ID: SB0214 and Concentration (ppb)	KAFB-106123 Duplicate ID: SB0215 and Concentration (ppb)	RPD%	Control Limit
SW8260B	1,2,4-Trimethylbenzene	0.860 (value <LOQ)	0.394 (value <LOQ)	NC	< 50%
	1,3,5-Trimethylbenzene	0.428 (value <LOQ)	0.265 (value <LOQ)	NC	< 50%
	2-Butanone	8.83	25.2	96.2%	< 50%
	4-Isopropyltoluene	1.31 (value <LOQ)	5.84	NC	< 50%
	Acetone	20.3	22.4	9.8%	< 50%
	Benzene	2.12	1.13 (value <LOQ)	NC	< 50%
	Ethylbenzene	0.432 (value <LOQ)	0.355 (value <LOQ)	NC	< 50%
	Toluene	2.25	1.60 (value <LOQ)	NC	< 50%
	m,p-Xylenes	1.40 (value <LOQ)	1.12 (value <LOQ)	NC	< 50%
	o-Xylene	0.369 (value <LOQ)	0.227 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	385	51.9 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	67500	52300	25.4%	< 50%
SW6010C	Lead	0.00876	0.00798	9.3%	< 50%
Analytical Method	**Analyte**	**KAFB-106123 Sample ID: SB0226 and Concentration (ppb)**	**KAFB-106123 Duplicate ID: SB0227 and Concentration (ppb)**	**RPD%**	**Control Limit**
SW8260B	Acetone	4.51 (value <LOQ)	4.82 (value <LOQ)	NC	< 50%
SW8260B	Benzene	0.361 (value <LOQ)	8.67	NC	<50%
SW8260B	Ethylbenzene	Non-detect	0.844 (value <LOQ)	NC	<50%
SW8260B	Toluene	0.748 (value <LOQ)	20.9	NC	< 50%
SW8260B	m,p-Xylenes	Non-Detect	2.05 (value <LOQ)	NC	<50%
SW8270D	bis(2-Ethylhexyl)phthalate	368	292 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	66100	79400	18.3%	<50%
SW6010C	Lead	0.00256	0.00233	9.4%	<50%
Analytical Method	**Analyte**	**KAFB-106120 Sample ID: SB0176 and Concentration (ppb)**	**KAFB-106120 Duplicate ID: SB0177 and Concentration (ppb)**	**RPD%**	**Control Limit**
SW8260B	2-Butanone	8.91	12.5	33.5%	< 50%
SW8260B	Acetone	32.8	52.7	46.6%	< 50%
SW8260B	Benzene	0.599 (value <LOQ)	0.688 (value <LOQ)	NC	< 50%
SW8260B	Ethylbenzene	0.290 (value <LOQ)	0.353 (value <LOQ)	NC	< 50%
SW8260B	Toluene	1.06 (value <LOQ)	1.07 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	32.6 (value <LOQ)	47.3 (value <LOQ)	NC	< 50%
SW8270D	Di-n-octylphthalate	Non-detect	12.6 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	8810	15200	53.2%	< 50%
SW6010C	Lead	4980	5450	9.0%	< 50%

Table 1.2-1. Summary of Field Duplicate Results and Impacted Data (Concluded)

Analytical Method	Analyte	KAFB-106122 Sample ID: SB0202 and Concentration (ppb)	KAFB-106122 Duplicate ID: SB0203 and Concentration (ppb)	RPD%	Control Limit
SW8260B	1,2,4-Trimethylbenzene	0.597 (value <LOQ)	0.597 (value <LOQ)	NC	< 50%
SW8260B	1,3,5-Trimethylbenzene	0.347 (value <LOQ)	0.347 (value <LOQ)	NC	< 50%
SW8260B	Acetone	7.27 (value <LOQ)	7.27 (value <LOQ)	NC	< 50%
SW8260B	Benzene	1.52 (value <LOQ)	1.52 (value <LOQ)	NC	< 50%
SW8260B	Toluene	2.01	2.32	14.3%	< 50%
SW8260B	m,p-Xylenes	2.06 (value <LOQ)	2.06 (value <LOQ)	NC	< 50%
SW8260B	o-Xylene	1.56 (value <LOQ)	1.56 (value <LOQ)	NC	< 50%
SW8260B	Xylenes, Total	0.497 (value <LOQ)	0.497 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	223 (value <LOQ)	199 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	20200	13800	37.6%	< 50%
SW6010C	Lead	5570	6030	7.9%	< 50%
Analytical Method	**Analyte**	**KAFB-106122 Sample ID: SB0212 and Concentration (ppb)**	**KAFB-106122 Duplicate ID: SB1744 and Concentration (ppb)**	**RPD%**	**Control Limit**
SW8260B	2-Butanone	17.0	10.3	49.1%	< 50%
SW8260B	Acetone	Non-detect	5.23	NC	< 50%
SW8260B	Benzene	2.25	2.65	16.3%	< 50%
SW8260B	Ethylbenzene	Non-detect	0.467 (value <LOQ)	NC	< 50%
SW8260B	Toluene	4.52	5.09	11.9%	< 50%
SW8260B	m,p-Xylenes	Non-detect	0.492 (value <LOQ)	NC	< 50%
SW8260B	o-Xylene	Non-detect	0.219 (value <LOQ)	NC	< 50%
SW8260B	Xylenes, Total	Non-detect	0.711 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	455	55.6 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	22200	99600	127%	< 50%
SW6010C	Lead	2890	2540	12.9%	< 50%

Except for analytes shown in shaded cells in Table 1.2-1, the RPDs for all other listed parameters are within the 50% field duplicate precision goal. Detected results exceeding the field duplicate precision limit were qualified as estimated (J). The high RPD values may be attributed to the following factors:

- At low concentrations the relative difference in results is magnified by the RPD calculation even though the results are comparable in absolute terms.

1.3 Non-homogeneity in distribution of target analytes occurs within the sample matrix.Completeness

The following sections present a discussion of contractual, analytical, and technical completeness for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event. Completeness calculations were performed only for those soil samples used for project decisions.

1.3.1 Contractual Completeness

Contractual completeness is a quantitative measurement of the number of unqualified results compared to the total number of sample results expressed as a percentage, based on data qualified for QC outliers related to method performance. These include data qualified for calibration or preparation blank contamination, missed holding times, and non-compliant LCS recovery and/or precision. The contractual completeness goal is 95%. Contractual completeness is calculated as follows:

$$\% \text{ Contractual Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \times 100$$

Contractual completeness for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event is summarized in Table 1.3-1.

Table 1.3-1. Contractual Completeness Summary

Analytical Method	Number of Unqualified Results	Total Number of Results	% Contractual Completeness
SW6010C	58	58	100%
SW8015B-GRO	58	58	100%
SW8015B-DRO	58	58	100%
SW8260B	3,861	4,060	95.1%
SW8270D	4,176	4,234	98.6%

The 95% contractual completeness goal was also achieved for all analytical suites (Lead by SW6010C, TPH-GRO by SW8015B, TPH-DRO by SW8015B, VOCs by SW8260B, and SVOCs by SW8270D). Sufficient acceptable results were obtained to meet the project objectives.

1.3.2 Analytical Completeness

Analytical completeness is a quantitative measure of the number of unqualified data results compared to the total number of results expressed as a percentage, based on target analytes qualified for exceedances of QC requirements based on calibration, LCS, MS/MSD, surrogates, method precision, and laboratory method blank contamination results. Analytical completeness does not include analytes qualified as estimated (J) due to values reported between the laboratory's DL and LOQ. The analytical completeness goal is 90%. Analytical completeness is calculated as follows:

$$\% \text{ Analytical Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \times 100$$

Analytical completeness for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event is summarized in Table 1.3-2.

Table 1.3-2. Analytical Completeness Summary

Analytical Method	Number of Unqualified Results	Total Number of Results	% Analytical Completeness
SW6010C	55	58	94.8%
SW8015B-GRO	41	58	70.7%
SW8015B-DRO	46	58	79.3%
SW8260B	2,957	4,060	72.8%
SW8270D	3,299	4,234	77.9%

The 90% analytical completeness goal was not achieved for all analytical suites (TPH-GRO by SW8015B, TPH-DRO by SW8015B, VOCs by SW8260B, and SVOCs by SW8270D). The low analytical completeness percentages are due to elevated cooler temperatures recorded at 13.1 and 7.0°C for samples reported in SDG 211060401. Based on professional judgment, TPH-GRO, TPH-DRO, VOC, and SVOC results reported for samples SB0214, SB0215, SB0216, SB0217, SB0218, SB0219, SB0220, SB0221, SB0222, SB0223, SB0224, and SB0225 were qualified as estimated (J or UJ) due to the elevated cooler temperatures at time of receipt. The results may be biased low. Preserving TPH-GRO and VOC fractions in TerraCore® samplers prior to shipment reduced the impact of elevated cooler temperatures on the de-volatilization of target analytes in the impacted samples. As a result of analytical completeness, data were qualified as estimated detected and non-detected values. Estimated data are still usable to achieve project data quality objectives.

1.3.3 Technical Completeness

Technical completeness is a quantitative measure of the data usability based on the number of rejected data results compared to the total number of sample results. The technical completeness goal for each method is equal to or greater than 95%. The technical completeness calculation considers all data that are not rejected to be usable, and technical completeness is calculated as follows:

$$\% \text{ Technical Completeness} = \frac{\text{Number of Usable Results}}{\text{Total Number of Results}} \times 100$$

Technical completeness for the Second Quarter 2011 soil vapor monitoring well installation soil sampling event is summarized in Table 1.3-3.

Table 1.3-3. Technical Completeness Summary

Analytical Method	Number of Unqualified Results	Total Number of Results	% Technical Completeness
SW6010C	58	58	100%
SW8015B-GRO	58	58	100%
SW8015B-DRO	58	58	100%
SW8260B	3,918	4,060	96.5%
SW8270D	4,234	4,234	100%

Analytes with ICV and CCV RRFs of less than 0.1 and not detected above the laboratory's DL in the associated samples were qualified with R as rejected, which is due to the poor sensitivity of the method at low levels for these analytes. Impacted analytes include 2-butanone, acrolein (2-propenal), acrylonitrile (2-propenenitrile), and bromochloromethane. The R-qualified data are determined to be unreliable at the laboratory's DL. However, sufficient acceptable results were obtained to meet the project objectives for technical completeness.

1.4 Summary

The analytical data reported for this event have been reviewed for completeness, bias, and precision. Data quality issues observed consisted of biased surrogate, spiked internal standard outliers, parent sample and field duplicate precision outliers, LCS/LCSD, MS/MSD recoveries, initial and continuing calibration outliers, and laboratory and field blank contamination. The affected data were qualified as estimated or non-detected with the exception of the results for 2-butanone, acrolein (2-propenal), acrylonitrile (2-propenenitrile), and bromochloromethane, which were qualified with R for some samples due to ICV and/or CCV RRFs of less than 0.1 The R-qualified data are determined to be unreliable at the laboratory's DL but may be used for screening purposes only. The R-qualified data results are not associated with target analytes for the BFF Spill project. The 95% technical completeness goal was exceeded for all methods.

B-2. DATA QUALITY EVALUATION REPORTS – SOIL SECOND AND THIRD QUARTER

2. LABORATORY DATA QUALITY SUMMARY, THIRD QUARTER 2011 SOIL SAMPLING, JULY – SEPTEMBER 2011

This laboratory data quality summary describes the findings of the review of data from the Third Quarter 2011 soil vapor monitoring well installation soil sampling event and is provided to document the quality of the analytical data used in the *Quarterly Pre-Remedy Monitoring and Site Investigation Report for July – September 2011, Bulk Fuels Facility (BFF), Solid Waste Management Units ST-106 and SS-111* (hereafter referred to as the quarterly report). Sampling procedures and overall quality control (QC) and quality assurance protocols for the Third Quarter 2011 soil vapor monitoring well installation soil sampling event are presented in the *Quality Assurance Project Plan (QAPjP), BFF Spill, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico* (U.S. Army Corps of Engineers [USACE], 2011b).

During the period from June 19 through July 23, 2011, 42 soil samples, 7 field duplicates, 4 field blanks, 4 equipment rinse blanks, and 6 trip blanks were collected and sent to Gulf Coast Analytical Laboratories, Inc. (GCAL), Baton Rouge, Louisiana, for analysis. The laboratory holds a current U.S. Department of Defense (DoD) Environmental Laboratory Accreditation Program certification to perform the listed analyses.

Soil boring samples were analyzed for the following list of parameters:

- Volatile organic compounds (VOCs) – U.S. Environmental Protection Agency (EPA) SW8260B;
- Semivolatile organic compounds (SVOCs) – EPA SW8270D;
- Total petroleum hydrocarbons (TPH)-gasoline range organics (GRO) (C6-C10) – EPA SW8015B;
- TPH-diesel range organics (DRO) (C10-C28) – EPA SW8015B; and
- Lead – EPA SW6010C.

All analytical results obtained from the Third Quarter 2011 soil vapor monitoring well installation soil sampling event were submitted in sample delivery groups (SDGs) 211062325, 211062509, 211063024, 211070716, 211071306, 211072234, and 211072707 (Appendix B2 – Table 4, provided at the end of this report). Appendix B2 – Table 5 summarizes the location identification (ID), the sample ID, sample purpose, date of collection, GCAL's sample ID, and the specific analytical program for each sample collected during the Third Quarter 2011 soil vapor monitoring well installation soil sampling event. An EPA Level III data review was performed on analytical results for the seven SDGs. The review was performed in accordance with the guidelines and control criteria specified in the following documents:

- The site-specific BFF Spill QAPjP (USACE, 2011b);
- *DoD Quality Systems Manual for Environmental Laboratories (QSM), Version 4.2* (DoD, 2010);
- *USEPA Contract Laboratory Program, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA, 2006) (SW-846, 2006 and updates);
- USACE EM 200-1-10, *Environmental Quality – Guidance for Evaluating Performance-Based Chemical Data* (USACE, 2005);
- *USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008); and
- *USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Superfund Data Review*, Final (EPA, 2010).

The following QC elements were included in the EPA Level III data review:

- Sample preservation and sample extraction and analysis holding times;
- Laboratory method blanks;
- Initial and continuing calibration blanks (metals only);
- Surrogate recoveries (organic analyses);
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) recoveries;
- Matrix spike (MS)/matrix spike duplicate (MSD) recoveries;
- Relative percent differences (RPDs);
- Initial calibration and verifications;
- Continuing calibration verifications (CCVs);
- Inductively coupled plasma (ICP) interference check samples (metal analysis only);

- ICP serial dilution (metal analysis only);
- Internal standards;
- Field blanks; and
- Field duplicates.

Analytical data were reviewed in terms of precision, bias, representativeness, comparability, and completeness as follows:

- *Bias* is demonstrated by recovery of target analytes from fortified blank and sample matrices, LCS/LCSD, and MS/MSD, respectively. For organic methods, bias is also demonstrated through recovery of surrogates from each field and QC sample. The recovery of target analytes from fortified samples is compared to the acceptance criteria defined in the QAPjP (USACE, 2011b) and DoD QSM (DoD, 2010). When the acceptance criteria are not available in the QAPjP or DoD QSM, results are compared to the laboratory in-house control limits. When these criteria are not met, the data are flagged accordingly.
- *Precision* is expressed as the RPD between the results of replicate sample analyses: sample duplicates, LCSDs, and MSDs. When analyte RPDs exceed the acceptance criteria, the data are flagged accordingly.
- *Representativeness* of the samples submitted for analysis is ensured by adherence to standard sampling techniques and protocols.
- *Comparability* of sample results is ensured through the use of approved sampling and analysis methods.
- *Completeness* is expressed as a ratio of the number of usable data results to the total of analytical data results.

The following sections present EPA Level III data review findings. The discussion summarizes data quality outliers and their potential impact on the data quality and usability of analytical results. Appendix B2 – Table 3 (at the end of this report) presents definitions of data qualification and reason codes applied to the analytical results.

2.1 Reason Codes

2.1.1 Sample Preservation, Sample Extraction and Analysis Holding Times (Reason Code H)

The sample coolers and samples were received intact at the laboratory within the required 0 to 6 degrees Celsius (°C), in compliance with EPA and Standard Method preservation requirements with the exception of the sample shipment reported in SDG 211062325. Of 13 coolers, the temperature for the cooler associated with SDG 211062325 was recorded at 6.8°C. The cooler temperature, which slightly exceeds the QC criteria, contained only the volatile fractions for samples SB0229, SB0230, SB0231, SB0232, SB0233, SB0234, SB0235, SB0236, SB0237, SB0238, and SB0239. Based on professional judgment, TPH-GRO and VOC results reported for these samples were qualified as estimated with "J" or "UJ," due to the elevated cooler temperatures at time of receipt. The results may be slightly biased low. Preserving TPH-GRO and VOCs fractions in TerraCore® samplers prior to shipment reduced the impact of elevated cooler temperatures on the de-volatilization of target analytes in the impacted samples. Sample holding times were evaluated by comparing the sample collection dates to the sample extraction and analysis dates. Extraction and analysis holding times were reviewed for all samples to determine the validity of the sample results. No holding times were exceeded.

2.1.2 Laboratory Method Blanks (Reason Code B1)

The field sample results were evaluated with respect to the laboratory method blank prepared and analyzed for each analytical batch and for each analytical method. Positive results in the laboratory method blanks for Methods SW8015B-DRO, SW8260B and SW6010C were observed and are summarized in Table 2.1-1 as follows:

Table 2.1-1. Summary of Laboratory Method Blank Contamination and Impacted Data

Analytical Method	Laboratory QC Batch #	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	MB961513	Bromomethane	1.39	4.00	None
		Methylene chloride	1.10	6.00	None
SW8260B	MB961521	Methylene chloride	2.90	5.00	None
		Toluene	0.440	2.00	"U" qualified for analyte in SB0239
SW8015B	MB963063	TPH-DRO	1900	2000	None
SW8260B	MB965860	1,2,4-Trichlorobenzene	0.582	2.00	"U" qualified for analyte in SB0248
		1,2,4-Trimethylbenzene	0.159	2.00	"U" qualified for analyte in SB0244, SB0245, SB0248
		1,2,3-Trichlorobenzene	0.673	2.00	"U" qualified for analyte in SB0248
		Toluene	0.379	2.00	"U" qualified for analyte in SB0244, SB0245
SW8260B	MB966282	Acetone	1.70	25.0	"U" qualified for analyte in SB0252
		1,2,4-Trichlorobenzene	0.499	2.00	None
		1,2,4-Trimethylbenzene	0.234	2.00	"U" qualified for analyte in SB0247, SB0249,SB0250, SB0251
		Xylenes (Total)	0.460	6.00	"U" qualified for analyte in SB0249
		1,3-Dichlorobenzene	0.179	2.00	None
		n-Butylbenzene	0.171	2.00	None
		Naphthalene	0.911	2.00	"U" qualified for analyte in SB0247, SB0249,SB0250, SB0251, SB0252, SB0253
		1,2,3-Trichlorobenzene	0.678	2.00	None
		Benzene	0.142	2.00	"U" qualified for analyte in SB0247, SB0250, SB0251, SB0252, SB0253
		Toluene	1.22	2.00	"U" qualified for analyte in SB0247, SB0249,SB0250, SB0251, SB0252, SB0253
SW8260B	MB965020	Chloroform	0.860	2.00	"U" qualified for analyte in SB0243
SW8260B	MB966050	Acetone	7.20	25.0	"U" qualified for analyte in SB0254, SB0255,SB0256
		Chloroform	1.65	2.00	"U" qualified for analyte in SB0254, SB0255,SB0256
		Methylene choride	3.78	5.00	None
		Toluene	0.399	2.00	"U" qualified for analyte in SB0256

Table 2.1-1. Summary of Laboratory Method Blank Contamination and Impacted Data (Concluded)

Analytical Method	Laboratory QC Batch #	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	MB967197	Methylene choride	2.47	5.00	None
SW8260B	MB970885	Acetone	3.36	25.0	"U" qualified for analyte in SB0258,SB0259,SB 0260, SB0261, SB0262,SB0263, SB0264, SB0265, SB0266, SB0267, SB0268, SB0269, SB0270
		2-Butanone	3.64	5.00	"U" qualified for analyte in SB0258,SB0259,SB 0260, SB0261, SB0262,SB0263, SB0264, SB0265, SB0266, SB0267, SB0268, SB0269, SB0270
SW8260B	MB871106	2-Butanone	2.51	5.00	"U" qualified for analyte in SB0271, SB1746
		o-Xylene	0.815	2.00	"U" qualified for analyte in SB0271, SB1746
		Xylenes (Total)	0.815	6.00	"U" qualified for analyte in SB0271, SB1746
		Benzene	0.166	2.00	None
SW8260B	MB974970	Chloroform	0.853	2.00	None
SW6010C	MB973464	Lead	94.0	600	None

LOQ Limit of quantitation
ppb parts per billion

Based on the DoD QSM requirements (DoD, 2010), laboratory method blank levels are considered acceptable when contaminant levels in the blank are less than one-half the LOQ for target analytes and less than the LOQ for common laboratory contaminants, such as acetone, toluene, and methylene chloride. Table 2.1-1 summarizes method blank contamination and impacted sample results. As a result of the blank detections, the impacted results were qualified as non-detected ("U"). The detected concentrations in the samples are less than or equal to five times the corresponding levels detected in the blanks. The detected result for toluene was also qualified as non-detected (U) at the LOQ as the detected

sample result is less than 10 times the blank level. The blank qualification has no impact on the data usability.

2.1.3 Initial and Continuing Calibration Blanks (Reason Code B2)

In addition to the laboratory method blank for metals, initial and continuing calibration blank results were reviewed to ensure that the instrument was free of contamination prior to the analyses. No qualification of the data is required due to contamination detected in the initial and continuing calibration blanks. Detected concentrations of lead in the associated samples are greater than five times the corresponding levels detected in the initial and continuing calibration blanks.

2.1.4 Surrogate Recoveries (Reason Code S)

Surrogate standards are organic compounds added to field and laboratory QC samples for organic analysis to evaluate matrix effect and method performance on an individual sample basis. Biased surrogate recoveries were noted for Method SW8015B-DRO, summarized in Table 2.1-2 as follows:

Table 2.1-2. Summary of Surrogate Recovery Outlier and Impacted Data

Analytical Method	Sample	Surrogate Recovery Outlier (%)	Control Limit (%)	Qualifier
SW8015B	SB0233	o-Terphenyl (0%)	67-120	None
SW8015B	SB0234	o-Terphenyl (0%)	67-120	None
SW8015B	SB0246	o-Terphenyl (0%)	67-120	None

In samples SB0233, SB0234, and SB0246, elevated TPH-DRO concentrations were detected. In order to bring the sample result within the range, samples SB0233, SB0234, and SB0246 were diluted at a dilution factor of 10x or greater. Data qualification was not applied to the TPH-DRO results because of the required dilutions. With this exception, surrogate recoveries in other samples analyzed for VOCs, SVOCs, TPH-GRO, and TPH-DRO meet the acceptance criteria.

2.1.5 Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries (Reason Codes L and D1)

The LCS is an aliquot of analyte-free matrix spiked with target analytes that is prepared with each analytical batch for each analytical method. The recovery of target analytes from the LCS analysis is a measurement of method performance in an interference-free sample matrix. LCS recovery biases were reported for Methods SW8260B and SW8270D, as presented in Table 2.1-3, which summarizes LCS/LCSD outliers and impacted sample results.

Table 2.1-3. Summary of LCS/LCSD Recovery and RPD Outliers and Impacted Data

Analytical Method	Laboratory QC Batch #	LCS/LCSD Recovery/RPD Outliers (%)	Control Limit (%)	Qualifier
SW8260B	459360	1,2-Dibromoethane (32% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0239
		2,2-Dichloropropane (ok/38%; 88% RPD)	65-135%; RPD ≤30	"UJ" qualified for analyte in SB0239
		2-Butanone (44% RPD)	RPD ≤30	"J" qualified for analyte in SB0239
		Carbon tetrachloride (44% RPD)	RPD ≤30	UJ" qualified for analyte in SB0239
		Vinyl acetate (35% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0239
		cis-1,3-Dichloropropene (31% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0239
		trans-1,3-Dichloropropene (40% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0239
SW8270D	459688	4-Chloroaniline (35% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0240, SB0241, SB0242, SB1745
SW8270D	459801	Pyridine (55% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0243, SB0244, SB0245, SB0246, SB0247, SB0248, SB0249, SB0250, SB0251, SB0252, SB0253
		m,p-Cresols (ok/113%)	40-105%	None
SW8270D	461244	Aniline (36% RPD)	RPD ≤30	"UJ" qualified for analyte in SB0268, SB0269, SB0270, SB0271, SB1746

Impacted results were qualified as estimated (J or UJ). This data qualification was applied to all samples in the non-compliant batches. As shown in Table 2.1-3, the reported LCS recovery biases do not significantly deviate from the respective lower or upper control limits, and therefore the data usability is not affected. In addition, high LCS recovery biases were noted for other VOC and SVOC analytes in several batches. Because these analytes were not detected in any samples, the sample results are not affected by the elevated LCS recovery biases, and no data qualification is warranted.

2.1.6 Matrix Spike/Matrix Spike Duplicate Recoveries (Reason Code M)

The MS and MSD samples are a portion of a field sample spiked with target analytes that are prepared with each analytical batch. The MS/MSD results are used to evaluate any bias introduced to the method due to matrix interference and to measure bias and precision for each analytical batch. In accordance with the QAPjP requirements (USACE, 2011b), the MS/MSD samples are to be collected at a rate of 1 per 20 soil samples. Table 2.1-4 identifies the site-specific MS/MSD samples collected during the Third Quarter 2011 soil vapor monitoring well installation soil sampling event.

Table 2.1-4. Site-Specific MS/MSD Samples and Corresponding Analytical Suite

Well Location	Sample Number	MS/MSD Analysis
KAFB-106124	SB0230	VOCs, SVOCs, TPH-GRO, TPH-DRO, Metals
KAFB-106125	SB0248	VOCs, SVOCs, TPH-GRO, TPH-DRO, Metals
KAFB-106125	SB0257	SVOC
KAFB-106126	SB0267	SVOC
KAFB-106126	SB0258	Metals
KAFB-106127	SB0274	VOCs, SVOCs, TPH-GRO, TPH-DRO, Metals
KAFB-106127	SB0284	Metals

KAFB Kirtland Air Force Base

The RPDs between the MS and MSD recoveries meet the precision acceptance criteria for all the listed analyses; however, numerous MS/MSD RPD values for VOCs are unusable due to the different amount of spike added for each MS and MSD sample. Table 2.1-5 summarizes MS/MSD outliers and impacted sample results.

Table 2.1-5. Summary of MS/MSD Recovery Outliers and Impacted Data

Analytical Method	Spiked Sample	MS/MSD Recovery Outliers (%)	Control Limit (%)	Qualifier
SW8260B	SB0230	1,2,3-Trichlorobenzene (42% RPD)	RPD ≤30	“UJ” for analyte in SB0230
		1,2,4-Trichlorobenzene (ok%/61%; 49% RPD)	65-130; RPD ≤30	“UJ” for analyte in SB0230
		1,2,4-Trimethylbenzene (35% RPD)	RPD ≤30	“UJ” for analyte in SB0230
		1,3,5-Trimethylbenzene (34% RPD)	RPD ≤30	“UJ” for analyte in SB0230
		2-Hexanone (147%/ok)	45-145	None

Table 2.1-5. Summary of MS/MSD Recovery Outliers and Impacted Data (Concluded)

Analytical Method	Spiked Sample	MS/MSD Recovery Outliers (%)	Control Limit (%)	Qualifier
SW8260B	SB0230	4-Chlorotoluene (ok/74%)	75-125	"UJ" for analyte in SB0230
		4-Isopropyltoluene (ok/53%; 49% RPD)	75-135; RPD ≤30	"UJ" for analyte in SB0230
		Ethylbenzene (ok/74%)	75-125	"UJ" for analyte in SB0230
		Hexachlorobutadiene (51%/30%; 51% RPD)	55-140; RPD ≤30	"UJ" for analyte in SB0230
		Isopropylbenzene (ok/67%)	75-130	"UJ" for analyte in SB0230
		m,p-Xylenes (ok/75%)	80-125	"UJ" for analyte in SB0230
		n-Butylbenzene (ok%/48%; 58% RPD)	65-140; RPD ≤30	"UJ" for analyte in SB0230
SW8260B	SB0230	n-Propylbenzene (33% RPD)	RPD ≤30	"UJ" for analyte in SB0230
		sec-Butylbenzene (ok/52%; 51% RPD)	65-130; RPD ≤30	"UJ" for analyte in SB0230
		tert-Butylbenzene (ok/56%; 44% RPD)	65-130; RPD ≤30	"UJ" for analyte in SB0230
SW8015B	SB0230	TPH-DRO (169%/152%)	50-124%	"J+ " for analyte in SB0230
SW8260B	SB0248	2-Hexanone (ok/194%)	45-145%	None
		4-Isopropyltoluene (70%/68%)	75-135%	"UJ" for analyte in SB0248
		Hexachlorobutadiene (37%/25%)	55-140%	"UJ" for analyte in SB0248
		Styrene (58%/12%)	75-125%	"UJ" for analyte in SB0248
		n-Butylbenzene (ok/59%)	65-140%	"UJ" for analyte in SB0248
SW8015B	SB0248	TPH-DRO (303%/239%)	50-124%	"J+ " for analyte in SB0248
SW6010C	SB0248	Lead (67%/70%)	80-120%	"J-" for analyte in SB0248
SW8270D	SB0257	2,4-Dinitrotoluene (116%/120%)	50-115%	None
		4-Nitroaniline (122%/135%)	35-115%	None
		4-Nitrophenol (ok/146%)	15-140%	None
		Anthracene (121%/118%)	55-105%	None
		Di-n-butylphthalate (113%/ok)	55-110%	None
		Diethylphthalate (ok/117%)	50-115%	None
		m,p-Cresols (117%/118%)	40-105%	None
SW8270D	SB0267	Anthracene (ok/108%)	55-105%	None
		Pentachlorophenol (ok/126%)	25-120%	None
SW6010C	SB0258	Lead (ok/79%; 22% RPD)	80-120%; RPD ≤20	"J-" for analyte in SB0258
SW8260B	SB0274	4-Isopropyltoluene (ok/72%)	75-135%	"UJ" for analyte in SB0274
		Acrolein (36% RPD)	RPD ≤30	"UJ" for analyte in SB0274
		Hexachlorobutadiene (52%/45%)	55-140%	"UJ" for analyte in SB0274
		Styrene (ok/50%; 52% RPD)	75-125%; RPD ≤30	"UJ" for analyte in SB0274
		Vinyl acetate (37% RPD)	RPD ≤30	"UJ" for analyte in SB0274
SW8270D	SB0274	Aniline (ok/134%)	21-131%	None
		Anthracene (108%/109%)	55-105%	None
SW6010C	SB0274	Lead (76%/73%)	80-120%	"J-" for analyte in SB0274

Impacted results were qualified as estimated (J+ or J-) or estimated non-detections (UJ). This data qualification was applied only to the MS/MSD parent samples. As shown in Table 2.1-5, the reported MS/MSD recovery biases do not significantly deviate from the respective lower or upper control limits, and therefore the data usability is not affected. In addition, high MS/MSD recovery biases were noted for other VOC and SVOC analytes. Because these analytes were not detected in the parent sample, the

sample results are not affected by the high MS/MSD recovery biases, and no data qualification is warranted. Except as noted, the MS precision and bias results are acceptable for all other analyses.

2.1.7 Initial Calibration (Reason Code G)

Instrument calibration is performed for VOCs, SVOCs, TPH-GRO, TPH-DRO, and metals analyses according to the EPA method requirements. The linear analytical range is established for each method by analysis of standards prepared at increasing concentrations that cover the expected sample concentrations. The acceptability of the initial calibration is determined by calculation of a percent relative standard deviation or linear coefficient. The initial calibration results are acceptable for all the listed methods, with the exception of the average relative response factor (RRF) for VOC analysis, summarized in Table 2.1-6 as follows:

Table 2.1-6. Summary of Initial Calibration Outliers and Impacted Data

Analytical Method	Instrument#	ICV Outliers (RRF)	Control Limit (RRF)	Qualifier
SW8260B	MSV11 [2110623]	Acrylonitrile (0.06094)	0.1	“R” qualified for analyte in SB0239
SW8260B	MSV12 [2110625]	Acrylonitrile (0.07039)	0.1	“R” qualified for analyte in SB0229, SB0230, SB0231, SB0232, SB0233, SB0234, SB0235, SB0236, SB0237, SB0238
SW8260B	MSV9 [2110701]	Acrolein (0.01570)	0.1	“R” qualified for analyte in SB0240, SB0241, SB0242, SB1745
	MSV9 [2110701]	Acetone (0.07288)	0.1	“R” qualified for analyte in SB0240, SB0241, SB0242, SB1745
SW8260B	MSV9 [2110701]	Acrylonitrile (0.03915)	0.1	“R” qualified for analyte in SB0240, SB0241, SB0242, SB1745
	MSV9 [2110701]	2-Butanone (0.09308)	0.1	“R” qualified for analyte in SB0240, SB0241, SB0242, SB1745
SW8260B	MSV11 [2110707]	Acrolein (0.02507)	0.1	“R” qualified for analyte in SB0244, SB0245, SB0246, SB0247, SB0248, SB0249, SB0250, SB0251, SB0252, SB0253
SW8260B	MSV11 [2110707]	Acrylonitrile (0.05912)	0.1	“R” qualified for analyte in SB0244, SB0245, SB0246, SB0247, SB0248, SB0249, SB0250, SB0251, SB0252, SB0253
SW8260B	MSV12 [2110703]	Acrylonitrile (0.06310)	0.1	“R” qualified for analyte in SB0243
SW8260B	MSV9 [2110711]	Acrylonitrile (0.04174)	0.1	“R” qualified for analyte in SB0257

Table 2.1-6. Summary of Initial Calibration Outliers and Impacted Data (Concluded)

Analytical Method	Instrument#	ICV Outliers (RRF)	Control Limit (RRF)	Qualifier
SW8260B	MSV12 [2110707]	Acrylonitrile (0.07246)	0.1	"R" qualified for analyte in SB0254, SB0255, SB0256
SW8260B	MSV9 [2110720]	Acrolein (0.02369)	0.1	"R" qualified for analyte in SB0258, SB0259, SB0260, SB0261, SB0262, SB0263, SB0264, SB0265, SB0266, SB0267, SB0268, SB0269, SB0270
		Acrylonitrile (0.05491)	0.1	"R" qualified for analyte in SB0258, SB0259, SB0260, SB0261, SB0262, SB0263, SB0264, SB0265, SB0266, SB0267, SB0268, SB0269, SB0270
SW8260B	MSV12 [2110714]	Acrylonitrile (0.08755)	0.1	"R" qualified for analyte in SB0271, SB1746
SW8260B	MSV9 [2110730]	Acrylonitrile (0.05478)	0.1	"R" qualified for analyte in SB0272, SB0273, SB0274, SB0275, SB0276, SB0277, SB0278, SB0279, SB0280, SB0281, SB0282, SB0283
SW8260B	MSV9 [2110801]	Acrylonitrile (0.07035)	0.1	"R" qualified for analyte in SB0284, SB0285

ICV Initial calibration verification

Immediately after the initial calibration for each method, an ICV was conducted at the mid-point of instrument calibration range by using a second source calibration standard to verify the accuracy of the initial calibration. Except where noted, the ICV results meet the acceptance criteria for all other analyses.

2.1.8 Continuing Calibration Verification (Reason Code C)

Routinely during sample analysis, the stability of the analytical system is monitored by analysis of continuing calibration standards at concentrations near the mid-point of the linear range. Percent differences between the RRF in the initial calibration and the RRF in the continuing calibration exceed the acceptance criteria for VOC and SVOC analyses. The continuing calibration outliers that resulted in data qualification are summarized in Table 2.1-7.

Table 2.1-7. Summary of Continuing Calibration Verification Outliers and Impacted Data

Analytical Method	Instrument #	CCV Outlier (RRF/%)	Control Limit	Qualifier
SW8260B	MSV11 [2110625]	Acrylonitrile (0.06301)	0.1	“R” qualified for analyte in SB0239
SW8260B	MSV12 [2110625]	Acrylonitrile (0.06955)	0.1	“R” qualified for analyte in SB0229, SB0231, SB0232, SB0233, SB0234, SB0235, SB0236
SW8260B	MSV12 [2110626]	Acrylonitrile (0.06745)	0.1	R” qualified for analyte in SB0230, SB0237, SB0238
		Bromomethane (-22.32%)	± 20%	“UJ” qualified for analyte in SB0230, SB0237, SB0238
SW8260B	MSV9 [2110703]	Acrolein (0.01580)	0.1	“R” qualified for analyte in SB0240, SB0241, SB0242, SB1745
		Acetone (0.09498)	0.1	“R” qualified for analyte in SB0240, SB0241, SB0242, SB1745
		Acrylonitrile (0.03781)	0.1	“UJ” qualified for analyte in SB0240, SB0241, SB0242, SB1745
		2-Hexanone (23.3%)	± 20%	“UJ” qualified for analyte in SB0240, SB0241, SB0242, SB1745
SW8260B	MSV11 [2110708]	Acrolein (0.02327)	0.1	“R” qualified for analyte in SB0244, SB0245, SB0246, SB0248
		Acrylonitrile (0.05657)	0.1	“UJ” qualified for analyte in SB0244, SB0245, SB0246, SB0248
SW8260B	MSV11 [2110708]	Acrolein (0.02376)	0.1	“R” qualified for analyte in SB0247, SB0249, SB0250, SB0251, SB0252, SB0253
		Acrylonitrile (0.06437)	0.1	“UJ” qualified for analyte in SB0247, SB0249, SB0250, SB0251, SB0252, SB0253
SW8260B	MSV12 [2110706]	Acrylonitrile (0.06437)	0.1	R” qualified for analyte in SB0243
		Acetone (-22.8%)	± 20%	“UJ” qualified for analyte in SB0243
SW8260B	MSV9 [2110712]	Acrylonitrile (0.03863)	0.1	“R” qualified for analyte in SB0257
		Acetone (-20.7%)	± 20%	“J” qualified for analyte in SB0257
		Bromomethane (-31.3%)	± 20%	“UJ” qualified for analyte in SB0257
SW8260B	MSV12 [2110708]	Acrylonitrile (0.06570)	0.1	R” qualified for analyte in SB0254, SB0255, SB0256
		Vinyl acetate (-20.3%)	± 20%	“UJ” qualified for analyte in SB0254, SB0255, SB0256
SW8270D	MSSV5 [2110719]	4-Nitroaniline (26.5%)	± 20%	“UJ” qualified for analyte in SB0254, SB0255, SB0256, SB0257
SW8260B	MSV12 [2110721]	Acrylonitrile (0.07675)	0.1	R” qualified for analyte in SB0271, SB1746
SW8260B	MSV9 [2110730]	Acrylonitrile (0.05774)	0.1	“R” qualified for analyte in SB0276, SB0277
		Bromomethane (22.5%)	± 20%	“UJ” qualified for analyte in SB0276, SB0277
SW8260B	MSV9 [2110730]	Acrylonitrile (0.05812)	0.1	“R” qualified for analyte in SB0272, SB0273, SB0274, SB0275, SB0278, SB0279, SB0280, SB0281, SB0283
SW8260B	MSV9 [2110731]	Acrylonitrile (0.04900)	0.1	“R” qualified for analyte in SB0282
SW8260B	MSV9 [2110802]	Acrylonitrile (0.06898)	0.1	“R” qualified for analyte inSB0284, SB0285

Analytes with ICV and CCV RRFs of less than 0.1 that were not detected above the laboratory's detection limit (DL) in the associated samples were qualified with "R" as rejected, which is due to the poor sensitivity of the method at low levels for these analytes. The R-qualified data are determined to be unreliable at the laboratory's LOQ. The R-qualified results are not for BFF Spill project target analytes. Except as noted in Table 2.1-7, the continuing calibration results are acceptable for all other analyses.

2.1.9 Interference Check Samples (Reason Code O)

The ICP interference check sample (ICS) verifies the interelement and background correction factors. An ICS was analyzed at the beginning of each analytical sequence. All ICS results are within the established control limit.

2.1.10 Inductively Coupled Plasma Serial Dilution (Reason Code A)

The ICP serial dilution determines whether significant physical or chemical interferences exist due to sample matrix. Table 2.1-8 summarizes ICP serial dilution exceedances and impacted sample results.

Table 2.1-8. Summary of ICP Serial Dilution Outliers[a] and Impacted Data

Analytical Method	Sample	Analyte	Initial Sample Result (mg/kg)	Serial Dilution Result (mg/kg)	Percent Difference (%)	Qualifier
SW6010C	SB0230	Lead	5.47	4.51	17.8%	"J" qualified for analyte in SB0230
SW6010C	SB0274	Lead	6.14	5.03	18.1%	"J" qualified for analyte in SB0274

[a]Serial dilution outlier reason code is "A."

2.1.11 Ambient Blanks/Field Blanks (Reason Code K2)

Ambient blanks serve as a check for environmental contamination from airborne contaminants at a sampling location. The ambient blank is prepared by pouring distilled water into a clean sample container in the field and exposing this blank in the field at the time of sample collection and at a particular

location. No ambient blanks were collected during the Third Quarter 2011 soil vapor monitoring well installation soil sampling event.

Field blanks are prepared in the actual sample containers and are kept with the investigative samples throughout the sampling event. A field blank is prepared by filling the sample container with distilled, organic-free water, exposing it to field conditions by adding preservatives, and in general treating it as a normal sample. At no time after their preparation are the sample containers opened before they reach the laboratory. Table 2.1-9 summarizes field blank contamination and impacted sample results.

Table 2.1-9. Summary of Field Blank Contamination and Impacted Data

Analytical Method	Field Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	SB8022-FB	Acetone	1.06	5.00	None
		Bromodichloromethane	0.700	2.00	None
		Chloroform	2.79	2.00	None
		Dibromochloromethane	0.620	2.00	None
SW8260B	SB8024-FB	Bromodichloromethane	1.26	2.00	None
		Chloroform	3.02	2.00	None
		Dibromochloromethane	1.10	2.00	None
SW8260B	SB8025-FB	Acetone	1.05	5.00	"U" qualified for analyte in SB0277, SB0279, SB0280, SB0281, SB0282, and SB0283
		Bromodichloromethane	1.29	2.00	None
		Chloroform	3.40	2.00	None
		Dibromochloromethane	0.994	2.00	None

As a result of the field blank detections, the impacted results were qualified as non-detected (U). The detected concentrations in the samples are less than or equal to five times the corresponding levels detected in the blanks.

2.1.12 Trip Blanks (Reason Code K3)

Trip blanks are prepared by the laboratory and stored with the soil samples collected for VOC analysis. One trip blank sample was shipped with each cooler containing VOC samples shipped to the laboratory

from June 19 through July 23, 2011. A total of six trip blanks were collected during the Third Quarter 2011 sampling event. Table 2.1-10 summarizes trip blank contamination and impacted sample results.

Table 2.1-10. Summary of Trip Blank Contamination and Impacted Data

Analytical Method	Trip Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	SB8039-TB	Acetone	4.24	5.00	"U" qualified for analyte in SB0240, SB0241, SB0242, and SB1745
SW8260B	SB8041-TB	Toluene	0.141	2.00	None
SW8260B	SB8042-TB	Acetone	1.26	5.00	"U" qualified for analyte in SB0260, SB0261, SB0263, SB0264, SB0265, SB0266, SB0267, SB0268, SB0269, SB0271, and SB1746
		Xylenes (Total)	3.49	6.00	"U" qualified for analyte in SB0271, SB1746
		m,p-Xylenes	3.49	4.00	None
SW8260B	SB8043-TB	Acetone	1.40	5.00	"U" qualified for analyte in SB0274, SB0277, SB0278, SB0279, SB0280, SB0281, SB0282, and SB0283
		Bromodichloromethane	1.02	2.00	None
		Chloroform	2.33	2.00	None
		Dibromochloromethane	0.776	2.00	None
SW8260B	SB8044-TB	Acetone	0.358	5.00	None

2.1.13 Equipment Rinse Blanks (Reason Code K1)

Equipment rinse blanks are designed to check for contamination from sampling equipment, and the results for the equipment rinse blanks are used to evaluate the efficiency of equipment decontamination procedures.

During the Third Quarter 2011 soil vapor monitoring well installation soil sampling event, four equipment rinse blanks were collected. These four equipment rinse blank samples were prepared by rinsing the sampling equipment with the distilled water obtained from the laboratory and then collecting the final rinse water into appropriate sample containers. Equipment rinse blank samples were analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO, and metals. Table 2.1-11 summarizes rinsate blank contamination and impacted sample results.

Table 2.1-11. Summary of Rinsate Blank Contamination and Impacted Data

Analytical Method	Equipment Rinse Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	SB8032-RB	Acetone	1.55	5.00	"U" qualified for analyte in SB0240, SB1745
		Bromodichloromethane	0.671	2.00	None
		Chloroform	2.48	2.00	None
		Dibromochloromethane	0.600	2.00	None
SW8260B	SB8033-RB	Bromodichloromethane	0.786	2.00	None
		Chloroform	2.33	2.00	"U" qualified for analyte in SB0254, SB0255, SB0256
		Dibromochloromethane	0.769	2.00	None
SW8260B	SB8034-RB	Acetone	1.70	5.00	"U" qualified for analyte in SB0259, SB0260, SB0261, SB0262, SB0263, SB0264, SB0265, SB0266, SB0267, SB0268, SB0269, SB0270
		Bromodichloromethane	0.766	2.00	None
		Chloroform	1.73	2.00	None
		Dibromochloromethane	0.602	2.00	None
SW8260B	SB8035-RB	Acetone	1.28	5.00	"U" qualified for analyte in SB0274, SB0277, SB0278, SB0279, SB0280, SB0281, SB0282, and SB0283

2.1.14 Internal Standards (Reason Code I)

All spiked internal standards recoveries meet QC criteria.

2.2 Field Duplicates

In accordance with the site-specific BFF Spill QAPjP (USACE, 2011b) requirements, field duplicate samples are to be collected at a minimum rate of 10% of the total number of soil samples. Field duplicate samples are evaluated by calculating the RPD between the sample and its corresponding duplicate sample. The RPD is calculated using the following equation:

$$RPD = |(S-D)/[(S+D)/2]| \times 100$$

where:

S = sample result
D = duplicate result

Acceptable precision control criteria are established at less than or equal to 50% for soil samples. The RPD is calculated between pairs of field duplicate samples when both results are reported above the LOQ.

Seven duplicate pairs were collected during the Third Quarter 2011 soil vapor monitoring well installation soil sampling event. Therefore, the 10% field duplicate frequency requirement was achieved. Field duplicate samples are collected in immediate succession after the initial parent samples are collected employing identical recovery techniques. The duplicate pairs were collected and analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO, and metals. Table 2.2-1 summarizes field duplicate results and impacted data.

Table 2.2-1. Summary of Field Duplicate Results and Impacted Data

Analytical Method	Analyte	KAFB-106124 Sample ID: SB0233 and Concentration (ppb)	KAFB-106124 Duplicate ID: SB0234 and Concentration (ppb)	RPD	Control Limit
SW8260B	2-Butanone	8.28	2.85 (value <LOQ)	NC	<50%
	Acetone	28.6	14.7 (value <LOQ)	NC	<50%
	Benzene	0.314 (value <LOQ)	Non-detect	NC	<50%
SW8270D	bis(2-Ethylhexyl)phthalate	300 (value <LOQ)	1160	NC	<50%
SW8270D	Di-n-butyl phthalate	136 (value <LOQ)	21.2 (value <LOQ)	NC	<50%
SW8015B	TPH-DRO	347000	889000	87.7%	<50%
SW6010C	Lead	4430	4320	2.51%	<50%
Analytical Method	**Analyte**	**KAFB-106124 Sample ID: SB0240 and Concentration (ppb)**	**KAFB-106124 Duplicate ID: SB1745 and Concentration (ppb)**	**RPD**	**Control Limit**
SW8260B	Acetone	14.4 (value <LOQ)	13.4 (value <LOQ)	NC	< 50%
	Benzene	0.146 (value <LOQ)	Non-detect	NC	< 50%
	Toluene	0.554 (value <LOQ)	0.634 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	152 (value <LOQ)	43.7 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	56.7	24.2	80.4%	< 50%
SW6010C	Lead	2680	2600	3.0%	< 50%

Table 2.2-1. Summary of Field Duplicate Results and Impacted Data (Continued)

Analytical Method	Analyte	KAFB-106125 Sample ID: SB0244 and Concentration (ppb)	KAFB-106125 Duplicate ID: SB0245 and Concentration (ppb)	RPD	Control Limit
SW8260B	1,2,4-Trimethylbenzene	0.539 (value <LOQ)	0.285 (value <LOQ)	NC	< 50%
SW8260B	1,3,5-Trimethylbenzene	2.02 (value <LOQ)	Non-detect	NC	< 50%
SW8260B	2-Butanone	9.04	4.04 (value <LOQ)	NC	< 50%
SW8260B	Acetone	27 (value <LOQ)	12 (value <LOQ)	NC	< 50%
SW8260B	Benzene	0.908 (value <LOQ)	0.448 (value <LOQ)	NC	<50%
SW8260B	Ethylbenzene	0.498 (value <LOQ)	0.214 (value <LOQ)	NC	<50%
SW8260B	Toluene	1.65 (value <LOQ)	0.699 (value <LOQ)	NC	< 50%
SW8260B	m,p-Xylenes	1.04 (value <LOQ)	0.536 (value <LOQ)	NC	<50%
SW8260B	o-Xylene	0.274 (value <LOQ)	Non-detect	NC	<50%
SW8270D	bis(2-Ethylhexyl)phthalate	114 (value <LOQ)	197 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	138	142	2.9%	<50%
SW6010C	Lead	5970	5640	5.7%	<50%
Analytical Method	**Analyte**	**KAFB-106125 Sample ID: SB0254 and Concentration (ppb)**	**KAFB-106125 Duplicate ID: SB0255 and Concentration (ppb)**	**RPD**	**Control Limit**
SW8260B	1,2,4-Trimethylbenzene	0.805 (value <LOQ)	0.261 (value <LOQ)	NC	< 50%
SW8260B	1,3,5-Trimethylbenzene	0.308 (value <LOQ)	0.127 (value <LOQ)	NC	< 50%
SW8260B	2-Butanone	5.2 (value <LOQ)	2.91 (value <LOQ)	NC	< 50%
SW8260B	Acetone	22.1 (value <LOQ)	7.41 (value <LOQ)	NC	< 50%
SW8260B	Benzene	4.51	3.56	23.5%	< 50%
SW8260B	Chloroform	1.61 (value <LOQ)	0.998 (value <LOQ)	NC	< 50%
SW8260B	Ethylbenzene	2.03 (value <LOQ)	0.828 (value <LOQ)	NC	< 50%
SW8260B	Toluene	6.46	6.85	5.9%	< 50%
SW8260B	Xylenes (Total)	2.41 (value <LOQ)	1.02 (value <LOQ)	NC	< 50%
SW8260B	m,p-Xylenes	1.74 (value <LOQ)	0.775 (value <LOQ)	NC	<50%
SW8260B	o-Xylene	0.673 (value <LOQ)	0.241 (value <LOQ)	NC	<50%
SW8270D	bis(2-Ethylhexyl)phthalate	Non-detect	64.2 (value <LOQ)	NC	< 50%
SW8270D	Diethyl phthalate	Non-detect	50.3 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	10700	26400	84.6%	< 50%
SW6010C	Lead	9960	11800	16.9%	< 50%
Analytical Method	**Analyte**	**KAFB-126126 Sample ID: SB0260 and Concentration (ppb)**	**KAFB-126126 Duplicate ID: SB0261 and Concentration (ppb)**	**RPD**	**Control Limit**
SW8260B	2-Butanone	7.63	1.97 (value <LOQ)	NC	< 50%
SW8260B	Acetone	8.77 (value <LOQ)	10.1 (value <LOQ)	NC	< 50%
SW8260B	Benzene	1.73 (value <LOQ)	1.91 (value <LOQ)	NC	< 50%
SW8260B	Toluene	1.19 (value <LOQ)	0.881 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	15500	10700	36.6%	< 50%
SW6010C	Lead	8960	8920	0.4%	< 50%

Table 2.2-1. Summary of Field Duplicate Results and Impacted Data (Concluded)

Analytical Method	Analyte	KAFB-126126 Sample ID: SB0269 and Concentration (ppb)	KAFB-126126 Duplicate ID: SB1746 and Concentration (ppb)	RPD	Control Limit
SW8260B	2-Butanone	7.38	3.16 (value <LOQ)	NC	< 50%
SW8260B	Acetone	6.95 (value <LOQ)	4.28 (value <LOQ)	NC	< 50%
SW8260B	Benzene	0.519 (value <LOQ)	1.34 (value <LOQ)	NC	< 50%
SW8260B	Toluene	0.452 (value <LOQ)	0.803 (value <LOQ)	NC	< 50%
SW8260B	Xylenes (Total)	Non-detect	0.835 (value <LOQ)	NC	< 50%
SW8260B	m,p-Xylenes	Non-detect	0.835 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	78.5 (value <LOQ)	98.2 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	58700	50300	15.4%	< 50%
SW6010C	Lead	5060	3310	41.8%	< 50%
Analytical Method	**Analyte**	**KAFB-126127 Sample ID: SB0276 and Concentration (ppb)**	**KAFB-126127 Duplicate ID: SB0277 and Concentration (ppb)**	**RPD**	**Control Limit**
SW8260B	2-Butanone	11.3	4.60	84.3%	< 50%
SW8260B	Acetone	26.6 (value <LOQ)	6.72 (value <LOQ)	NC	< 50%
SW8270D	bis(2-Ethylhexyl)phthalate	Non-detect	192 (value <LOQ)	NC	< 50%
SW8270D	Di-n-butyl phthalate	Non-detect	14.0 (value <LOQ)	NC	< 50%
SW8270D	o-Cresol	Non-detect	19.1 (value <LOQ)	NC	< 50%
SW8015B	TPH-DRO	42300	153000	113%	< 50%
SW6010C	Lead	6080	5010	19.3%	< 50%

Except for analytes shown in shaded cells in Table 2.2-1, the RPDs for all other listed parameters are within the 50% field duplicate precision goal. Results exceeding the field duplicate precision limit were qualified as estimated (J). The high RPD values may be attributed to the following factors:

- At low concentrations the relative difference in results is magnified by the RPD calculation even though the results are comparable in absolute terms.
- Non-homogeneity distribution of target analytes occurs within the sample matrix.

2.3 Completeness

The following sections present a discussion of contractual, analytical, and technical completeness for the Third Quarter 2011 soil vapor monitoring well installation soil sampling event. Completeness calculations were performed only for the soil samples that are used for project decisions.

2.3.1 Contractual Completeness

Contractual completeness is a quantitative measure of the number of unqualified data results compared to the total number of sample results expressed as a percentage, based on data qualified for QC outliers related to method performance. These include data qualified for calibration or laboratory blank contamination, missed holding times, and non-compliant LCS recovery and/or precision. The contractual completeness goal is 95%. Contractual completeness is calculated as follows:

$$\% \text{ Contractual Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \times 100$$

Contractual completeness for the Third Quarter 2011 soil vapor monitoring well installation soil sampling event is summarized in Table 2.3-1.

Table 2.3-1. Contractual Completeness Summary

Analytical Method	Number of Unqualified Results	Total Number of Results	% Contractual Completeness
SW6010C	48	48	100%
SW8015B-GRO	48	48	100%
SW8015B-DRO	48	48	100%
SW8260B	3,252	3,360	96.8%
SW8270D	3,491	3,504	99.6%

The 95% contractual completeness goal was also achieved for all analytical suites (Lead by EPA Method SW6010C, TPH-GRO by SW8015B, TPH-DRO by SW8015B, VOCs by SW8260B, and SVOCs by SW8270D). Sufficient acceptable results were obtained to meet the project objectives.

2.3.2 Analytical Completeness

Analytical completeness is a quantitative measure of the number of unqualified data results compared to the total number of results expressed as a percentage, based on target analytes qualified for exceedances of QC requirements based on calibration, LCS, MS/MSD, surrogates, method precision, and laboratory method blank contamination results. Analytical completeness does not include analytes qualified as estimated (J) due to values reported between the laboratory's DL and LOQ. The analytical completeness goal is 90%. Analytical completeness is calculated as follows:

$$\% \text{ Analytical Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \times 100$$

Analytical completeness for the Third Quarter 2011 soil vapor monitoring well installation soil sampling event is summarized in Table 2.3-2.

Table 2.3-2. Analytical Completeness Summary

Analytical Method	Number of Unqualified Results	Total Number of Results	% Analytical Completeness
SW6010C	45	48	93.8%
SW8015B-GRO	37	48	77.1%
SW8015B-DRO	41	48	85.4%
SW8260B	2,542	3,360	75.6%
SW8270D	3,491	3,504	99.6%

The 90% analytical completeness goal was not achieved for the following analytical suites: TPH-GRO by EPA Method SW8015B, TPH-DRO by SW8015B, and VOCs by SW8260B. The low analytical

completeness percentages are due to the temperature in the cooler containing TPH-GRO and VOC fractions of samples reported in SDG 211062325 as being received by GCAL at 6.8°C. Based on professional judgment, TPH-GRO and VOC results reported for samples SB0229, SB0230, SB0231, SB0232, SB0233, SB0234, SB0235, SB0236, SB0237, SB0238, and SB0239 were qualified with J or UJ due to the elevated cooler temperature exceeding the QC criteria (4 ± 2°C). The results may be slightly biased low. Preserving TPH-GRO and VOCs fractions in TerraCore® samplers prior to shipment reduced the impact of elevated cooler temperatures on the de-volatilization of target analytes in the impacted samples. As a result of analytical completeness, data were qualified as estimated detected and non-detected values. Estimated data are usable to achieve project data quality objectives.

2.3.3 Technical Completeness

Technical completeness is a quantitative measure of the data usability based on the number of rejected data results compared to the total number of sample results. The technical completeness goal for each method is equal to or greater than 95%. The technical completeness calculation considers all data that are not rejected to be usable, and technical completeness is calculated as follows:

$$\% \text{ Technical Completeness} = \frac{\text{Number of Usable Results}}{\text{Total Number of Results}} \times 100$$

Technical completeness for the Third Quarter 2011 soil vapor monitoring well installation soil sampling event is summarized in Table 2.3-3.

Table 2.3-3. Technical Completeness Summary

Analytical Method	Number of Unqualified Results	Total Number of Results	% Technical Completeness
SW6010C	48	48	100%
SW8015B-GRO	48	48	100%
SW8015B-DRO	48	48	100%
SW8260B	3,288	3,360	97.9%
SW8270D	3,504	3,504	100%

Analytes with ICV and CCV RRFs of less than 0.1 and not detected above the laboratory's DLs in associated samples are qualified with "R" as rejected, which is due to the poor sensitivity of the method at low levels for these analytes. Impacted analytes include 2-butanone, acetone, acrolein (2-propenal), and acrylonitrile (2-propenenitrile); however, these analytes are not BFF Spill project target analytes. The R-qualified data are determined to be unreliable at the laboratory's LOQ. Sufficient acceptable results were obtained to meet the project objectives for technical completeness.

2.4 Summary

The analytical data reported for this event have been reviewed for completeness, bias, and precision. Data quality issues observed consisted of biased surrogate, spiked internal standard outliers, parent sample and field duplicate precision outliers, LCS/LCSD, MS/MSD recoveries, initial and continuing calibration outliers, and laboratory and field blank contamination. The affected data were qualified as estimated or non-detected with the exception of the 2-butanone, acetone, acrolein (2-propenal), and acrylonitrile (2-propenenitrile) results for some samples, which were qualified with "R" due to ICV and/or CCV RRFs of less than 0.1 The R-qualified data are determined to be unreliable at the laboratory's DL but may be used for screening purposes only; however, these results are not for project-specific target analytes. The 95% technical completeness goal for all methods was exceeded.

REFERENCES

DoD. 2010. *DoD Quality Systems Manual for Environmental Laboratories, Version 4.2.* October 25.

EPA. 2010. *USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Superfund Data Review, Final.* Office of Superfund Remediation and Technology Innovation (OSRTI). Office of Solid Waste and Emergency Response (OSWER) 8240.1-51 and USEPA-540-R-10-011. January.

EPA. 2008. *USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review, Final.* OSRTI. OSWER 9240.1-48 and USEPA-540-R-08-01. June.

EPA. 2006. *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods.* SW-846 (see 2008 update). Office of Solid Waste, Washington D.C. Online at http://www.epa.gov/osw/hazard/testmethods/sw846.

USACE. 2011a. *Quarterly Pre-Remedy Monitoring and Site Investigation Report, April – June 2011, Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 AND SS-111, Kirtland Air Force Base, Albuquerque, New Mexico.* Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W912DY-10-D-0014, Delivery Order 0002. September.

USACE. 2011b. *Quality Assurance Project Plan, Bulk Fuels Facility (BFF) Spill, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico.* Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W912DY-10-D-0014, Delivery Order 0002. April.

USACE. 2005. *Environmental Quality – Guidance for Evaluating Performance-Based Chemical Data,* EM 200-1-10. June 30.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLES

List of Appendix B-2 Tables

Appendix B2 – Table 1: Soil Vapor Well Installation Soil Samples, April – June 2011, Gulf Coast Analytical Laboratories, Inc. Sample Delivery Groups

Appendix B2 – Table 2: Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Second Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico

Appendix B2 – Table 3: Data Qualification Flags and Reason Codes

Appendix B2 – Table 4: Soil Vapor Well Installation Soil Samples, July – September 2011, Gulf Coast Analytical Laboratories, Inc. Sample Delivery Groups

Appendix B2 – Table 5: Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Third Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary, Kirtland Air Force Base, Albuquerque, New Mexico

Appendix B2 – Table 1: Soil Vapor Well Installation Soil Samples, April – June 2011
Gulf Coast Analytical Laboratories, Inc. Sample Delivery Groups

Location	Sample Date	Sample Number	SDG	Type
KAFB-106120	6-Jun-11	SB0172	211061111	SO
KAFB-106120	6-Jun-11	SB0173	211061111	SO
KAFB-106120	6-Jun-11	SB0174	211061111	SO
KAFB-106120	6-Jun-11	SB0175	211061111	SO
KAFB-106120	6-Jun-11	SB0176	211061111	SO
KAFB-106120	6-Jun-11	SB0177	211061111	SO
KAFB-106120	6-Jun-11	SB0178	211061111	SO
KAFB-106120	6-Jun-11	SB0179	211061111	SO
KAFB-106120	6-Jun-11	SB0181	211061111	SO
KAFB-106120	6-Jun-11	SB0183	211061111	SO
KAFB-106120	7-Jun-11	SB0180	211061111	SO
KAFB-106120	7-Jun-11	SB0182	211061111	SO
KAFB-106120	7-Jun-11	SB0184	211061111	SO
KAFB-106120	7-Jun-11	SB0185	211061111	SO
KAFB-106121	19-May-11	SB0186	211052503	SO
KAFB-106121	19-May-11	SB0187	211052503	SO
KAFB-106121	19-May-11	SB0188	211052503	SO
KAFB-106121	19-May-11	SB0189	211052503	SO
KAFB-106121	19-May-11	SB0190	211052503	SO
KAFB-106121	21-May-11	SB0191	211052503	SO
KAFB-106121	21-May-11	SB0192	211052503	SO
KAFB-106121	21-May-11	SB0193	211052503	SO
KAFB-106121	21-May-11	SB0194	211052503	SO
KAFB-106121	22-May-11	SB0195	211052503	SO
KAFB-106121	22-May-11	SB0196	211052503	SO
KAFB-106121	22-May-11	SB0197	211052503	SO
KAFB-106121	22-May-11	SB0198	211052503	SO
KAFB-106121	22-May-11	SB0199	211052503	SO
KAFB-106122	14-Jun-11	SB0200	211061625	SO
KAFB-106122	14-Jun-11	SB0201	211061625	SO
KAFB-106122	14-Jun-11	SB0202	211061625	SO
KAFB-106122	14-Jun-11	SB0203	211061625	SO
KAFB-106122	14-Jun-11	SB0204	211061625	SO
KAFB-106122	14-Jun-11	SB0205	211061625	SO
KAFB-106122	15-Jun-11	SB0206	211061625	SO
KAFB-106122	15-Jun-11	SB0207	211061705	SO
KAFB-106122	15-Jun-11	SB0208	211061705	SO
KAFB-106122	15-Jun-11	SB0209	211061705	SO
KAFB-106122	15-Jun-11	SB0210	211061705	SO
KAFB-106122	16-Jun-11	SB0211	211061803	SO
KAFB-106122	16-Jun-11	SB0212	211061803	SO
KAFB-106122	16-Jun-11	SB0213	211061803	SO
KAFB-106122	16-Jun-11	SB1744	211061803	SO
KAFB-106123	31-May-11	SB0214	211060401	SO
KAFB-106123	31-May-11	SB0215	211060401	SO
KAFB-106123	31-May-11	SB0216	211060401	SO
KAFB-106123	31-May-11	SB0217	211060401	SO
KAFB-106123	31-May-11	SB0218	211060401	SO
KAFB-106123	31-May-11	SB0219	211060401	SO
KAFB-106123	31-May-11	SB0220	211060401	SO
KAFB-106123	1-Jun-11	SB0221	211060401	SO
KAFB-106123	1-Jun-11	SB0222	211060401	SO
KAFB-106123	1-Jun-11	SB0223	211060401	SO

Appendix B2 – Table 1: Soil Vapor Well Installation Soil Samples, April – June 2011 Gulf Coast Analytical Laboratories, Inc. Sample Delivery Groups (Concluded)

Location	Sample Date	Sample Number	SDG	Type
KAFB-106123	1-Jun-11	SB0224	211060401	SO
KAFB-106123	1-Jun-11	SB0225	211060401	SO
KAFB-106123	2-Jun-11	SB0226	211060718	SO
KAFB-106123	2-Jun-11	SB0227	211060718	SO
KAFB-106123	2-Jun-11	SB0228	211060718	SO

Appendix B2 – Table 2. Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Second Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico

Location ID	Sample Number	Sample Purpose	Sample Date	Start Depth (ft)	End Depth (ft)	Laboratory Sample ID	Lead by SW-846 6010C	TPH-GRO by SW-846 8015B	TPH-DRO by SW-846 8015B	VOCs by SW-846 8260B	SVOCs by SW-846 8270D
KAFB-106120	SB0172	REG	6-Jun-11	---	---	21106111101	X	X	X	X	X
KAFB-106120	SB0173	REG	6-Jun-11	10	20	21106111102	X	X	X	X	X
KAFB-106120	SB0174	REG	6-Jun-11	20	30	21106111105	X	X	X	X	X
KAFB-106120	SB0175	REG	6-Jun-11	30	40	21106111106	X	X	X	X	X
KAFB-106120	SB0176	REG	6-Jun-11	40	50	21106111107	X	X	X	X	X
KAFB-106120	SB0177	FD	6-Jun-11	40	50	21106111108	X	X	X	X	X
KAFB-106120	SB0178	REG	6-Jun-11	50	100	21106111109	X	X	X	X	X
KAFB-106120	SB0179	REG	6-Jun-11	100	150	21106111110	X	X	X	X	X
KAFB-106120	SB0180	REG	7-Jun-11	150	200	21106111111	X	X	X	X	X
KAFB-106120	SB0181	REG	6-Jun-11	200	250	21106111112	X	X	X	X	X
KAFB-106120	SB0182	REG	7-Jun-11	250	300	21106111113	X	X	X	X	X
KAFB-106120	SB0183	REG	6-Jun-11	300	350	21106111114	X	X	X	X	X
KAFB-106120	SB0184	REG	7-Jun-11	350	400	21106111115	X	X	X	X	X
KAFB-106120	SB0185	REG	7-Jun-11	400	450	21106111116	X	X	X	X	X
KAFB-106121	SB0186	REG	19-May-11	0	10	21105250301	X	X	X	X	X
KAFB-106121	SB0187	REG	19-May-11	10	20	21105250302	X	X	X	X	X
KAFB-106121	SB0188	REG	19-May-11	20	30	21105250303	X	X	X	X	X
KAFB-106121	SB0189	REG	19-May-11	30	40	21105250304	X	X	X	X	X
KAFB-106121	SB0190	REG	19-May-11	40	50	21105250305	X	X	X	X	X
KAFB-106121	SB0191	REG	21-May-11	50	100	21105250309	X	X	X	X	X
KAFB-106121	SB0192	REG	21-May-11	100	150	21105250310	X	X	X	X	X
KAFB-106121	SB0193	REG	21-May-11	150	200	21105250311	X	X	X	X	X
KAFB-106121	SB0194	FD	21-May-11	150	200	21105250312	X	X	X	X	X
KAFB-106121	SB0195	REG	22-May-11	200	250	21105250313	X	X	X	X	X
KAFB-106121	SB0196	REG	22-May-11	250	300	21105250314	X	X	X	X	X
KAFB-106121	SB0197	REG	22-May-11	300	350	21105250315	X	X	X	X	X
KAFB-106121	SB0198	REG	22-May-11	350	400	21105250316	X	X	X	X	X
KAFB-106121	SB0199	REG	22-May-11	400	450	21105250317	X	X	X	X	X
KAFB-106122	SB0200	REG	14-Jun-11	0	10	21106162501	X	X	X	X	X
KAFB-106122	SB0201	REG	14-Jun-11	10	20	21106162502	X	X	X	X	X

Appendix B2 – Table 2. Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Second Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico (Continued)

Location ID	Sample Number	Sample Purpose	Sample Date	Start Depth (ft)	End Depth (ft)	Laboratory Sample ID	Lead by SW-846 6010C	TPH-GRO by SW-846 8015B	TPH-DRO by SW-846 8015B	VOCs by SW-846 8260B	SVOCs by SW-846 8270D
KAFB-106122	SB0202	REG	14-Jun-11	20	30	21106162503	X	X	X	X	X
KAFB-106122	SB0203	FD	14-Jun-11	20	30	21106162504	X	X	X	X	X
KAFB-106122	SB0204	REG	14-Jun-11	30	40	21106162505	X	X	X	X	X
KAFB-106122	SB0205	REG	14-Jun-11	40	50	21106162506	X	X	X	X	X
KAFB-106122	SB0206	REG	15-Jun-11	50	100	21106162507	X	X	X	X	X
KAFB-106122	SB0207	REG	15-Jun-11	100	150	21106170501	X	X	X	X	X
KAFB-106122	SB0208	REG	15-Jun-11	150	200	21106170504	X	X	X	X	X
KAFB-106122	SB0209	REG	15-Jun-11	200	250	21106170505	X	X	X	X	X
KAFB-106122	SB0210	REG	15-Jun-11	250	300	21106170506	X	X	X	X	X
KAFB-106122	SB0211	REG	16-Jun-11	300	350	21106180301	X	X	X	X	X
KAFB-106122	SB0212	REG	16-Jun-11	350	400	21106180302	X	X	X	X	X
KAFB-106122	SB1744	FD	16-Jun-11	350	400	21106180304	X	X	X	X	X
KAFB-106122	SB0213	REG	16-Jun-11	400	450	21106180303	X	X	X	X	X
KAFB-106123	SB0214	REG	31-May-11	0	10	21106040101	X	X	X	X	X
KAFB-106123	SB0215	FD	31-May-11	0	10	21106040102	X	X	X	X	X
KAFB-106123	SB0216	REG	31-May-11	10	20	21106040103	X	X	X	X	X
KAFB-106123	SB0217	REG	31-May-11	20	30	21106040104	X	X	X	X	X
KAFB-106123	SB0218	REG	31-May-11	30	40	21106040107	X	X	X	X	X
KAFB-106123	SB0219	REG	31-May-11	40	50	21106040108	X	X	X	X	X
KAFB-106123	SB0220	REG	31-May-11	50	100	21106040109	X	X	X	X	X
KAFB-106123	SB0221	REG	1-Jun-11	100	150	21106040110	X	X	X	X	X
KAFB-106123	SB0222	REG	1-Jun-11	150	200	21106040111	X	X	X	X	X
KAFB-106123	SB0223	REG	1-Jun-11	200	250	21106040112	X	X	X	X	X
KAFB-106123	SB0224	REG	1-Jun-11	250	300	21106040113	X	X	X	X	X
KAFB-106123	SB0225	REG	1-Jun-11	300	350	21106040114	X	X	X	X	X
KAFB-106123	SB0226	REG	2-Jun-11	350	400	21106071801	X	X	X	X	X
KAFB-106123	SB0227	FD	2-Jun-11	350	400	21106071802	X	X	X	X	X
KAFB-106123	SB0228	REG	2-Jun-11	400	450	21106071803	X	X	X	X	X

Appendix B2 – Table 2. Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Second Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico (Concluded)

Location ID	Sample Number	Sample Purpose	Sample Date	Start Depth (ft)	End Depth (ft)	Laboratory Sample ID	Lead by SW-846 6010C	TPH-GRO by SW-846 8015B	TPH-DRO by SW-846 8015B	VOCs by SW-846 8260B	SVOCs by SW-846 8270D
Field QC Summary											
FIELDQC	SB8015-FB	FB	1-Jun-11	---	---	21106040115				X	
FIELDQC	SB8018-FB	FB	21-May-11	---	---	21105250318				X	
FIELDQC	SB8020-FB	FB	7-Jun-11	---	---	21106111117				X	
FIELDQC	SB8021-FB	FB	15-Jun-11	---	---	21106170507				X	
FIELDQC	SB8028-RB	ER	21-May-11	---	---	21105250319	X	X	X	X	X
FIELDQC	SB8029-RB	ER	7-Jun-11	---	---	21106111118	X	X	X	X	X
FIELDQC	SB8030-RB	ER	1-Jun-11	---	---	21106040116	X	X	X	X	X
FIELDQC	SB8031-RB	ER	15-Jun-11	---	---	21106170508	X	X	X	X	X
FIELDQC	SB8030-TB	TB	19-May-11	---	---	21105250306				X	
FIELDQC	SB8031-TB	TB	21-May-11	---	---	21105250331				X	
FIELDQC	SB8032-TB	TB	31-May-11	---	---	21106040117				X	
FIELDQC	SB8033-TB	TB	2-Jun-11	---	---	21106071804				X	
FIELDQC	SB8034-TB	TB	6-Jun-11	---	---	21106111119				X	
FIELDQC	SB8035-TB	TB	14-Jun-11	---	---	21106162508				X	
FIELDQC	SB8036-TB	TB	15-Jun-11	---	---	21106170509				X	
FIELDQC	SB8037-TB	TB	16-Jun-11	---	---	21106180305				X	

X indicates a sample was collected and analyzed for the given parameter.

ER	Equipment rinsate sample
FB	Field blank sample
FD	Field duplicate sample
ft	Feet
ID	Identification
REG	Regular field sample
SVOCs	Semivolatile organic compounds
TB	Trip blank
TPH-DRO	Total petroleum hydrocarbons – Diesel Range Organics
TPH-GRO	Total petroleum hydrocarbons – Gasoline Range Organics
VOCs	Volatile organic compounds

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B2 – Table 3. Data Qualification Flags and Reason Codes

Data Qualifier Definitions for Organic Data Review

Qualifier	Definition
	No Qualifier indicates that the data are acceptable both qualitatively and quantitatively.
U	The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J	The analyte was analyzed for and was positively identified, but the reported numerical value may not be consistent with the amount actually present in the environmental sample. Results are estimated although the data are considered usable and may be used as appropriate to meet project objectives. Results are qualitatively acceptable and quantitatively uncertain.
J-	The analyte was positively identified; associated numerical value is its approximate concentration with a low bias in the sample.
J+	The analyte was positively identified; associated numerical value is its approximate concentration with a high bias in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated value represents its approximate concentration.
“UJ” qualified	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The analyte was analyzed for, but the presence <u>or</u> absence of the analyte has not been verified. Re-sampling and reanalysis may be necessary to confirm or deny the presence of the analyte. Results are rejected and data are <u>unusable</u> for any purposes.

Data Qualifier Definitions for Inorganic Data Review

Qualifier	Definition
	No Qualifier indicates that the data are acceptable both qualitatively and quantitatively.
U	The analyte was analyzed for but was not detected above the level of the reported value. The reported value is the instrument detection limit for waters and the method detection limit (MDL) for soils for all the analytes except cyanide (CN) and mercury (Hg). For CN and Hg, the reported value is the contract-required detection limit.
J	The analyte was analyzed for and was positively identified, but the reported numerical value may not be consistent with the amount actually present in the environmental sample. Results are estimated although the data are considered usable and may be used as appropriate to meet project objectives. Results are qualitatively acceptable and quantitatively uncertain.
J-	The analyte was positively identified; associated numerical value is its approximate concentration with a low bias in the sample.
J+	The analyte was positively identified; associated numerical value is its approximate concentration with a high bias in the sample.
“UJ” qualified	The analyte was analyzed for but was not detected above the reported value. The reported value may not accurately or precisely represent the sample reporting limit.
R	The analyte was analyzed for, but the presence <u>or</u> absence of the analyte has not been verified. Resampling and reanalysis may be necessary to confirm or deny the presence of the analyte. Results are rejected and data are <u>unusable</u> for any purposes.

Appendix B2 – Table 3. Data Qualification Flags and Reason Codes (Concluded)

Reason Codes for Data Review and Validation

Reason Code	Description
A	Serial dilution outside criteria (Level IV).
B1	Method blank contaminants above reporting limit.
B2	Calibration blank contaminants above reporting limit.
B2, Bias Flag "-"	Calibration blank indicates negative interference, false negatives may be present.
C	Calibration outside control limits.
D1	Sample duplicate RPD outside control limit.
D2	Matrix duplicate RPD outside control limit.
E	The sample results exceed the linear calibration range of the instrument.
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard.
G1	Initial calibration relative standard deviation outside control limit.
G2	Initial continuing calibration RRF outside control limit.
G3	Continuing calibration RRF outside control limit.
H	Holding time exceeded.
I	Internal standard recovery outside control limit.
K1	Equipment rinsate contamination.
K2	Ambient blank contamination.
K3	Trip blank contamination.
L	LCS outside control limits.
M	MS outside control limits.
O	Interference check sample outside acceptance criteria.
P	Analyte qualified based on the professional judgment of the reviewer.
S	Surrogate recovery outside control limit.
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the MDL and practical quantitation limit.
W	Pesticide breakdown outside criteria (Level IV).
X	Raised reporting limit due to matrix interference or high analyte concentration.
Y	Analyte was not confirmed by a second column.
Y1	Primary and confirmation sample duplicate RPD outside control limit.

Appendix B2 – Table 4: Soil Vapor Well Installation Soil Samples, July – September 2011 Gulf Coast Analytical Laboratories, Inc. Sample Delivery Groups

Location	Sample Date	Sample Number	SDG	Type
KAFB-106124	19-Jun-11	SB0229	211062325	SO
KAFB-106124	19-Jun-11	SB0230	211062325	SO
KAFB-106124	19-Jun-11	SB0231	211062325	SO
KAFB-106124	19-Jun-11	SB0232	211062325	SO
KAFB-106124	19-Jun-11	SB0233	211062325	SO
KAFB-106124	19-Jun-11	SB0234	211062325	SO
KAFB-106124	20-Jun-11	SB0235	211062325	SO
KAFB-106124	21-Jun-11	SB0236	211062325	SO
KAFB-106124	21-Jun-11	SB0237	211062325	SO
KAFB-106124	21-Jun-11	SB0238	211062325	SO
KAFB-106124	21-Jun-11	SB0239	211062325	SO
KAFB-106124	22-Jun-11	SB0240	211062509	SO
KAFB-106124	22-Jun-11	SB0241	211062509	SO
KAFB-106124	22-Jun-11	SB0242	211062509	SO
KAFB-106124	22-Jun-11	SB1745	211062509	SO
KAFB106125	27-Jun-11	SB0243	211063024	SO
KAFB106125	27-Jun-11	SB0244	211063024	SO
KAFB106125	27-Jun-11	SB0245	211063024	SO
KAFB106125	27-Jun-11	SB0246	211063024	SO
KAFB106125	28-Jun-11	SB0247	211063024	SO
KAFB106125	28-Jun-11	SB0248	211063024	SO
KAFB106125	28-Jun-11	SB0249	211063024	SO
KAFB106125	28-Jun-11	SB0250	211063024	SO
KAFB106125	29-Jun-11	SB0251	211063024	SO
KAFB106125	29-Jun-11	SB0252	211063024	SO
KAFB106125	29-Jun-11	SB0253	211063024	SO
KAFB106125	6-Jul-11	SB0254	211070716	SO
KAFB106125	6-Jul-11	SB0255	211070716	SO
KAFB106125	6-Jul-11	SB0256	211070716	SO
KAFB106125	6-Jul-11	SB0257	211070716	SO
KAFB106126	10-Jul-11	SB0258	211071306	SO
KAFB106126	10-Jul-11	SB0259	211071306	SO
KAFB106126	10-Jul-11	SB0260	211071306	SO
KAFB106126	10-Jul-11	SB0261	211071306	SO
KAFB106126	10-Jul-11	SB0262	211071306	SO
KAFB106126	10-Jul-11	SB0263	211071306	SO
KAFB106126	10-Jul-11	SB0264	211071306	SO
KAFB106126	11-Jul-11	SB0265	211071306	SO
KAFB106126	11-Jul-11	SB0266	211071306	SO
KAFB106126	11-Jul-11	SB0267	211071306	SO
KAFB106126	11-Jul-11	SB0268	211071306	SO
KAFB106126	12-Jul-11	SB0269	211071306	SO
KAFB106126	12-Jul-11	SB0270	211071306	SO
KAFB106126	12-Jul-11	SB0271	211071306	SO
KAFB106126	12-Jul-11	SB1746	211071306	SO
KAFB106127	20-Jul-11	SB0272	211072234	SO
KAFB106127	20-Jul-11	SB0273	211072234	SO
KAFB106127	20-Jul-11	SB0274	211072234	SO
KAFB106127	20-Jul-11	SB0275	211072234	SO
KAFB106127	20-Jul-11	SB0276	211072234	SO
KAFB106127	20-Jul-11	SB0277	211072234	SO
KAFB106127	20-Jul-11	SB0278	211072234	SO

Appendix B2 – Table 4: Soil Vapor Well Installation Soil Samples, July – September 2011 Gulf Coast Analytical Laboratories, Inc. Sample Delivery Groups (Concluded)

Location	Sample Date	Sample Number	SDG	Type
KAFB106127	21-Jul-11	SB0279	211072234	SO
KAFB106127	21-Jul-11	SB0280	211072234	SO
KAFB106127	21-Jul-11	SB0281	211072234	SO
KAFB106127	21-Jul-11	SB0282	211072234	SO
KAFB106127	21-Jul-11	SB0283	211072234	SO
KAFB106127	23-Jul-11	SB0284	211072707	SO
KAFB106127	23-Jul-11	SB0285	211072707	SO

Appendix B2 – Table 5. Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Third-Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico

Location ID	Sample Number	Sample Purpose	Sample Date	Start Depth (ft)	End Depth (ft)	Laboratory Sample ID	Lead by SW-846 6010C	TPH-GRO by SW-846 8015B	TPH-DRO by SW-846 8015B	VOCs by SW-846 8260B	SVOCs by SW-846 8270D
KAFB-106124	SB0229	REG	19-Jun-11	0	10	21106232501	X	X	X	X	X
KAFB-106124	SB0230	REG	19-Jun-11	10	20	21106232502	X	X	X	X	X
KAFB-106124	SB0231	REG	19-Jun-11	20	30	21106232505	X	X	X	X	X
KAFB-106124	SB0232	REG	19-Jun-11	30	40	21106232506	X	X	X	X	X
KAFB-106124	SB0233	REG	19-Jun-11	40	50	21106232507	X	X	X	X	X
KAFB-106124	SB0234	FD	19-Jun-11	40	50	21106232508	X	X	X	X	X
KAFB-106124	SB0235	REG	20-Jun-11	50	100	21106232509	X	X	X	X	X
KAFB-106124	SB0236	REG	21-Jun-11	100	150	21106232510	X	X	X	X	X
KAFB-106124	SB0237	REG	21-Jun-11	150	200	21106232511	X	X	X	X	X
KAFB-106124	SB0238	REG	21-Jun-11	200	250	21106232512	X	X	X	X	X
KAFB-106124	SB0239	REG	21-Jun-11	250	300	21106232513	X	X	X	X	X
KAFB-106124	SB0240	REG	22-Jun-11	300	350	21106250901	X	X	X	X	X
KAFB-106124	SB0241	REG	22-Jun-11	350	400	21106250902	X	X	X	X	X
KAFB-106124	SB1745	FD	22-Jun-11	300	350	21106250904	X	X	X	X	X
KAFB-106124	SB0242	REG	22-Jun-11	400	450	21106250903	X	X	X	X	X
KAFB106125	SB0243	REG	27-Jun-11	0	10	21106302401	X	X	X	X	X
KAFB106125	SB0244	REG	27-Jun-11	10	20	21106302402	X	X	X	X	X
KAFB106125	SB0245	FD	27-Jun-11	10	20	21106302403	X	X	X	X	X
KAFB106125	SB0246	REG	27-Jun-11	20	30	21106302404	X	X	X	X	X
KAFB106125	SB0247	REG	28-Jun-11	30	40	21106302405	X	X	X	X	X
KAFB106125	SB0248	REG	28-Jun-11	40	50	21106302406	X	X	X	X	X
KAFB106125	SB0249	REG	28-Jun-11	50	100	21106302409	X	X	X	X	X
KAFB106125	SB0250	REG	28-Jun-11	100	150	21106302410	X	X	X	X	X
KAFB106125	SB0251	REG	29-Jun-11	150	200	21106302411	X	X	X	X	X
KAFB106125	SB0252	REG	29-Jun-11	200	250	21106302412	X	X	X	X	X
KAFB106125	SB0253	REG	29-Jun-11	250	300	21106302413	X	X	X	X	X
KAFB106125	SB0254	REG	6-Jul-11	300	350	21107071601	X	X	X	X	X
KAFB106125	SB0255	FD	6-Jul-11	300	350	21107071602	X	X	X	X	X
KAFB106125	SB0256	REG	6-Jul-11	350	400	21107071603	X	X	X	X	X
KAFB106125	SB0257	REG	6-Jul-11	400	450	21107071604	X	X	X	X	X

Appendix B2 – Table 5. Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Third-Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico (Continued)

Location ID	Sample Number	Sample Purpose	Sample Date	Start Depth (ft)	End Depth (ft)	Laboratory Sample ID	Lead by SW-846 6010C	TPH-GRO by SW-846 8015B	TPH-DRO by SW-846 8015B	VOCs by SW-846 8260B	SVOCs by SW-846 8270D
KAFB106126	SB0258	REG	10-Jul-11	0	11	21107130601	X	X	X	X	X
KAFB106126	SB0259	REG	10-Jul-11	10	20	21107130602	X	X	X	X	X
KAFB106126	SB0260	REG	10-Jul-11	20	30	21107130603	X	X	X	X	X
KAFB106126	SB0261	FD	10-Jul-11	20	30	21107130604	X	X	X	X	X
KAFB106126	SB0262	REG	10-Jul-11	30	40	21107130605	X	X	X	X	X
KAFB106126	SB0263	REG	10-Jul-11	40	50	21107130606	X	X	X	X	X
KAFB106126	SB0264	REG	10-Jul-11	50	100	21107130607	X	X	X	X	X
KAFB106126	SB0265	REG	11-Jul-11	100	150	21107130608	X	X	X	X	X
KAFB106126	SB0266	REG	11-Jul-11	150	200	21107130609	X	X	X	X	X
KAFB106126	SB0267	REG	11-Jul-11	200	250	21107130610	X	X	X	X	X
KAFB106126	SB0268	REG	11-Jul-11	250	300	21107130611	X	X	X	X	X
KAFB106126	SB0269	REG	12-Jul-11	300	350	21107130612	X	X	X	X	X
KAFB106126	SB0270	REG	12-Jul-11	350	400	21107130613	X	X	X	X	X
KAFB106126	SB1746	FD	12-Jul-11	300	350	21107130615	X	X	X	X	X
KAFB106126	SB0271	REG	12-Jul-11	400	450	21107130614	X	X	X	X	X
KAFB106127	SB0272	REG	20-Jul-11	0	10	21107223401	X	X	X	X	X
KAFB106127	SB0273	REG	20-Jul-11	10	20	21107223402	X	X	X	X	X
KAFB106127	SB0274	REG	20-Jul-11	20	30	21107223403	X	X	X	X	X
KAFB106127	SB0275	REG	20-Jul-11	30	40	21107223406	X	X	X	X	X
KAFB106127	SB0276	REG	20-Jul-11	40	50	21107223407	X	X	X	X	X
KAFB106127	SB0277	FD	20-Jul-11	40	50	21107223408	X	X	X	X	X
KAFB106127	SB0278	REG	20-Jul-11	50	100	21107223409	X	X	X	X	X
KAFB106127	SB0279	REG	21-Jul-11	100	150	21107223410	X	X	X	X	X
KAFB106127	SB0280	REG	21-Jul-11	150	200	21107223411	X	X	X	X	X
KAFB106127	SB0281	REG	21-Jul-11	200	250	21107223412	X	X	X	X	X
KAFB106127	SB0282	REG	21-Jul-11	250	300	21107223413	X	X	X	X	X
KAFB106127	SB0283	REG	21-Jul-11	300	350	21107223414	X	X	X	X	X
KAFB106127	SB0284	REG	23-Jul-11	350	400	21107270701	X	X	X	X	X
KAFB106127	SB0285	REG	23-Jul-11	400	450	21107270702	X	X	X	X	X

Appendix B2 – Table 5. Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111 Third-Quarter 2011 Soil Vapor Monitoring Well Installation Soil Sampling Summary Kirtland Air Force Base, Albuquerque, New Mexico (Concluded)

Location ID	Sample Number	Sample Purpose	Sample Date	Start Depth (ft)	End Depth (ft)	Laboratory Sample ID	Lead by SW-846 6010C	TPH-GRO by SW-846 8015B	TPH-DRO by SW-846 8015B	VOCs by SW-846 8260B	SVOCs by SW-846 8270D
Field QC Summary											
FIELDQC	SB8022-FB	FB	22-Jun-11	---	---	21106250905				X	
FIELDQC	SB8023-FB	FB	6-Jul-11	---	---	21107071605				X	
FIELDQC	SB8024-FB	FB	12-Jul-11	---	---	21107130616				X	
FIELDQC	SB8025-FB	FB	20-Jul-11	---	---	21107223417				X	
FIELDQC	SB8032-RB	ER	22-Jun-11	---	---	21106250907	X	X	X	X	X
FIELDQC	SB8033-RB	ER	6-Jul-11	---	---	21107071607	X	X	X	X	X
FIELDQC	SB8034-RB	ER	12-Jul-11	---	---	21107130617	X	X	X	X	X
FIELDQC	SB8035-RB	ER	21-Jul-11	---	---	21107223415	X	X	X	X	X
FIELDQC	SB8038-TB	TB	19-Jun-11	---	---	21106232514				X	
FIELDQC	SB8039-TB	TB	22-Jun-11	---	---	21106250906				X	
FIELDQC	SB8040-TB	TB	27-Jun-11	---	---	21106302414				X	
FIELDQC	SB8041-TB	TB	6-Jul-11	---	---	21107071606				X	
FIELDQC	SB8042-TB	TB	10-Jul-11	---	---	21107130618				X	
FIELDQC	SB8043-TB	TB	20-Jul-11	---	---	21107223416				X	

X indicates a sample was collected and analyzed for the given parameter

ID	Identification
REG	Regular field sample
ft	Feet
FD	Field duplicate sample
TPH-GRO	Total petroleum hydrocarbons - Gasoline Range Organics
ER	Equipment rinsate sample
TPH-DRO	Total petroleum hydrocarbons - Diesel Range Organics
FB	Field blank sample
VOCs	Volatile organic compounds
TB	Trip blank
SVOCs	Semivolatile organic compounds

THIS PAGE INTENTIONALLY LEFT BLANK