Technical Memorandum

August 17, 2016

DOE Area IV Spring 2016 Seep Probe Sampling Results

This memorandum documents the results of sampling seep monitoring probes conducted by CDM Smith for DOE from April 4 to April 20, 2016. Ten samples (eight primary and two duplicates) were collected from three seep well clusters located down gradient of Area IV, as shown in Figure 1. Two of the seep probe clusters (SP-424 and SP-19) are located on Brandeis property and one seep probe cluster (SP-T02) is located in the NBZ. Seep probe cluster SP-900 located on Brandeis property was dry and was not sampled. Table 1 provides the description details for these seep probes.

Seep Probe Cluster Observations

A total of twelve seep probes were visited during this event. Four of the seep probes were dry and unable to provide groundwater samples. These included all of the SP-900 cluster (A, B, and C) and one of the T-02 wells (A). Notably, all three of the SP-424 wells had artisan conditions with water flowing at the surface. Water was also observed seeping from the ground surrounding this well cluster. Stainless steel well coverings had been secured with wire cable and key locks. At many of the well locations, these key locks were rusted and unable to open. Lock lubricant and/or a different, secure lock set-up are recommended the future to provide for easier probe access.

Seep Probe Groundwater Sampling

Seep probes were purged and groundwater samples were obtained using a ¼-inch polyethylene tubing either attached to a peristaltic pump, or inserted into well casing for artesian probes (i.e., static water level was above ground surface and groundwater was flowing out of the well). If the seep well was purged dry before sampling occurred, the well was allowed to recover and sampled four days later. The purge water was monitored using an YSI sonde meter for field parameters (temperature, specific conductance, pH, turbidity, and ORP). Samples were obtained once these parameters stabilized. Table 2 provides the purge water quality results.

Samples submitted for volatile organic compounds (VOC) analysis were collected into 40-mL glass vials with Teflon caps. All other samples were collected in 250 mL amber glass containers and 250 mL poly containers. Water samples were submitted to Eurofins Lancaster Labs in Lancaster, PA for VOC and other chemical analyses as shown in Table 1. Samples for radionuclide analysis were sent to Pace Analytical in Greensburg, PA.

Table 3 provides the chemical results and Table 4 the radionuclide results. Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Potassium 40, and Strontium 90 were analyzed at all seeps well locations except the SP-TO2 cluster due to insufficient water. Samples were submitted for TPH-GRO and 1,4 Dioxane instead of VOCs for the SP-19 wells (A and B).

Data Quality Assessment

A data validation review was performed on the dataset. Quality assurance (QA) objectives for data are expressed in terms of measurement performance data quality indicators, precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). QA objectives provide a mechanism for ongoing quality control (QC) and evaluating and measuring data quality throughout the project. These QA objectives are outlined in the Site Wide QAPP (Haley & Aldrich 2010; Appendix B).

The data review was conducted to demonstrate that the measurement performance criteria established in the QAPP had been met. In general, the following data measurement objectives were considered:

- Appropriate laboratory analytical QC requirements were followed and achieved
- Required measurement performance criteria for data quality indicators (PARCCS) were met
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications

Data verification, data validation and data assessment were used to verify adherence to the QAPP procedures and requirements. These assessments were used to reconcile the planned objectives detailed in the QAPP against the investigation results. The outputs serve to verify that the collected data are of sufficient quality to support their intended use.

The data were provided in seven data packages for chemical analyses and four data packages for radionuclides. All data were validated at Level 4 criteria by Laboratory Data Consultants, Inc., Carlsbad, California.

Two field duplicates and matrix spike/matrix spike duplicate (MS/MSD) samples were collected as part of this effort. The laboratories performed field duplicate and MS/MSD analyses as required by the methods.

The Level 4 validation was performed using the following documents:

- Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1, December 2010
- Multi Agency Radiological Laboratory Analytical Protocols, July 2004
- USEPA Contract Laboratory Program National Functional Guidelines, CLP NFG, for Superfund Organic Methods Data Review, June 2008
- USEPA Contract Laboratory Program National Functional Guidelines, CLP NFG, for Inorganic Superfund Data Review, January 2010

- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update lIB, January 1995; update Ill, December 1996; update lIlA, April 1998; IIIB, November 2004; Update IV, February 2007; and update V July 2014

Data validation reports for the 11 data packages are provided in Appendix A. Specific details of the validation are provided within these reports. In summary, some analytes were qualified as estimated (J/UJ), nondetect (U) or rejected (R) based on validation criteria. Below is a summary of the qualifications:

- Applicable results for some VOC analytes were qualified as estimated based on initial calibration results. Nondetect results for 2-chloroethyl vinyl ether were rejected.

- The nondetect 2-chloroethyl vinyl ether result for one matrix spike sample was rejected based on low matrix spike recovery.

- Applicable strontium results were qualified as estimated based on inductively coupled plasma interference and serial dilution analyses.

- Some aluminum, chromium, cobalt and copper results were qualified as nondetect based on blank criteria.

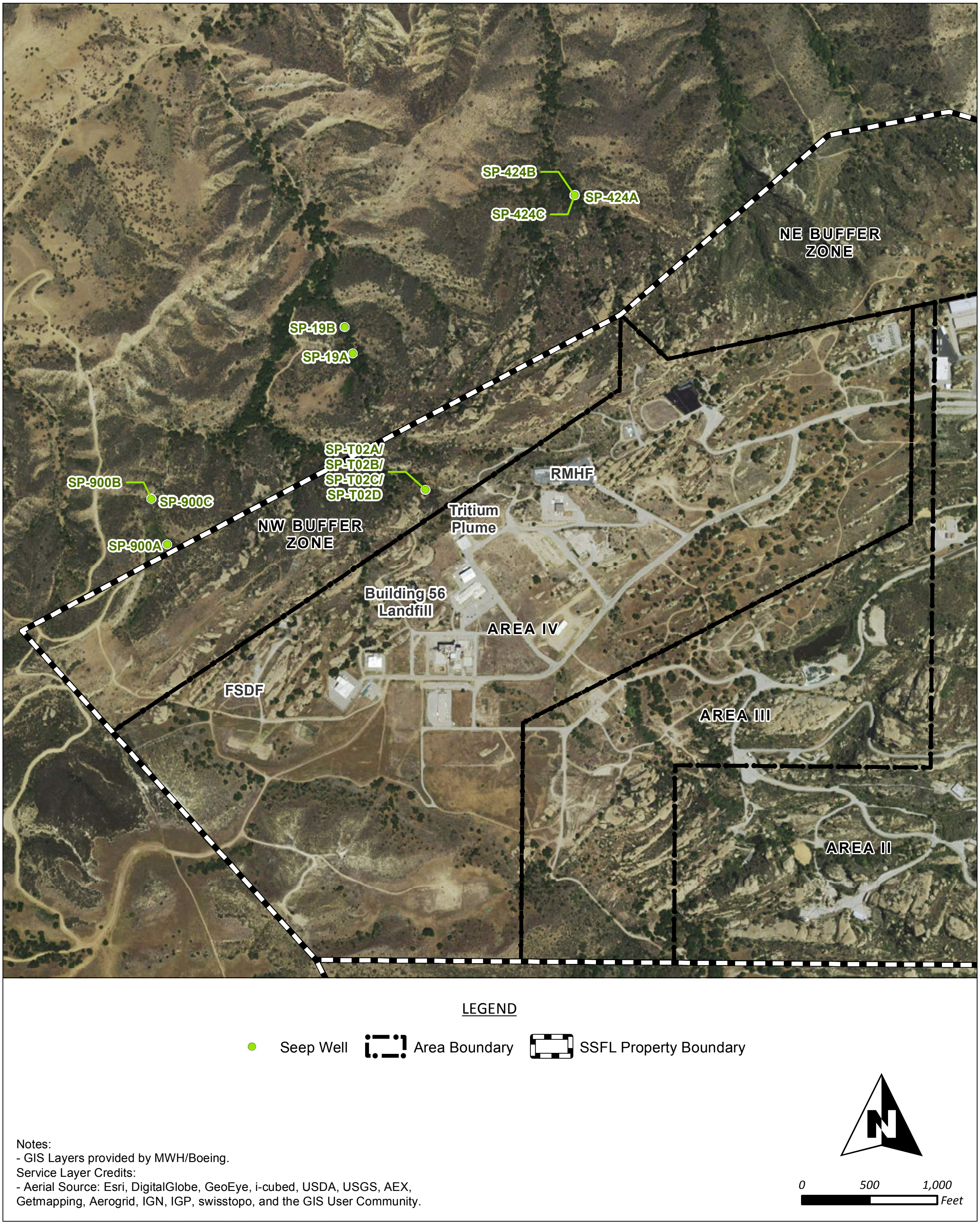
- Applicable uranium-235 results were qualified as nondetect based on blank criteria.

- Applicable uranium-232 results were qualified as estimated based on tracer recovery criteria

In summary, all of the validated data are suitable for their intended use for site characterization except for two 2-chloroethyl vinyl ether results which were rejected. Sample results that were qualified as estimated are usable for project decisions.

Conclusions

Seep sampling was conducted according to the planning objectives. Some seep sample locations were dry and were not able to be sampled. Data quality was met for all analytes except two 2-chloroethyl vinyl ether results which are not usable for project purposes. Completeness goals for the number of samples to be collected was met for seep locations that contained water and for the number of results that are usable for project goals.



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CDM Smith

FIGURE 1

Seeps Locations

Table 1. Seep Probe Details and Spring 2016 Laboratory Analyses

Probe ID	Seep Probe Location	Probe Total Depth (ft. bgs)	Screen Interval (ft bgs)	Measured Depth to Water (ft bgs)	Sample Number	Laboratory Analyses
SP-TO2A	NBZ - Area IV North of Tritium Plume	9.48	7.5-9.48	Dry	No water for sample	Not Sampled
SP-TO2B		12.42	10-12.42	7.1	SP-T02B_041216_01_L	VOCs EPA 8260B, Tritium EPA 906, Radionuclides EPA 900
SP-TO2C		24.3	19-24.3	7.27	SP-T02C_041216_01_L	VOCs EPA 8260B, Tritium EPA 906, Radionuclides EPA 900
SP-T02D		35.18	30-35	7.47	SP-424A_041416_01_L SP-T02D_040616_36_L Duplicate	VOCs EPA 8260B, Tritium EPA 906, Radionuclides EPA 900
SP-424A	North of NBZ and SRE Area (Brandeis Property)	8.8	3.3-8.8	Above Ground Surface	SP-424A_041416_01_L SP-424A_041416_36_L Duplicate	VOCs EPA 8260B, Tritium EPA 906, Radionuclides EPA 900, Perchlorate EPA 314 , Mercury EPA 7471, Metals EPA 6010, Metals EPA 6020, 1,4 Dioxane EPA 8279, Flouride EPA 300
SP-424B		16.9	15-16.9	Above Ground Surface	SP-424B_041316_01_L	VOCs EPA 8260B, Tritium EPA 906, Radionuclides EPA 900, Perchlorate EPA 314 , Mercury EPA 7471, Metals EPA 6010, Metals EPA 6020, 1,4 Dioxane EPA 8279, Flouride EPA 300
SP-424C		19.6	16.6-19.6	Above Ground Surface	SP-424C_041316_01_L	VOCs EPA 8260B, Tritium EPA 906, Radionuclides EPA 900, Perchlorate EPA 314 , Mercury EPA 7471, Metals EPA 6010, Metals EPA 6020, 1,4 Dioxane EPA 8279, Flouride EPA 300
SP-19A	North of NBZ and Tritium Plume Area (Brandeis Property)	10	7-10	7.05	SP-424A_041416_01_L	TPH-GRO EPA 8015, 1,4 Dioxane 8260 SIM, Tritium EPA 906, Radionuclides EPA 900, Perchlorate EPA 314 , Mercury EPA 7471, Metals EPA 6010, Metals EPA 6020, 1,4 Dioxane EPA 8279, Flouride EPA 300
SP-19B		18.83	16-18.8	8.65	SP-19B_041916_01_L	TPH-GRO EPA 8015, 1,4 Dioxane 8260 SIM, Tritium EPA 906, Radionuclides EPA 900, Perchlorate EPA 314 , Mercury EPA 7471, Metals EPA 6010, Metals EPA 6020, 1,4 Dioxane EPA 8279, Flouride EPA 300
SP-900A	North of NBZ and FSDF Area (Brandeis	10	3.74-10	Dry	No water for sample	Not Sampled
SP-900B		18.41	16-18.41	Dry	No water for sample	Not Sampled
SP-900C		30.13	26.5-30.0	Dry	No water for sample	Not Sampled

NBZ - northern Buffer Zone
FSDF - Former Sodium Disposal Facility `
SRE - Sodium Reactor Experiment

Table 2. Seep Probe Purge Water Quality Data

Seep Probe ID	Date	Time	Cumulative Volume (m/L)	Temperature (°C)	Specific Conductance (µS/cm)	pH	Turbidity (NTUs)	ORP	PID (ppm)	Comments
SP-TO2A	4/8/2016	---	---	---	---	---	---	---	0.0	Dry.
SP-TO2B	4/8/2016	9:35	---	---	---	---	---	---	0.0	Dry.
	4/12/2016	14:00	350	---	---	---	---	---	0.0	Sample collected
SP-TO2C	4/8/2016	10:00	---	15.5	1089	6.16	---	-107	0.0	
		10:03	---	---	---	---	---	---	0.0	Probe purged dry, no parameters due to lack of water
	4/12/2016	14:30	1000	---	---	---	---	---	0.0	Sample collected
SP-TO2D	4/6/2016	10:25	25	19.6	1079	6.69	22.7	79	0.1	Water pumped at about 5 mL/min.
		10:30	50	18.4	1079	6.69	16.3	73	0.1	Slight organic odor noticed during pumping
		10:35	75	18.2	1077	6.72	5.18	69	0.1	
		10:40	100	17.9	1078	6.73	4.85	68	0.1	
		10:45	125	17.8	1078	6.75	4.21	66	0.1	
		10:50	150	---	---	---	---	---	0.1	Sample collected
SP-424A	4/14/2016	10:15	250	16.9	910.0	8.71	11.4	---	0.1	Artesian flow conditions, pumping at about 100 mL/min.
		10:20	700	16.6	892.6	8.37	1.48	---	0.1	ORP meter would not calibrate
		10:25	1200	16.6	891.3	8.22	0.72	---	0.2	
		10:30	1500	---	---	---	---	---	0.0	Sample collected
SP-424B	4/13/2016	11:10	240	17.5	925.2	8.90	3.60	---	0.1	Artesian flow conditions, pumping at about 75 mL/min.
		11:15	490	17.2	889.5	8.44	0.44	---	0.1	ORP meter would not calibrate
		11:20	738	---	---	---	---	---	0.1	Sampled collected
SP-424C	4/13/2016	11:45	250	17.3	881.1	8.21	35.5	---	0.1	Artesian flow conditions, pumping at about 70 mL/min.
		11:50	500	17.4	885.1	8.03	1.21	---	0.1	ORP meter would not calibrate
		11:55	800	17.4	885.0	7.94	0.36	---	0.1	
		12:00	1000	---	---	---	---	---		Sample collected
SP-19A	4/19/2016	8:48	20	17.9	1159	7.63	53.6	---	0.1	
		8:49	40	16.7	1175	7.62	18.0	---	0.0	ORP meter would not calibrate
		8:50	60	17.5	1197	7.53	3.96	---	0.3	Sample collected
SP-19B	4/19/2016	7:18	15	17.1	2050	8.53	4.98	---	0.2	
		7:31	45	16.7	2100	7.28	0.83	---	0.1	ORP meter would not calibrate
		7:41	80	20.0	2103	7.16	2.60	---	0.1	Organic odor during pumping
		7:48	120	18.4	2103	7.02	1.08	---	0.1	
		7:56	150	16.6	2105	6.89	1.36	---	0.1	
		8:00	180	---	---	---	---	---	0.1	Sample collected
SP-900A	4/7/2016	14:18	---	---	---	---	---	---	0.0	Went dry after pumping for 30 seconds.
SP-900B	4/7/2016	11:05	---	---	---	---	---	---	0.0	Dry.
SP-900C	4/7/2016	13:05	---	---	---	---	---	---	0.0	Dry.

Table 3
Seep Probe Analytical Results for Chemicals

			Seep Probe	SP-19A	SP-19B	SP-424A	SP-424A	SP-424B
			Sample Name	SP-19A_041916_01_L	SP-19B_041916_01_L	SP-424A_041416_01_	SP-424A_041416_36_	SP-424B_041316_01_
			Sample Data	4/19/2016	4/19/2016	4/14/2016	4/14/2016	4/13/2016
			Sample Type	N	N	N	FD	N
Method	Chemical Name	Fraction	Unit	Result	Result	Result	Result	Result
E300.0	Fluoride	N	mg/L	1.1	0.75	1.9	2	2.3
SW6010C	Aluminum	D	mg/L	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
SW6010C	Aluminum	T	mg/L	0.393 J	0.4 U	0.4 U	0.113 U	0.4 U
SW6010C	Antimony	D	mg/L	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Antimony	T	mg/L	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Arsenic	D	mg/L	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Arsenic	T	mg/L	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Barium	D	mg/L	0.036	0.0388	0.0319	0.0323	0.0406
SW6010C	Barium	T	mg/L	0.0387	0.0405	0.0319	0.0336	0.0458
SW6010C	Beryllium	D	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Beryllium	T	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Boron	D	mg/L	0.123	0.074 J	0.0659 J	0.0668 J	0.0669 J
SW6010C	Boron	T	mg/L	0.119	0.0741 J	0.0627 J	0.0756 J	0.0664 J
SW6010C	Cadmium	D	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Cadmium	T	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Calcium	D	mg/L	208	97.1	85.2	86	82.8
SW6010C	Calcium	T	mg/L	215	98.8	82.6	82.7	83.9
SW6010C	Chromium	D	mg/L	0.0025 J	0.03 U	0.0021 J	0.03 U	0.002 J
SW6010C	Chromium	T	mg/L	0.0048 U	0.0024 U	0.0023 U	0.0025 U	0.0021 U
SW6010C	Cobalt	D	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Cobalt	T	mg/L	0.00095 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Copper	D	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
SW6010C	Copper	T	mg/L	0.0079 U	0.02 U	0.0033 U	0.02 U	0.0042 U
SW6010C	Iron	D	mg/L	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
SW6010C	Iron	T	mg/L	0.709	0.229 J	0.0717 J	0.0456 J	0.17 J
SW6010C	Lead	D	mg/L	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
SW6010C	Lead	T	mg/L	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
SW6010C	Lithium	D	mg/L	0.119	0.0823	0.0508	0.0508	0.0483
SW6010C	Lithium	T	mg/L	0.124	0.0873	0.051	0.0532	0.0522
SW6010C	Magnesium	D	mg/L	74	30.4	23.8	24.1	22.8
SW6010C	Magnesium	T	mg/L	73.5	30.8	23.7	24.7	23.9
SW6010C	Manganese	D	mg/L	0.0212	0.0259	0.234	0.239	0.281
SW6010C	Manganese	T	mg/L	0.03	0.0281	0.23	0.242	0.367
SW6010C	Molybdenum	D	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.0021 J
SW6010C	Molybdenum	T	mg/L	0.02 U	0.02 U	0.0022 J	0.02 U	0.02 U
SW6010C	Nickel	D	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
SW6010C	Nickel	T	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
SW6010C	Phosphorus	D	mg/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
SW6010C	Phosphorus	T	mg/L			0.2 U	0.2 U	0.2 U
SW6010C	Potassium	D	mg/L	4.64	2.91	3.34	3.39	3.29
SW6010C	Potassium	T	mg/L	4.54	2.82	3.25	3.36	3.22
SW6010C	Sodium	D	mg/L	184	160	83.6	85	87.3
SW6010C	Sodium	T	mg/L	189	164	80.5	82.7	84
SW6010C	Tin	D	mg/L	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Tin	T	mg/L	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Titanium	D	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
SW6010C	Titanium	T	mg/L	0.032	0.0052 J	0.0058 J	0.0059 J	0.0066 J
SW6010C	Vanadium	D	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Vanadium	T	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SW6010C	Zinc	D	mg/L	0.0053 J	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Zinc	T	mg/L	0.0114 J	0.04 U	0.04 U	0.04 U	0.04 U
SW6010C	Zirconium	D	mg/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
SW6010C	Zirconium	T	mg/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
SW6020A	Selenium	D	mg/L	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
SW6020A	Selenium	T	mg/L	0.0015 J	0.004 U	0.004 U	0.004 U	0.004 U
SW6020A	Silver	D	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
SW6020A	Silver	T	mg/L	0.00013 J	0.001 U	0.001 U	0.001 U	0.001 U
SW6020A	Strontium	D	mg/L	1.77 J	0.781 J	0.436 J	0.415 J	0.403 J
SW6020A	Strontium	T	mg/L	1.62 J	0.789 J	0.419 J	0.41 J	0.428 J
SW6020A	Thallium	D	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
SW6020A	Thallium	T	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
SW6850	Perchlorate	N	ug/L	1 U	1 U	1 U	1 U	1 U
SW7470A	Mercury	D	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
SW7470A	Mercury	T	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
SW8015B	Gasoline Range Organics (C5-C12)	N	ug/L	50 U	50 U	--	--	--
SW8260B	1,1,1,2-Tetrachloroethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,1,1-Trichloroethane	N	ug/L	--	--	1 U	1 U	1 U

			Seep Probe	SP-19A	SP-19B	SP-424A	SP-424A	SP-424B
			Sample Name	SP-19A_041916_01_L	SP-19B_041916_01_L	SP-424A_041416_01_	SP-424A_041416_36_	SP-424B_041316_01_
			Sample Data	4/19/2016	4/19/2016	4/14/2016	4/14/2016	4/13/2016
			Sample Type	N	N	N	FD	N
SW8260B	1,1,2,2-Tetrachloroethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,1,2-Trichloro-1,2,2-trifluoroethane	N	ug/L	--	--	10 U	10 U	10 U
SW8260B	1,1,2-Trichloroethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,1-Dichloroethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,1-Dichloroethene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,1-Dichloropropene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2,3-Trichlorobenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2,3-Trichloropropane	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2,4-Trichlorobenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2,4-Trimethylbenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2-Dibromo-3-chloropropane	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2-Dibromoethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,2-Dichlorobenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,2-Dichloroethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,2-Dichloropropane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,3,5-Trimethylbenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,3-Dichlorobenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1,3-Dichloropropane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	1,4-Dichlorobenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	1-Chlorohexane	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	2,2-Dichloroproprame	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	2-Butanone (MEK)	N	ug/L	--	--	10 U	10 U	10 U
SW8260B	2-Chloro-1,1,1-trifluoroethane	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	2-Chloroethyl Vinyl Ether	N	ug/L	--	--	10 U	10 U	10 U
SW8260B	2-Chlorotoluene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	2-Hexanone	N	ug/L	--	--	10 UJ	10 UJ	10 U
SW8260B	2-Phenylbutane	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	4-Chlorotoluene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	4-Methyl-2-pentanone (MIBK)	N	ug/L	--	--	10 UJ	10 UJ	10 U
SW8260B	Acetone	N	ug/L	--	--	20 U	20 U	20 U
SW8260B	Acrolein	N	ug/L	--	--	100 U	100 U	100 U
SW8260B	Acrylonitrile	N	ug/L	--	--	20 U	20 U	20 U
SW8260B	Benzene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Bromobenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Bromochloromethane	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Bromodichloromethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Bromoform	N	ug/L	--	--	4 U	4 U	4 U
SW8260B	Bromomethane	N	ug/L	--	--	1 UJ	1 UJ	1 U
SW8260B	Carbon Disulfide	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Carbon Tetrachloride	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Chlorobenzene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Chloroethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Chloroform	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Chloromethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Chlorotrifluoroethylene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	cis-1,2-Dichloroethene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	CIS-1,3-Dichloropropene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Cymene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Dibromochloromethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Dibromomethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Dichlorodifluoromethane	N	ug/L	--	--	1 UJ	1 UJ	1 U
SW8260B	Diisopropyl Ether	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Ethylbenzene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Hexachlorobutadiene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Isopropylbenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	M,P-XYLENE	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Methyl Iodide	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Methyl Tert-Butyl Ether	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Methylene Chloride	N	ug/L	--	--	4 U	4 U	4 U
SW8260B	n-Butylbenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	n-Propylbenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	o-Xylene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Styrene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Tert-Amyl-Methyl-Ether	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	tert-Butyl Alcohol	N	ug/L	--	--	50 U	50 U	50 U
SW8260B	tert-Butyl ethyl ether	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	tert-Butylbenzene	N	ug/L	--	--	5 U	5 U	5 U
SW8260B	Tetrachloroethene	N	ug/L	--	--	1 U	1 U	1 U

			Seep Probe	SP-19A	SP-19B	SP-424A	SP-424A	SP-424B
			Sample Name	SP- 19A_041916_01_L	SP- 19B_041916_01_L	SP- 424A_041416_01_	SP- 424A_041416_36_	SP- 424B_041316_01_
			Sample Data	4/19/2016	4/19/2016	4/14/2016	4/14/2016	4/13/2016
			Sample Type	N	N	N	FD	N
SW8260B	Toluene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	trans-1,2-Dichloroethene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	trans-1,3-Dichloropropene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Trichloroethene	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Trichlorofluoromethane	N	ug/L	--	--	1 U	1 U	1 U
SW8260B	Vinyl Acetate	N	ug/L	--	--	10 U	10 U	10 U
SW8260B	Vinyl Chloride	N	ug/L	--	--	1 U	1 U	1 U
SW8260B SIM	1,4-Dioxane	N	ug/L	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U

Notes:
N = Normal
D = Dissolved
T = Total
ug/L = microgram per liter
mg/L = microgram per liter
TB = Trip Blank
U = Sample result is nondetect
UJ = Sample result is estimated nondetect
J = Sample result is estimated
R = Sample result is rejected
FD = Field Duplicate
-- = Not analyzed

			Seep Probe	SP-424C	SP-T02B	SP-T02C	SP-T02D	SP-T02D
			Sample Name	SP-424C_041316_01_	SP-T02B_041216_01	SP-T02C_041216_01	SP-T02D_040616_01	SP-T02D_040616_36
			Sample Data	4/13/2016	4/12/2016	4/12/2016	4/6/2016	4/6/2016
			Sample Type	N	N	N	N	FD
Method	Chemical Name	Fraction	Unit	Result	Result	Result	Result	Result
E300.0	Fluoride	N	mg/L	2.5	--	--	--	--
SW6010C	Aluminum	D	mg/L	0.4 U	--	--	--	--
SW6010C	Aluminum	T	mg/L	0.4 U	--	--	--	--
SW6010C	Antimony	D	mg/L	0.04 U	--	--	--	--
SW6010C	Antimony	T	mg/L	0.04 U	--	--	--	--
SW6010C	Arsenic	D	mg/L	0.04 U	--	--	--	--
SW6010C	Arsenic	T	mg/L	0.04 U	--	--	--	--
SW6010C	Barium	D	mg/L	0.0267	--	--	--	--
SW6010C	Barium	T	mg/L	0.0274	--	--	--	--
SW6010C	Beryllium	D	mg/L	0.01 U	--	--	--	--
SW6010C	Beryllium	T	mg/L	0.01 U	--	--	--	--
SW6010C	Boron	D	mg/L	0.0687 J	--	--	--	--
SW6010C	Boron	T	mg/L	0.0769 J	--	--	--	--
SW6010C	Cadmium	D	mg/L	0.01 U	--	--	--	--
SW6010C	Cadmium	T	mg/L	0.01 U	--	--	--	--
SW6010C	Calcium	D	mg/L	76.3	--	--	--	--
SW6010C	Calcium	T	mg/L	77.4	--	--	--	--
SW6010C	Chromium	D	mg/L	0.03 U	--	--	--	--
SW6010C	Chromium	T	mg/L	0.03 U	--	--	--	--
SW6010C	Cobalt	D	mg/L	0.0046 J	--	--	--	--
SW6010C	Cobalt	T	mg/L	0.0032 J	--	--	--	--
SW6010C	Copper	D	mg/L	0.02 U	--	--	--	--
SW6010C	Copper	T	mg/L	0.02 U	--	--	--	--
SW6010C	Iron	D	mg/L	0.4 U	--	--	--	--
SW6010C	Iron	T	mg/L	0.104 J	--	--	--	--
SW6010C	Lead	D	mg/L	0.03 U	--	--	--	--
SW6010C	Lead	T	mg/L	0.03 U	--	--	--	--
SW6010C	Lithium	D	mg/L	0.0467	--	--	--	--
SW6010C	Lithium	T	mg/L	0.0482	--	--	--	--
SW6010C	Magnesium	D	mg/L	22.4	--	--	--	--
SW6010C	Magnesium	T	mg/L	22.7	--	--	--	--
SW6010C	Manganese	D	mg/L	0.0597	--	--	--	--
SW6010C	Manganese	T	mg/L	0.0612	--	--	--	--
SW6010C	Molybdenum	D	mg/L	0.0022 J	--	--	--	--
SW6010C	Molybdenum	T	mg/L	0.0028 J	--	--	--	--
SW6010C	Nickel	D	mg/L	0.02 U	--	--	--	--
SW6010C	Nickel	T	mg/L	0.02 U	--	--	--	--
SW6010C	Phosphorus	D	mg/L	0.2 U	--	--	--	--
SW6010C	Phosphorus	T	mg/L	0.2 U	--	--	--	--
SW6010C	Potassium	D	mg/L	3.1	--	--	--	--
SW6010C	Potassium	T	mg/L	3.12	--	--	--	--
SW6010C	Sodium	D	mg/L	90.2	--	--	--	--
SW6010C	Sodium	T	mg/L	90.7	--	--	--	--
SW6010C	Tin	D	mg/L	0.04 U	--	--	--	--
SW6010C	Tin	T	mg/L	0.04 U	--	--	--	--
SW6010C	Titanium	D	mg/L	0.0037 J	--	--	--	--
SW6010C	Titanium	T	mg/L	0.0039 J	--	--	--	--
SW6010C	Vanadium	D	mg/L	0.01 U	--	--	--	--
SW6010C	Vanadium	T	mg/L	0.01 U	--	--	--	--
SW6010C	Zinc	D	mg/L	0.04 U	--	--	--	--
SW6010C	Zinc	T	mg/L	0.04 U	--	--	--	--
SW6010C	Zirconium	D	mg/L	0.1 U	--	--	--	--
SW6010C	Zirconium	T	mg/L	0.1 U	--	--	--	--
SW6020A	Selenium	D	mg/L	0.004 U	--	--	--	--
SW6020A	Selenium	T	mg/L	0.004 U	--	--	--	--
SW6020A	Silver	D	mg/L	0.001 U	--	--	--	--
SW6020A	Silver	T	mg/L	0.001 U	--	--	--	--
SW6020A	Strontium	D	mg/L	0.42 J	--	--	--	--
SW6020A	Strontium	T	mg/L	0.418 J	--	--	--	--
SW6020A	Thallium	D	mg/L	0.001 U	--	--	--	--
SW6020A	Thallium	T	mg/L	0.001 U	--	--	--	--
SW6850	Perchlorate	N	ug/L	1 U	--	--	--	--
SW7470A	Mercury	D	mg/L	0.0002 U	--	--	--	--
SW7470A	Mercury	T	mg/L	0.0002 U	--	--	--	--
SW8015B	Gasoline Range Organics (C5-C12)	N	ug/L	--	--	--	--	--
SW8260B	1,1,1,2-Tetrachloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,1,1-Trichloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U

			Seep Probe	SP-424C	SP-T02B	SP-T02C	SP-T02D	SP-T02D
			Sample Name	SP-424C_041316_01_	SP-T02B_041216_01	SP-T02C_041216_01	SP-T02D_040616_01	SP-T02D_040616_36
			Sample Data	4/13/2016	4/12/2016	4/12/2016	4/6/2016	4/6/2016
			Sample Type	N	N	N	N	FD
SW8260B	1,1,2,2-Tetrachloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,1,2-Trichloro-1,2,2-trifluoroethane	N	ug/L	10 U	10 U	10 U	2 U	2 U
SW8260B	1,1,2-Trichloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,1-Dichloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,1-Dichloroethene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,1-Dichloropropene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,2,3-Trichlorobenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,2,3-Trichloropropane	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,2,4-Trichlorobenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,2,4-Trimethylbenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,2-Dibromo-3-chloropropane	N	ug/L	5 U	5 U	5 U	2 U	2 U
SW8260B	1,2-Dibromoethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,2-Dichlorobenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,2-Dichloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,2-Dichloropropane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,3,5-Trimethylbenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,3-Dichlorobenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1,3-Dichloropropane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	1,4-Dichlorobenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	1-Chlorohexane	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	2,2-Dichloroproprame	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	2-Butanone (MEK)	N	ug/L	10 U	10 U	10 U	3 U	3 U
SW8260B	2-Chloro-1,1,1-trifluoroethane	N	ug/L	5 U	5 U	5 U	2 U	2 U
SW8260B	2-Chloroethyl Vinyl Ether	N	ug/L	10 R	10 U	10 U	2 R	2 U
SW8260B	2-Chlorotoluene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	2-Hexanone	N	ug/L	10 U	10 U	10 U	3 UJ	3 UJ
SW8260B	2-Phenylbutane	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	4-Chlorotoluene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	4-Methyl-2-pentanone (MIBK)	N	ug/L	10 U	10 U	10 U	3 UJ	3 UJ
SW8260B	Acetone	N	ug/L	20 U	20 U	20 U	6 U	6 U
SW8260B	Acrolein	N	ug/L	100 U	100 U	100 U	40 U	40 U
SW8260B	Acrylonitrile	N	ug/L	20 U	20 U	20 U	4 U	4 U
SW8260B	Benzene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Bromobenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	Bromochloromethane	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	Bromodichloromethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Bromoform	N	ug/L	4 U	4 U	4 U	0.5 U	0.5 U
SW8260B	Bromomethane	N	ug/L	1 U	1 U	1 U	0.5 UJ	0.5 UJ
SW8260B	Carbon Disulfide	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	Carbon Tetrachloride	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Chlorobenzene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Chloroethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Chloroform	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Chloromethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Chlorotrifluoroethylene	N	ug/L	5 U	5 U	5 U	2 U	2 U
SW8260B	cis-1,2-Dichloroethene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	CIS-1,3-Dichloropropene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Cymene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	Dibromochloromethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Dibromomethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Dichlorodifluoromethane	N	ug/L	1 U	1 U	1 U	0.5 UJ	0.5 UJ
SW8260B	Diisopropyl Ether	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Ethylbenzene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Hexachlorobutadiene	N	ug/L	5 U	5 U	5 U	2 U	2 U
SW8260B	Isopropylbenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	M,P-XYLENE	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Methyl Iodide	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Methyl Tert-Butyl Ether	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Methylene Chloride	N	ug/L	4 U	4 U	4 U	2 U	2 U
SW8260B	n-Butylbenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	n-Propylbenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	o-Xylene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Styrene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	Tert-Amyl-Methyl-Ether	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	tert-Butyl Alcohol	N	ug/L	50 U	50 U	50 U	5 U	5 U
SW8260B	tert-Butyl ethyl ether	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	tert-Butylbenzene	N	ug/L	5 U	5 U	5 U	1 U	1 U
SW8260B	Tetrachloroethene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U

Table 3
Seep Probe Analytical Results for Chemicals

			Seep Probe	SP-424C	SP-T02B	SP-T02C	SP-T02D	SP-T02D
			Sample Name	SP-424C_041316_01_	SP-T02B_041216_01	SP-T02C_041216_01	SP-T02D_040616_01	SP-T02D_040616_36
			Sample Data	4/13/2016	4/12/2016	4/12/2016	4/6/2016	4/6/2016
			Sample Type	N	N	N	N	FD
SW8260B	Toluene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	trans-1,2-Dichloroethene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	trans-1,3-Dichloropropene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Trichloroethene	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Trichlorofluoromethane	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B	Vinyl Acetate	N	ug/L	10 U	10 U	10 U	2 U	2 U
SW8260B	Vinyl Chloride	N	ug/L	1 U	1 U	1 U	0.5 U	0.5 U
SW8260B SIM	1,4-Dioxane	N	ug/L	0.4 U	--	--	--	--

Notes:
N = Normal
D = Dissolved
T = Total
ug/L = microgram per liter
mg/L = microgram per liter
TB = Trip Blank
U = Sample result is nondetect
UJ = Sample result is estimated nondetect
J = Sample result is estimated
R = Sample result is rejected
FD = Field Duplicate
-- = Not analyzed

Table 4
Seep Probe Results for Radiochemistry

Well Identifier:		SP-19A				SP-19B				SP-424A			
Sample Type:		N				N				N			
Sample Name:		SP_19A_041916_01_L				SP_19B_041916_01_L				SP_424A_041416_01_L			
Lab Name:		PACE				PACE				PACE			
Collection Date:		4/19/2016				4/19/2016				4/14/2016			
Analyte	Method	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC
Actinium-228	901.1	0	U	5.461	9.652	0	U	8.66	18.98	0	U	5.039	7.957
Americium-241	901.1	12.849	U	39.005	34.56	3.406	U	21.895	20.06	13.64	U	30.087	36.87
Antimony-125	901.1	1.935	U	5.256	5.841	-0.229	U	10.665	11.96	4.825	U	6.249	5.985
Barium-133	901.1	2.8	U	3.08	2.924	0.93	U	4.632	5.371	-0.449	U	2.565	2.858
Cesium-134	901.1	0.246	U	2.868	2.18	0.006	U	3.944	4.277	1.434	U	2.029	2.512
Cesium-137	901.1	1.306	U	2.29	2.368	0.207	U	4.328	4.699	0	U	0.869	2.269
Cobalt-57	901.1	0.594	U	3.062	2.746	0.144	U	5.277	4.774	0.678	U	2.292	2.754
Cobalt-60	901.1	0.568	U	3.735	2.688	0	U	2.832	5.971	0	U	2.106	2.951
Europium-152	901.1	0.451	U	6.478	7.8	-0.878	U	11.302	13.58	-0.594	U	6.619	7.973
Europium-154	901.1	1.837	U	6.073	5.405	-0.786	U	7.911	9.505	0	U	1.357	5.77
Europium-155	901.1	0.189	U	7.139	11.91	0	U	4.531	17.17	3.99	U	7.014	11.58
Gross Alpha	900	2.5	U	1.66	2.64	7.86		3.54	4.78	5.71		1.93	1.85
Gross Beta	900	2.43		1.05	1.63	10.6		3	3.72	5.98		1.41	1.39
Manganese-54	901.1	0	U	1.345	2.632	0	U	1.513	5.031	0	U	1.175	2.395
Potassium-40	901.1	2.955	U	37.535	28.61	56.992	U	68.542	61.09	0	U	23.98	27.16
Sodium-22	901.1	0.16	U	3.423	2.191	0	U	2.398	4.95	2.1		2.747	1.875
Strontium-90	ASTM D5811-95	0.114	U	0.227	0.421	-0.058	U	0.208	0.401	-0.115	U	0.21	0.41
Tritium	906	144	U	137	224	70.2	U	133	227	-61	U	107	190
Uranium-238	HASL 300	0.764		0.159	0.032	2.08		0.323	0.023	0.742		0.245	0.081
Uranium-233/234	HASL 300	1.91		0.33	0.041	3.1		0.467	0.023	1.09		0.313	0.096
Uranium-235	HASL 300	0.038		0.03	0.016	0.155		0.049	0.009	0.122		0.101	0.057

pCi/L = picocuries per liter
U = Non detect
MDC = minimal detectable concentration
N = normal sample
FD = field duplicate

Table 4
Seep Probe Results for Radiochemistry

	Well Identifier:	SP-424A				SP-424B				SP-424C			
	Sample Type:	N				N				N			
	Sample Name:	SP_424A_041416_36_L				SP_424B_041316_01_L				SP_424C_041316_01_LMS			
	Lab Name:	PACE				PACE				PACE			
	Collection Date:	4/14/2016				4/13/2016				4/13/2016			
Analyte	Method	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC
Actinium-228	901.1	0	U	9.711	18.26	3.726	U	19.062	15.81	0	U	6.025	10.25
Americium-241	901.1	0	U	11.412	24.23	9.553	U	18.163	17.78	18.029	U	37.113	45.4
Antimony-125	901.1	3.959	U	14.932	13.61	3.584	U	12.662	10.45	0	U	1.628	7.879
Barium-133	901.1	0	U	2.488	6.336	0	U	2.007	4.874	0.788	U	3.094	3.438
Cesium-134	901.1	1.141	U	4.171	4.502	-0.671	U	3.686	3.996	2.01	U	2.361	3.32
Cesium-137	901.1	0	U	2.417	4.961	0	U	1.45	4.467	0	U	1.29	2.88
Cobalt-57	901.1	0.473	U	4.356	5.234	2.491	U	3.538	4.219	1.484	U	2.962	3.541
Cobalt-60	901.1	1.849	U	5.861	5.59	0.336	U	4.583	4.524	0	U	1.934	3.105
Europium-152	901.1	2.411	U	14.353	14.75	2.897	U	12.486	12.12	6.227	U	5.519	10.24
Europium-154	901.1	0	U	5.465	10.39	0.434	U	8.741	8.526	0	U	2.711	7.369
Europium-155	901.1	2.411	U	14.492	17.4	2.46	U	11.843	14.24	7.504	U	9.197	15.09
Gross Alpha	900	4.38		1.67	1.83	6.65		2.21	2.27	4.01		1.88	2.79
Gross Beta	900	6.7		1.5	1.23	5.71		1.43	1.56	4.44		1.26	1.61
Manganese-54	901.1	1.146	U	4.559	4.781	-4.635	U	4.687	4.811	0	U	0.978	2.776
Potassium-40	901.1	17.485	U	67.563	64.25	16.914	U	64.481	58.19	0	U	27.033	30.51
Sodium-22	901.1	0	U	1.286	5.304	0	U	0.651	4.294	0.074	U	3.631	2.799
Strontium-90	ASTM D5811-95	-0.125	U	0.212	0.412	-0.255	U	0.203	0.401	0.038	U	0.222	0.42
Tritium	906	-136	U	104	188	-164	U	103	188	-95.7	U	105	189
Uranium-238	HASL 300	0.885		0.254	0.089	0.858		0.293	0.161	0.559		0.191	0.096
Uranium-233/234	HASL 300	1.28		0.324	0.104	1.17		0.353	0.141	1.2		0.308	0.088
Uranium-235	HASL 300	0.083	U	0.078	0.087	0.196		0.144	0.126	0.058	U	0.065	0.086

pCi/L = picocuries per liter
U = Non detect
MDC = minimal detectable concentrat
N = normal sample
FD = field duplicate

Table 4
Seep Probe Results for Radiochemistry

	Well Identifier:	SP-T02B				SP-T02C				SP-T02D			
	Sample Type:	N				N				FD			
	Sample Name:	SP-T02B_041216_01_L				SP-T02C_04122016_01_L				SP-T02D_040616_36_L			
	Lab Name:	PACE				PACE				PACE			
	Collection Date:	4/12/2016				4/12/2016				4/6/2016			
Analyte	Method	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC
Actinium-228	901.1	4.786	U	10.345	9.134	17.816		19.775	16.37	0.347	U	26.294	25.43
Americium-241	901.1	0	U	15.784	39.03	0.071	U	20.859	21.07	7.412	U	31.335	35.38
Antimony-125	901.1	-1.252	U	5.76	6.442	0	U	5.107	12.69	10.726	U	19.543	19.68
Barium-133	901.1	0.551	U	2.568	2.87	0.855	U	4.729	5.514	-0.668	U	7.348	8.514
Cesium-134	901.1	0.566	U	3.08	2.4	1.915	U	5.511	4.37	0	U	2.527	6.812
Cesium-137	901.1	-1.232	U	2.518	2.616	1.783	U	4.068	4.409	2.125	U	5.731	6.18
Cobalt-57	901.1	0	U	1.611	2.712	-0.07	U	3.971	4.791	-0.819	U	6.258	7.507
Cobalt-60	901.1	0	U	1.625	3.075	0	U	3.898	5.864	0	U	4.194	7.36
Europium-152	901.1	0	U	3.707	7.91	-2.566	U	11.538	13.88	7.626	U	17.373	20.77
Europium-154	901.1	-0.438	U	4.462	5.393	0	U	4.168	9.785	0	U	4.17	15.1
Europium-155	901.1	-7.691	U	10.476	12.5	-2.664	U	13.862	16.68	-12.72	U	22.036	26.28
Gross Alpha	900	0.073	U	0.53	1.43	0.309	U	0.875	2.1	14.8		3.73	2.61
Gross Beta	900	0.222	U	0.74	1.75	0.034	U	0.676	1.66	9.15		1.93	1.15
Manganese-54	901.1	-0.49	U	2.482	2.518	0	U	1.987	5.062	0.234	U	7.178	6.622
Potassium-40	901.1												
Sodium-22	901.1												
Strontium-90	ASTM D5811-95	0.17	U	0.228	0.417	-0.029	U	0.213	0.409	-0.126	U	0.226	0.44
Tritium	906	802		173	188	520		146	190	1219		218	187
Uranium-238	HASL 300	0.384	J	0.203	0.23	0.442		0.109	0.048	4.83		0.869	0.113
Uranium-233/234	HASL 300	0.578	J	0.237	0.197	0.611		0.135	0.043	4.9		0.88	0.137
Uranium-235	HASL 300	0.055	UJ	0.103	0.161	0.125	U	0.057	0.039	0.298		0.144	0.103

pCi/L = picocuries per liter
U = Non detect
MDC = minimal detectable concentrat
N = normal sample
FD = field duplicate

Table 4
Seep Probe Results for Radiochemistry

Well Identifier:		SP-T02D			
Sample Type:		N			
Sample Name:		SP-T02D_040616_01_L			
Lab Name:		PACE			
Collection Date:		4/6/2016			
Analyte	Method	Result (pCi/L)	Final Qualifier	Total Uncertainty	MDC
Actinium-228	901.1	2.562	U	3.506	10.33
Americium-241	901.1	0	U	18.647	37.93
Antimony-125	901.1	0.291	U	5.495	6.172
Barium-133	901.1	1.183	U	2.021	2.903
Cesium-134	901.1	0.038	U	3.011	2.455
Cesium-137	901.1	1.498	U	1.267	1.595
Cobalt-57	901.1	5.153	U	9.834	16.3
Cobalt-60	901.1	0	U	1.529	3.323
Europium-152	901.1	2.266	U	17.747	17.12
Europium-154	901.1	1.788	U	2.888	5.139
Europium-155	901.1	-0.365	U	10.527	12.73
Gross Alpha	900	19.6		4.72	2.84
Gross Beta	900	8.74		1.95	1.42
Manganese-54	901.1	-0.524	U	2.516	2.552
Potassium-40	901.1				
Sodium-22	901.1				
Strontium-90	ASTM D5811-95	0.081	U	0.201	0.376
Tritium	906	1272		225	189
Uranium-238	HASL 300	4.63		0.803	0.065
Uranium-233/234	HASL 300	4.77		0.825	0.08
Uranium-235	HASL 300	0.398		0.151	0.034

pCi/L = picocuries per liter
U = Non detect
MDC = minimal detectable concentrat
N = normal sample
FD = field duplicate

Appendix A
Data Validation Reports

LDC Report# 36425B1a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Santa Susana Field Laboratory, GW
LDC Report Date:	June 27, 2016
Parameters:	Volatiles
Validation Level:	Level IV
Laboratory:	Eurofins
Sample Delivery Group (SDG):	PH267

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02D_040616_01_L	8326728	Water	04/06/16
SP-T02D_040616_36_L	8326729	Water	04/06/16
TB-040616	8326730	Water	04/06/16
SP-T02D_040616_01_LMS	8326728MS	Water	04/06/16
SP-T02D_040616_01_LMSD	8326728MSD	Water	04/06/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
04/06/16	Dichlorodifluoromethane Bromomethane 4-Methyl-2-pentanone 2-Hexanone	23 23 30 30	All samples in SDG PH267	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
04/19/16	4-Methyl-2-pentanone 2-Hexanone	32 34	All samples in SDG PH267	UJ (all non-detects) UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB-040616 was identified as a trip blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
SP-T02D_040616_01_LMS/MSD (SP-T02D_040616_01_L)	2-Chloroethylvinyl ether	0 (65-120)	0 (65-120)	R (all non-detects)	A

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples SP-T02D_040616_01_L and SP-T02D_040616_36_L were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to MS/MSD %R, data were rejected in one sample.

Due to ICV and continuing calibration %D, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Volatiles - Data Qualification Summary - SDG PH267

Sample	Compound	Flag	A or P	Reason (Code)
SP-T02D_040616_01_L SP-T02D_040616_36_L TB-040616	Dichlorodifluoromethane Bromomethane 4-Methyl-2-pentanone 2-Hexanone	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Initial calibration verification (%D) (C)
SP-T02D_040616_01_L SP-T02D_040616_36_L TB-040616	4-Methyl-2-pentanone 2-Hexanone	UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D) (C)
SP-T02D_040616_01_L	2-Chloroethylvinyl ether	R (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (Q)

Santa Susana Field Laboratory, GW
Volatiles - Laboratory Blank Data Qualification Summary - SDG PH267

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Volatiles - Field Blank Data Qualification Summary - SDG PH267

No Sample Data Qualified in this SDG

LDC #: 36425B1a

SDG #: PH267

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 06/17/16

Page: 1 of 1

Reviewer: JVG

2nd Reviewer:

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	ICAL ≤ 15/30% r^2 ICV ≤ 20%
IV.	Continuing calibration	SW	CCV ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 3
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS [illegible]
X.	Field duplicates	ND	D = 1/2
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:

A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1 —	SP-T02D_040616_01_L D	8326728	Water	04/06/16
2 —	SP-T02D_040616_36_L D	8326729	Water	04/06/16
3 —	TB-040616	8326730	Water	04/06/16
4	SP-T02D_040616_01_LMS	8326728MS	Water	04/06/16
5	SP-T02D_040616_01_LMSD	8326728MSD	Water	04/06/16
6				
7				
8				
9				

Notes:

—	VBLKU15						

LDC #: 36725B1

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ 30%/15% and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target compounds detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

LDC #: 36425B1

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?		✓		
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within + 30 seconds of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methyl cyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

LDC #: 36425B1a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y [✓ N] N/A Were all %D within the validation criteria of ≤20 %D?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Associated Samples	Qualifications
	04/06/16	la06V01	JJ	23	All (ND)	J/UJ/A (c)
			B	23		
			Y	30		
			Z	30		

LDC #: 36425 B1a

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

[✓ Y] N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y [✓ N] N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <20.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	04/19/16	la19c01	Y	32		All (ND)	J/UJ/A (c)
			Z	34		↓ ↓	↓

CONCAL.wpd

LDC #: 36425B1a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

[✓ Y] N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	4/5	II	0 (65-120)	0 (65-120)	( )	1 (HD)	J/R/A (Q)
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	≤ 22%	61-145%	≤ 14%
S.	Trichloroethene	62-137%	≤ 24%	71-120%	≤ 14%
V.	Benzene	66-142%	≤ 21%	76-127%	≤ 11%
CC.	Toluene	59-139%	≤ 21%	76-125%	≤ 13%
DD.	Chlorobenzene	60-133%	≤ 21%	75-130%	≤ 13%

(acid preserved)

LDC #: 36425B1a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound
S= Standard deviation of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL HP09915	04/06/16	Carbon Disulfide (FBZ)	0.8289	0.8289	0.7901	0.7902	5	5
			Tetrachloroethene (CBZ)	0.3801	0.3801	0.3616	0.3617	8	8
			1,1,2,2-TCA (DCB)	1.2036	1.2036	1.1241	1.1241	11	11

LDC # 36425B1a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	LA19C01 HP09915	4/19/2016	Carbon Disulfide (FBZ)	0.7901	0.7949	0.7949	1	1
			Tetrachloroethene (CBZ)	0.3616	0.3888	0.3888	8	8
			1,1,2,2-TCA (DCB)	1.1241	1.1119	1.1119	1	1

LDC #: 36425B1

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	50.0	50.083	100	100	0
1,2-Dichloroethane-d4		51.125	102	102	
Toluene-d8		50.035	100	100	
Bromofluorobenzene		48.848	98	98	

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 36425 B1a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Sample concentration

RPD = I MSC - MSC I * 2/(MSC + MSDC)
MSC = Matrix spike concentration
MSDC = Matrix spike duplicate concentration

MS/MSD sample: 4/5

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration (ug/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
▨	MS	MSD	——	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	20.0	20.0	0	22.5	22.35	113	113	112	112	1	1
Trichloroethene	↓	↓	↓	22.7	23.01	114	114	115	115	1	1
Benzene				22.25	22.46	111	111	112	112	1	1
Toluene				22.53	22.9	113	113	114	114	1	1
Chlorobenzene				21.91	22.19	110	110	111	111	1	1

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425B1a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA   Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)   LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: LCSL15

Compound	**Spike Added (ug/L)**		**Spiked Sample Concentration (ug/L)**		**LCS Percent Recovery**		**LCSD Percent Recovery**		**LCS/LCSD RPD**	
	LCS	**LCSD**	**LCS**	**LCSD**	**Reported**	**Recalc.**	**Reported**	**Recalc.**	**Reported**	**Recalculated**
1,1-Dichloroethene	20.0	NA	19.61	NA	98	98				
Trichloroethene	↓	↓	20.67	↓	103	103				
Benzene			20.13		101	101				
Toluene			20.67		103	103				
Chlorobenzene			20.15		101	101				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425B1a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?

[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.
V_o	=	Volume or weight of sample pruged in milliliters (ml) or grams (g).
Df	=	Dilution factor.
%S	=	Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. ND LCS, Benzene

Conc. = $\frac{(534436)(50.0)(\quad)}{(1207592)(1.0991)(\quad)(\quad)}$

= 20.13 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	LCS	Benzene	20.13		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 29, 2016

Parameters: Wet Chemistry

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH267

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
C08_040816_01_L	8326731	Water	04/08/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Dissolved Solids by Standard Method 2540C
Total Suspended Solids by Standard Method 2540D

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

VII. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

All sample result verifications were acceptable.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Wet Chemistry - Data Qualification Summary - SDG PH267

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG PH267

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Wet Chemistry - Field Blank Data Qualification Summary - SDG PH267

No Sample Data Qualified in this SDG

LDC #: 36425B6
SDG #: PH267
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 6/27/16
Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: (Analyte) TDS (SM2540C), TSS (SM2540D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/8/16
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	Not Req
VII.	Duplicate sample analysis	N	CS
VIII.	Laboratory control samples	A	LCSD
IX.	Field duplicates	N	
X.	Sample result verification	A	
XI	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	C08_040816_01_L	8326731	Water	04/08/16
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 30425B6

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JD
2nd Reviewer: SM

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.			✓	
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 36425B6

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36425B6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer: Sy

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where,
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R / RPD	%R / RPD	
LCS	Laboratory control sample	TDS	179 mg/L	200 mg/L	90%R	90%R	Y
N	Matrix spike sample		(SSR-SR)				
N	Duplicate sample						

Comments:

TOTCLC.6

LDC #: 36425B6

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?
[✓ Y] N N/A Are all detection limits below the CRQL?

Compound (analyte) results for (1) TSS reported with a positive detect were recalculated and verified using the following equation:

Concentration = $W_1 - W_2$

$W_1 = 0.1293 g/L$
$W_2 = 0.1155 g/L$

Recalculation: $0.1293 g/L - 0.1155 g/L = 0.0138 g/L$

$0.0138 g/L \times \frac{1000 mg}{1 g} = 13.8 mg/L$

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	TDS	442	442	Y
		TSS	13.8	13.8	↓

Note:

LDC Report# 36425C1a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 30, 2016

Parameters: Volatiles

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH268

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02B_041216_01_L	8333540	Water	04/12/16
TB-041316	8333541	Water	04/13/16
SP-424B_041316_01_L	8333542	Water	04/13/16
SP-424C_041316_01_L	8333543	Water	04/13/16
SP-T02C_041216_01_L	8333547	Water	04/12/16
SP-424C_041316_01_LMS	8333544MS	Water	04/13/16
SP-424C_041316_01_LMSD	8333544MSD	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB-041316 was identified as a trip blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
SP-424C_041316_01_LMS/MSD (SP-424C_041316_01_L)	2-Chloroethylvinyl ether	24 (65-120)	0 (65-120)	R (all non-detects)	A

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
SP-424C_041316_01_LMS/MSD (SP-424C_041316_01_L)	2-Chloroethylvinyl ether	200 (≤30)	NA	-

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to MS/MSD %R, data were rejected in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Volatiles - Data Qualification Summary - SDG PH268

Sample	Compound	Flag	A or P	Reason (Code)
SP-424C_041316_01_L	2-Chloroethylvinyl ether	R (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (Q)

Santa Susana Field Laboratory, GW
Volatiles - Laboratory Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Volatiles - Field Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

LDC #: 36425C1a

SDG #: PH268

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 06/17/16

Page: 1 of 1

Reviewer: JVG

2nd Reviewer: SM

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	ICAL ≤ 15/30 % r² ICV ≤ 20 %
IV.	Continuing calibration	A	CCV ≤ 20 %
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 2
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS /D
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-T02B_041216_01_L	8333540	Water	04/12/16
2	TB-041316	8333541	Water	04/13/16
3	SP-424B_041316_01_L	8333542	Water	04/13/16
4	SP-424C_041316_01_L	8333543	Water	04/13/16
5	SP-T02C_041216_01_L	8333547	Water	04/12/16
6	SP-424C_041316_01_LMS	833354~~3~~4MS	Water	04/13/16
7	SP-424C_041316_01_LMSD	833354~~3~~5MSD	Water	04/13/16
8				
9				
10				

Notes:

	VBLKY98						

LDC #: 36425C1a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ 30%/15% and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target compounds detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

LDC #: 36425C1a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methyl cyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

LDC #: 364259a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

[✓ Y] N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	6/7	II	24 (65-120)	0 (65-120)	( )	4 (ND)	J / R / A (G)
		II	( )	( )	200 (30)	↓ ↓	J dets / A ↓
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	≤ 22%	61-145%	≤ 14%
S.	Trichloroethene	62-137%	≤ 24%	71-120%	≤ 14%
V.	Benzene	66-142%	≤ 21%	76-127%	≤ 11%
CC.	Toluene	59-139%	≤ 21%	76-125%	≤ 13%
DD.	Chlorobenzene	60-133%	≤ 21%	75-130%	≤ 13%

(Acid preserved sample)

LDC #: 36425C1

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound
S= Standard deviation of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL HP09355	04/25/16	Trichloroethene (FBZ)	0.2770	0.2770	0.2526	0.2526	12	12
			Tetrachloroethene (CBZ)	0.3925	0.3925	0.3577	0.3577	12	12
			1,1,2,2-TCA (DCB)	0.9726	0.9726	0.9573	0.9573	5	5

LDC # 36425C1

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	YA26C01 HP09355	4/26/2016	Trichloroethene (FBZ)	0.2526	0.2606	0.2606	3	3
			Tetrachloroethene (CBZ)	0.3577	0.3615	0.3615	1	1
			1,1,2,2-TCA (DCB)	0.9573	0.9656	0.9656	1	1

LDC #: 36425C1a

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	50.0	47.372	95	95	0
1,2-Dichloroethane-d4		50.942	102	102	
Toluene-d8		52.026	104	104	
Bromofluorobenzene		49.603	99	99	

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 36425C1a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA   Where: SSC = Spiked sample concentration   SC = Sample concentration
SA = Spike added

RPD = I MSC - MSC I * 2/(MSC + MSDC)   MSC = Matrix spike concentration   MSDC = Matrix spike duplicate concentration

MS/MSD sample: 6/7

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration (ug/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
▒	MS	MSD	----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	20.0	20.0	0	22.19	22.46	111	111	112	112	1	1
Trichloroethene				23.64	23.33	118	118	117	117	1	1
Benzene				22.85	22.41	114	114	112	112	2	2
Toluene				23.34	23.32	117	117	116	116	1	1
Chlorobenzene				22.45	22.32	112	112	112	112	1	1

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425G1a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: LCS/D Y98

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	20.0	20.0	18.94	19.74	95	95	99	99	4	4
Trichloroethene			20.25	20.94	101	101	105	105	3	3
Benzene			20.14	20.65	101	101	103	103	2	2
Toluene			20.79	21.36	104	104	107	107	3	3
Chlorobenzene			20.12	20.59	101	101	103	103	2	2

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425 C1a

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?

[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. ND, TCE
lcs

Conc. = $\frac{(108848)(50)(\quad)}{(1064255)(0.2526)(\quad)(\quad)}$

= 20.245 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	lcs	TCE	20.25		

LDC Report# 36425C1b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: 1,4-Dioxane

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH268

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
TB-041316	8333541	Water	04/13/16
SP-424B_041316_01_L	8333542	Water	04/13/16
SP-424C_041316_01_L	8333543	Water	04/13/16
SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
SP-424C_041316_01_LMSD	8333543MSD	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8260B in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB-041316 was identified as a trip blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
1,4-Dioxane - Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
1,4-Dioxane - Field Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

LDC #: 36425C1b
SDG #: PH268
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 06/17/16
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8260B-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	ICAL ≤ 15% ICV ≤ 20%
IV.	Continuing calibration	A	CCV ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 1
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1 -	TB-041316	8333541	Water	04/13/16
2 -	SP-424B_041316_01_L	8333542	Water	04/13/16
3 -	SP-424C_041316_01_L	8333543	Water	04/13/16
4	SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
5	SP-424C_041316_01_LMSD	8333543MSD	Water	04/13/16
6				
7				
8				
9				

Notes:

-	VBLK E33						

LDC #: 36425C1b

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer: Sm

Method: Volatiles (EPA SW 846 Method 8260B-SIM)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check (Not required)				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) $\leq$ 15% and relative response factors (RRF) $\geq$ 0.05??	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of $\geq$ 0.990?		✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent difference (%D) ≤20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) $\leq$ 20% and relative response factors (RRF) $\geq$ 0.05?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			

LDC #: 364259b

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC # 36425C1b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Ax = Area of Compound
Cx = Concentration of compound
S= Standard deviation of the RRFs

Ais = Area of associated internal standard
Cis = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 10 std)	Recalculated RRF (RRF 10 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL HP15648	3/11/16	1,4-Dioxane (1,4-D-d8)	1.2758	1.2758	1.2762	1.2762	4	4

LDC # 36425C1b

VALIDATION FINDINGS WORKSHEET

Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	CCV RRF	Reported RRF	Recalculated RRF	Reported % D	Recalculated %D
1	EA21C02 HP15648	4/26/2016	1,4-Dioxane (1,4-D-d8)	1.2762	1.3178	1.3178	3	3

LDC #: 36 425 C1b

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8	10.0	9.85	99	99	0
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 76425C1b

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA   Where: SSC = Spiked sample concentration   SC = Sample concentration
SA = Spike added

RPD = I MSC - MSC I * 2/(MSC + MSDC)   MSC = Matrix spike concentration   MSDC = Matrix spike duplicate concentration

MS/MSD sample: 4/5

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration (ug/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,4-Dioxane	5.00	5.00	0	4.57	4.62	91	91	92	92	1	1
1,2,3-TCP											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425 C1b

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA   Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)   LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: LCS E33

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,4-Dioxane	5.00	NA	4.66	NA	93	93				
1,2,3-TCP										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425C1b

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer: Sm

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured
A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
I_s = Amount of internal standard added in nanograms (ng)
RRF = Relative response factor of the calibration standard.
V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).
Df = Dilution factor.
%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. LCS ND 1,4-Dioxane

Conc. = $\frac{(9073)(10)(\quad)}{(15267)(1.2767)(\quad)(\quad)}$

= 4.657 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	LCS	1,4-Dioxane	4.66		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 29, 2016

Parameters: Metals

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH268

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424B_041316_01_L	8333542	Water	04/13/16
SP-424C_041316_01_L	8333543	Water	04/13/16
SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
SP-424C_041316_01_LMSD	8333543MSD	Water	04/13/16
SP-424C_041316_01_LDUP	8333543DUP	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010C/6020A
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Level IV evaluation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	04/26/16 (09:59)	Strontium	68.0 (80-120)	All samples in SDG PH268	J (all detects)	P
ICSAB	04/26/16 (10:53)	Strontium	64.0 (80-120)	All samples in SDG PH268	J (all detects)	P

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Magnesium	117.760 ug/L 18.420 ug/L	SP-424B_041316_01_L
ICB/CCB	Aluminum Cadmium Calcium Chromium Cobalt Copper Magnesium	53.6 ug/L 0.37 ug/L 66.9 ug/L 0.97 ug/L 0.73 ug/L 2.1 ug/L 67.5 ug/L	SP-424B_041316_01_L

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium	42.640 ug/L	SP-424C_041316_01_L

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SP-424B_041316_01_L	Chromium Copper	0.0021 mg/L 0.0042 mg/L	0.0021U mg/L 0.0042U mg/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For SP-424C_041316_01_LMS/MSD, no data were qualified for Calcium percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

IX. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
SP-424C_041316_01_L	Strontium	13 (≤10)	All samples in SDG PH268	J (all detects)	A

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICS %R and serial dilution %D, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Metals - Data Qualification Summary - SDG PH268

Sample	Analyte	Flag	A or P	Reason (Code)
SP-424B_041316_01_L SP-424C_041316_01_L	Strontium	J (all detects)	P	ICP interference check sample analysis (%R) (I)
SP-424B_041316_01_L SP-424C_041316_01_L	Strontium	J (all detects)	A	Serial dilution (%D) (A)

Santa Susana Field Laboratory, GW
Metals - Laboratory Blank Data Qualification Summary - SDG PH268

Sample	Analyte	Modified Final Concentration	A or P	Code
SP-424B_041316_01_L	Chromium Copper	0.0021U mg/L 0.0042U mg/L	A	B

Santa Susana Field Laboratory, GW
Metals - Field Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

LDC #: 36425C4a
SDG #: PH268
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 6/28/16
Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 846 Method 6010C/6020A/7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/13/16
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	A	MS/D = (3,4) = Ca > 4x *See Below
VIII.	Duplicate sample analysis	A	DUP = SP-424A_041416-36-LDUP (SDG: PH269)
IX.	Serial Dilution	SW	SER = SP-424A_041416-36-L (SDG: PH269)
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	A	
XIV.	Overall Assessment of Data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-424B_041316_01_L	8333542	Water	04/13/16
2	SP-424C_041316_01_L	8333543	Water	04/13/16
3	SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
4	SP-424C_041316_01_LMSD	8333543MSD	Water	04/13/16
5	SP-424C_041316_01_LDUP	8333543DUP	Water	04/13/16
6				
7				
8				
9				
10				
11				
12				

Notes:

MS/D = SP-424A_041416-36-LMS/D (SDG: PH269)

LDC #: 36425C4a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JV
2nd Reviewer: SM

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 36425C4a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JD
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
VIII. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	✓			
Were all percent differences (%Ds) < 10%?		✓		
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		✓		
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36425C4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: JO
2nd reviewer: SM

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-2	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl], [✓ V], [✓ Zn, Mo, B, Sn, Ti], [✓ Li] [✓ P] [✓ Zr] [✓ Sr
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
QC:3-5	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl], [✓ V], [✓ Zn, Mo, B, Sn, Ti], [✓ Li] [✓ P] [✓ Zr] [✓ S
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Analysis Method
ICP		[✓ Al], [✓ Sb], [✓ As], [✓ Ba], [✓ Be], [✓ Cd], [✓ Ca], [✓ Cr], [✓ Co], [✓ Cu], [✓ Fe], [✓ Pb], [✓ Mg], [✓ Mn], Hg, [✓ Ni], [✓ K], Se, Ag, [✓ Na], Tl, [✓ V], [✓ Zn], [✓ Mo], [✓ B], [✓ Sn], [✓ Ti], [✓ Li] [✓ P] [✓ Zr]
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, [✓ Se], [✓ Ag], Na, [✓ Tl], V, Zn, Mo, B, Sn, Ti, [✓ Sr]
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 36425C4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were ICP interference check samples performed as required?
Y [✓ N] N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	04/26/16	ICSAB (9:59)	Sr	68.0	All	J/UJ/P (det) (I)
	04/26/16	ICSAB (10:53)	Sr	64.0	All	J/UJ/P (det) (I)

Comments:

LDC #: 36425C4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 864 Method 6010/6020/7000)
Soil preparation factor applied:
Sample Concentration units, unless otherwise noted: mg/L
Associated Samples: 1 (B)

					Sample Identification									
Analyte	**Maximum PB^a (mg/Kg)**	**Maximum PB^a (ug/L)**	**Maximum ICB/CCB^a (ug/L)**	**Blank Action Limit (mg/L)**	1									
Al			53.6	0.268000										
Cd			0.37	0.001850										
Ca		117.760	66.9	0.588800										
Cr			0.97	0.004850	0.0021									
Co			0.73	0.003650										
Cu			2.1	0.010500	0.0042									
Mg		18.420	67.5	0.337500										

Sample Concentration units, unless otherwise noted: mg/L
Associated Samples: 2 (B)

					Sample Identification									
Analyte	**Maximum PB^a (mg/Kg)**	**Maximum PB^a (ug/L)**	**Maximum ICB/CCB^a (ug/L)**	**Blank Action Limit (mg/L)**	No Qual.									
Ca		42.640		0.213200										

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 36425C4a

Page: 1 of 1
Reviewer:
2nd Reviewer:

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

METHOD: Trace Metals (EPA SW 846 Method 6010C/6020A/7471B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A If analyte concentrations were > 50X the MDL (ICP) ,or >100X the MDL (ICP/MS), was a serial dilution analyzed?

Y [✓ N] N/A Were ICP serial dilution percent differences (%D) ≤10%?

Y [✓ N] N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D (Limits)	Associated Samples	Qualifications
	2	W	Sr	13	All	J/UJ/A (det) (A)

Comments:

LDC #: 36425C4a

VALIDATION FINDINGS WORKSHEET

Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Trace Metals (See cover)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found/True x 100

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV 6:01	ICP (Initial calibration)	As	590ug/L	600 ug/L	98.3%R	98.3%R	Y
ICV 9:48	ICP/MS (Initial calibration)	Se	50.12 ug/L	50ug/L	100.2%R	100.2%R	↓
ICV 5:17	CVAA (Initial calibration)	Hg	2.48ug/L	2.5 ug/L	99.2%R	99.2%R	
CCV 6:20	ICP (Continuing calibration)	Be	490 ug/L	500 ug/L	98.0%R	98.0%R	
CCV 10:04	ICP/MS (Continuing calibration)	Ag	25.67ug/L	25 ug/L	102.7%R	102.7%R	
CCV 9:08	CVAA (Contining calibration)	Hg	0.96ug/L	1 ug/L	96.0%R	96.0%R	
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments:

LDC #: 36425C4a

VALIDATION FINDINGS WORKSHEET

Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICS AB 9:59	ICP interference check	Sr	3.4 ug/L	5 ug/L	68.0%R	68.0%R	Y
LCS 10:11	Laboratory control sample	Tl	2.127 ug/L	2 ug/L	106%R	106%R	↓
MS 6:42	Matrix spike	Pb	(SSR-SR) 149.8 ug/L	150 ug/L	100%R	100%R	
DUP 6:39	Duplicate	Ba	0.02751 mg/L	0.02740 mg/L	0%RPD	0%RPD	
SER 6:48	ICP serial dilution	Mn	0.06135 mg/L	0.06122 mg/L	0%D	0%D	

Comments:

LDC #: 36425C4a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
[✓ Y] N N/A Are all detection limits below the CRDL?

Detected analyte results for (2) Sr were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

Recalculation:

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

$RD = 417.9\,ug/L \times \frac{1mg}{1000ug} \simeq 0.418\,mg/L$

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	Ba	0.0458	0.0458	Y
	2	Sr	0.418	0.418	↓

Note:

LDC Report# 36425C6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 29, 2016

Parameters: Fluoride

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH268

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424B_041316_01_L	8333542	Water	04/13/16
SP-424C_041316_01_L	8333543	Water	04/13/16
SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
SP-424C_041316_01_LDUP	8333543DUP	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Fluoride by Environmental Protection Agency (EPA) Method 300.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicates

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

All sample result verifications were acceptable.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Fluoride - Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Fluoride - Laboratory Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Fluoride - Field Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

LDC #: 36425C6
SDG #: PH268
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/28/16
Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: (Analyte) Fluoride (EPA Method 300.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/13/16
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS = (3)
VII.	Duplicate sample analysis	A	DUP
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Sample result verification	A	
XI	Overall assessment of data	A	

Note:				
	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP-424B_041316_01_L	8333542	Water	04/13/16
2	SP-424C_041316_01_L	8333543	Water	04/13/16
3	SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
4	~~SP-424C_041316_01_LMSD~~ JD	8333543MSD	Water	04/13/16
5	SP-424C_041316_01_LDUP	8333543DUP	Water	04/13/16
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36425C6

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JD
2nd Reviewer: Sm

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients > 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of $\leq$ CRDL($\leq$ 2X CRDL for soil) was used for samples that were $\leq$ 5X the CRDL, including when only one of the duplicate sample values were $\leq$ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 36425C6

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JD
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36425C6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of F was recalculated.Calibration date: 4/2/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100 / True

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	F	s1	0.0	0	*0.998465*	0.998918	Y*
		s2	0.1	0.0684			
		s3	0.4	0.14			
		s4	1	0.3054			
		s5	2	0.601			
		s6	3	0.9124			
ICV 17:35 Calibration verification		Found 0.736mg/L	True 0.75mg/L		98%R	NR	Y
CCV 14:10 Calibration verification		0.781 mg/L	0.75mg/L		104%R	NR	Y
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

*Rounding

LDC #: 36425C6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / ((S+D)/2) x 100 Where,
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS 13:40	Laboratory control sample	F	0.753mg/L	0.75mg/L	100%R	100%R	Y
MS 16:54	Matrix spike sample	↓	(SSR-SR) 5.29mg/L	5mg/L	106%R	105%R	Y*
DUP 16:24	Duplicate sample	↓	2.466mg/L	2.517mg/L	2%RPD	2%RPD	Y

Comments: *Rounding

LDC #: 36425C6

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: JO
2nd reviewer: SM

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?
[✓ Y] N N/A Are all detection limits below the CRQL?

Compound (analyte) results for (1) F reported with a positive detect were recalculated and verified using the following equation:

Concentration = $\frac{A-0.025}{0.292}$

D.I=5
A=0.160

Recalculation: $\left(\frac{0.160-0.025}{0.292}\right) \times 5 = 2.3$ mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	F	2.3	2.3	Y
	2	↓	2.5	2.5	↓

Note:

LDC Report# 36425C87

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Perchlorate

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH268

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424B_041316_01_L	8333542	Water	04/13/16
SP-424C_041316_01_L	8333543	Water	04/13/16
SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
SP-424C_041316_01_LMSD	8333543MSD	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perchlorate by Environmental Protection Agency (EPA) SW 846 Method 6850

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance check was performed prior to initial calibration.

All perchlorate ion signal to noise ratio requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

The isotope ratios were within QC limits.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 15.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 15.0%.

The percent differences (%D) of the limit of detection verification (LODV) standard were less than or equal to 30.0%.

The isotope ratios were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria.

XII. Target Compound Identifications

All target compound identifications were within validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Perchlorate - Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Perchlorate - Laboratory Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Perchlorate - Field Blank Data Qualification Summary - SDG PH268

No Sample Data Qualified in this SDG

LDC #: 36425C87 **VALIDATION COMPLETENESS WORKSHEET** Date: 06/17/16
SDG #: PH268 Level IV Page: 1 of 1
Laboratory: Eurofins Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW846 Method 6850)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments	
I.	Sample receipt/Technical holding times	A / A		
II.	~~G~~C/MS Instrument performance check	A		
III.	Initial calibration/ICV	A / A	r²	ICV ≤ 15%
IV.	Continuing calibration	A	CCV ≤ 15%	LODV ≤ 30%
V.	Laboratory Blanks	A		
VI.	Field blanks	N		
VII.	Surrogate spikes	N	Not req'd.	
VIII.	Matrix spike/Matrix spike duplicates	A		
IX.	Laboratory control samples	A	LCS	
X.	Field duplicates	N		
XI.	Internal standards	A		
XII.	Compound quantitation RL/LOQ/LODs	A		
XIII.	Target compound identification	A		
XIV.	System performance	A		
XV.	Overall assessment of data	A		

Note:				
	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP-424B_041316_01_L	8333542	Water	04/13/16
2	SP-424C_041316_01_L	8333543	Water	04/13/16
3	SP-424C_041316_01_LMS	8333543MS	Water	04/13/16
4	SP-424C_041316_01_LMSD	8333543MSD	Water	04/13/16
5				
6				
7				
8				
9				

Notes:

	PBLK 25117						

LDC #: 36425C87

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer:

Method: Perchlorate (EPA SW 846 Method 6850)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	✓			
Were the Perchlorate ions within ±0.3 m/z of mass 99,101 and 107?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?			✓	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Was the isotope ratio of ^{35}Cl/^{37}Cl or m/z 99/101 within 2.3 to 3.8?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 15%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) of the mid-range continuing calibration ≤ 15%?	✓			
Were all percent differences (%D) of the low-range continuing calibration ≤ 50%?	✓			
Was the isotope ratio of ^{35}Cl/^{37}Cl or m/z 99/101 within 2.3 to 3.8?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		

LDC #: 26425C87

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?.			✓	
XI. Internal standards				
Were internal standard area counts within ± 50% of the associated calibration standard?	✓			
Were retention times of m/z 89 ($Cl^{18}O_3^-$) within 0.2 minutes of m/z 83 (ClO_3^-)?	✓			
XII. Compound quantitation.				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within 0.98 to 1.02?	✓			
Was the isotope ratio of $^{35}Cl/^{37}Cl$ or m/z 99/101 within 2.3 to 3.8?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC # 36425C87

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LCMS Perchlorate (EPA SW 846 Method 6850)

Parameter: Perchlorate

Order of regression: Linear

Date	Instrument	Compound	Points	y Response ratio	x Conc ratio
26-Apr-16	MS5P11616	Perchlorate	Point 1	0.1386	0.040
			Point 2	0.3517	0.100
			Point 3	0.7130	0.200
			Point 4	1.4656	0.400
			Point 5	3.9184	1.000
			Point 6	10.7827	2.500

Regression Output: Regression Output:			Reported	
Constant	c =	-0.17043	c =	-0.0604
Std Err of Y Est		0.04		
R Squared	r^2 =	0.99869	r^2 =	0.99666
No. of Observations		6.00		
Degrees of Freedom		5.00		
X Coefficient(s)	m =	0.23023	m =	0.41820
Std Err of Coef.	0.01			

LDC#: 36425C87

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: LCMS Perchlorate (EPA SW 846 Method 6850)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	CCV Conc	Reported Conc	Recalculated Conc	Reported % D	Recalculated %D
1	ms5P11616032 Iodv	4/26/2016	Perchlorate	0.40	0.50	0.50	25.00	25.00

LDC #: 36425C87

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850/6860)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA

Where:
SSC = Spiked sample concentration
SA = Spike added
SC = Sample concentation

RPD = I MS - MSD I * 2/(MS + MSD)

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 3/4

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration ( )		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
▨	MS	MSD	------	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Perchlorate	5.00	5.00	0	5.18	5.23	104	104	105	105	1	1

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425C87

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850/6860)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA   Where: SSC = Spike concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD)   LCS = Laboratory control sample percent recovery   LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS 25112

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
Perchlorate	5.00	NA	5.39	NA	108	108				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425C87

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: LCMS Perchlorate (EPA SW 846 Method 6850/6860)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured
A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
I_s = Amount of internal standard added in nanograms (ng)
V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i = Volume of extract injected in microliters (ul)
V_t = Volume of the concentrated extract in microliters (ul)
Df = Dilution Factor.
%S = Percent solids, applicable to soil and solid matrices only.
2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. MD LCS, ClO$_4$

$$\text{Conc.} = \frac{\left[\frac{(98462)}{(44843)}\right] - (0.0604)}{(0.4187)}$$

= 5.3948 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	LCS	ClO4	~~0.50~~ 5.39		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 20, 2016

Parameters: Volatiles

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH269

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424A_041416_01_L	8337439	Water	04/14/16
SP-424A_041416_36_L	8337440	Water	04/14/16
TB-041416	8337441	Water	04/14/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
04/06/16	Dichlorodifluoromethane Bromomethane 4-Methyl-2-pentanone 2-Hexanone	23 23 30 30	All samples in SDG PH269	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
04/19/16	4-Methyl-2-pentanone 2-Hexanone	32 34	All samples in SDG PH269	UJ (all non-detects) UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB-041416 was identified as a trip blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were not within QC limits. No data were qualified since there were no associated samples in this SDG. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples SP-424A_041416_01_L and SP-424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV and continuing calibration %D, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Volatiles - Data Qualification Summary - SDG PH269

Sample	Compound	Flag	A or P	Reason (Code)
SP-424A_041416_01_L SP-424A_041416_36_L TB-041416	Dichlorodifluoromethane Bromomethane 4-Methyl-2-pentanone 2-Hexanone	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Initial calibration verification (%D) (C)
SP-424A_041416_01_L SP-424A_041416_36_L TB-041416	4-Methyl-2-pentanone 2-Hexanone	UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D) (C)

Santa Susana Field Laboratory, GW
Volatiles - Laboratory Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Volatiles - Field Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

LDC #: 36425D1a

SDG #: PH269

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 06/17/16

Page: 1 of 1

Reviewer: JVG

2nd Reviewer:

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	ICAL ≤ 15/30% r² ICV ≤ 20%
IV.	Continuing calibration	SW	CCV ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 3
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	SP-T02D_040616_01L (No asstd sample, NQ)
IX.	Laboratory control samples	A	LCS ~~D~~
X.	Field duplicates	ND	D = 1/2
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:

A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP-424A_041416_01_L	8337439	Water	04/14/16
2	SP-424A_041416_36_L	8337440	Water	04/14/16
3	TB-041416	8337441	Water	04/14/16
4				
5				
6				
7				
8				
9				
10				

Notes:

	VBLK L15						

LDC #: 36425D1a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer: SM

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ 30%/15% and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target compounds detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

LDC #: 36425 D1a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?		✓		
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methyl cyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

LDC #: 56425D1a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: R

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y [✓ N] N/A Were all %D within the validation criteria of ≤20 %D?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Associated Samples	Qualifications
	04/06/16	1a06V01	JJ	23	All	J/UJ/A (c)
			B	23	↓	↓
			Y	30		
			Z	30		

ICVvoa.wpd

LDC #: 36425 D19

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: G

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?
[✓ Y] N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y [✓ N] N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	04/19/16	2a19C01	Y	32		All	J/UJ/A (C)
			Z	34		↓	↓

LDC #: 36425D1a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound
S= Standard deviation of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL HP09915	04/06/16	Carbon Disulfide (FBZ)	0.8289	0.8289	0.7901	0.7902	5	5
			Tetrachloroethene (CBZ)	0.3801	0.3801	0.3616	0.3617	8	8
			1,1,2,2-TCA (DCB)	1.2036	1.2036	1.1241	1.1241	11	11

LDC # 36425D1a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	LA19C01 HP09915	4/19/2016	Carbon Disulfide (FBZ)	0.7901	0.7949	0.7949	1	1
			Tetrachloroethene (CBZ)	0.3616	0.3888	0.3888	8	8
			1,1,2,2-TCA (DCB)	1.1241	1.1119	1.1119	1	1

LDC #: 26 f25 D1a

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: # 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	50.0	48,872	98	98	0
1,2-Dichloroethane-d4		49,930	100	100	
Toluene-d8		50,658	101	101	
Bromofluorobenzene		49.707	99	99	

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 36425D1a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA   Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)   LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: LCS 415

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	20.0	NA	19.61	NA	98	98				
Trichloroethene			20.67		103	103				
Benzene			20.13		101	101				
Toluene			20.67		103	103				
Chlorobenzene			20.5		101	101				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425 D1a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer: GA

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?

[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. ND, TCE

LCS

Conc. = $\frac{(137074)(50.0)(\quad)}{(1207592)(0.27455)(\quad)(\quad)}$

= 20.68

≈ 21 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	LCS	TCE	21		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: 1,4-Dioxane

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH269

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424A_041416_01_L	8337439	Water	04/14/16
SP-424A_041416_36_L	8337440	Water	04/14/16
TB-041416	8337441	Water	04/14/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8260B in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB-041416 was identified as a trip blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples SP-424A_041416_01_L and SP-424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
1,4-Dioxane - Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
1,4-Dioxane - Field Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

LDC #: 36425D1b

SDG #: PH269

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 06/17/16

Page: 1 of 1

Reviewer: JVG

2nd Reviewer:

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8260B-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	ICAL ≤ 15% ICV ≤ 20%
IV.	Continuing calibration	A	CCV ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 3
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	ND	D = 1/2
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:

A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
SW = See worksheet	FB = Field blank	EB = Equipment blank	

		Client ID	Lab ID	Matrix	Date
1	2	SP-424A_041416_01_L	8337439	Water	04/14/16
2	1	SP-424A_041416_36_L	8337440	Water	04/14/16
3	1	TB-041416	8337441	Water	04/14/16
4					
5					
6					
7					
8					
9					

Notes:

1	VBLK E34						
2	VBLK E38						

LDC #: 36425 D1b

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA SW 846 Method 8260B-SIM)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check (Not required)				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) $\leq$ 15% and relative response factors (RRF) $\geq$ 0.05??	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of $\geq$ 0.990?			✓	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent difference (%D) ≤20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) $\leq$ 20% and relative response factors (RRF) $\geq$ 0.05?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?			✓	

LDC #: 36475D1b

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?		✓		
XI. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC # 36425D1b

VALIDATION FINDINGS WORKSHEET

Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Ax = Area of Compound
Cx = Concentration of compound
S= Standard deviation of the RRFs

Ais = Area of associated internal standard
Cis = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 10 std)	Recalculated RRF (RRF 10 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL HP15648	3/11/16	1,4-Dioxane (1,4-D-d8)	1.2758	1.2758	1.2762	1.2762	4	4

LDC # 36425D1b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	CCV RRF	Reported RRF	Recalculated RRF	Reported % D	Recalculated %D
1	EA21C05 HP15648	4/21/2016	1,4-Dioxane (1,4-D-d8)	1.2762	1.2125	1.2125	5	5
2	EA25C01 HP15648	4/25/2016	1,4-Dioxane (1,4-D-d8)	1.2762	1.3781	1.3781	8	8

LDC #: 26425 D1b

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8	10.0	9.847	98	98	0
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 36425D1b

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA   Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)   LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: LCS E34

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
▨	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,4-Dioxane	5.00	NA	4.97	NA	99	99				
1,2,3-TCP										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425 D1b

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer: SM

METHOD: GC/MS VOA (EPA SW 846 Method 8260B-SIM)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?

[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured
A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
I_s = Amount of internal standard added in nanograms (ng)
RRF = Relative response factor of the calibration standard.
V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).
Df = Dilution factor.
%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. ND LCS E34, 1.4-Dioxane:

Conc. = $\frac{(9645)(10)(\quad)}{(15222)(1.2762)(\quad)(\quad)}$

= 4.9649 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	LCS	1,4-Dioxane	4.97		

LDC Report# 36425D4a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 29, 2016

Parameters: Metals

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH269

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424A_041416_01_L	8337439	Water	04/14/16
SP-424A_041416_36_L	8337440	Water	04/14/16
SP-424A_041416_36_LMS	8337440MS	Water	04/14/16
SP-424A_041416_36_LMSD	8337440MSD	Water	04/14/16
SP-424A_041416_36_LDUP	8337440DUP	Water	04/14/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010C/6020A
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Level IV evaluation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	04/26/16 (09:59)	Strontium	68.0 (80-120)	All samples in SDG PH269	J (all detects)	P
ICSAB	04/26/16 (10:53)	Strontium	64.0 (80-120)	All samples in SDG PH269	J (all detects)	P

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Magnesium	117.760 ug/L 18.420 ug/L	All samples in SDG PH269
ICB/CCB	Aluminum Cadmium Calcium Chromium Cobalt Copper Magnesium Titanium	53.6 ug/L 0.37 ug/L 66.9 ug/L 0.97 ug/L 0.73 ug/L 2.1 ug/L 67.5 ug/L 0.21 ug/L	All samples in SDG PH269

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SP-424A_041416_01_L	Chromium Copper	0.0023 mg/L 0.0033 mg/L	0.0023U mg/L 0.0033U mg/L
SP-424A_041416_36_L	Aluminum Chromium	0.113 mg/L 0.0025 mg/L	0.113U mg/L 0.0025U mg/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For SP-424A_041416_36_LMS/MSD, no data were qualified for Calcium percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

IX. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
SP-424C_041316_01_L	Strontium	13 (≤10)	All samples in SDG PH269	J (all detects)	A

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

Samples SP-424A_041416_01_L and SP-424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD (Limits)	Flag	A or P
	SP-424A_041416_01_L	SP-424A_041416_36_L			
Aluminum	0.400U	0.113	112 (≤35)	NQ	-
Barium	0.0319	0.0336	5 (≤35)	-	-
Boron	0.0627	0.0756	19 (≤35)	-	-
Calcium	82.6	82.7	0 (≤35)	-	-
Chromium	0.0023	0.0025	8 (≤35)	-	-
Copper	0.0033	0.0200U	143 (≤35)	NQ	-
Iron	0.0717	0.0456	45 (≤35)	NQ	-
Lithium	0.0510	0.0532	4 (≤35)	-	-
Magnesium	23.7	24.7	4 (≤35)	-	-
Manganese	0.230	0.242	5 (≤35)	-	-
Molybdenum	0.0022	0.0200U	160 (≤35)	NQ	-
Potassium	3.25	3.36	3 (≤35)	-	-
Sodium	80.5	82.7	3 (≤35)	-	-
Titanium	0.0058	0.0059	2 (≤35)	-	-
Strontium	0.419	0.410	2 (≤35)	-	-

NQ = One or both results were less than 5X the reporting limit, therefore no data were qualified.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICS %R and serial dilution %D, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Metals - Data Qualification Summary - SDG PH269

Sample	Analyte	Flag	A or P	Reason (Code)
SP-424A_041416_01_L SP-424A_041416_36_L	Strontium	J (all detects)	P	ICP interference check sample analysis (%R) (I)
SP-424A_041416_01_L SP-424A_041416_36_L	Strontium	J (all detects)	A	Serial dilution (%D) (A)

Santa Susana Field Laboratory, GW
Metals - Laboratory Blank Data Qualification Summary - SDG PH269

Sample	Analyte	Modified Final Concentration	A or P	Code
SP-424A_041416_01_L	Chromium Copper	0.0023U mg/L 0.0033U mg/L	A	B
SP-424A_041416_36_L	Aluminum Chromium	0.113U mg/L 0.0025U mg/L	A	B

Santa Susana Field Laboratory, GW
Metals - Field Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

LDC #: 36425D4a
SDG #: PH269
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 6/28/16
Page: 1 of 1
Reviewer: JSD
2nd Reviewer: SM

METHOD: Metals (EPA SW 846 Method 6010C/6020A/7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/14/16
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	A	MSD = (3,4) = Ca > 4X *See Below
VIII.	Duplicate sample analysis	A	DUP = SP-424C_041316-01-LDUP (SDG: PH 268)
IX.	Serial Dilution	SW	SER = SP-424C_041316-01-L (SDG: PH268)
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	SW	FD = (1,2)
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	A	
XIV	Overall Assessment of Data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-424A_041416_01_L	8337439	Water	04/14/16
2	SP-424A_041416_36_L	8337440	Water	04/14/16
3	SP-424A_041416_36_LMS 6010	8337440MS	Water	04/14/16
4	SP-424A_041416_36_LMSD ↓	8337440MSD	Water	04/14/16
5	SP-424A_041416_36_LDUP	8337440DUP	Water	04/14/16
6				
7				
8				
9				
10				
11				
12				

Notes:

*MSD = SP-424C-041316-01-LMSD (SDG: PH268)

LDC #: 36425D4a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: SD
2nd Reviewer: SM

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 36425D4a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JP
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
VIII. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	✓			
Were all percent differences (%Ds) < 10%?		✓		
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		✓		
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36425D4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: JD
2nd reviewer: SM

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-2	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti], [✓ Li] [✓ P] [✓ Zr] [✓ S]
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
QC:3-5	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn], Hg, [✓ Ni, K], Se, Ag, [✓ Na], Tl, [✓ V, Zn, Mo, B, Sn, Ti], [✓ Li] [✓ P] [✓ Zr]
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___

Analysis Method

ICP		[✓ Al], [✓ Sb], [✓ As], [✓ Ba], [✓ Be], [✓ Cd], [✓ Ca], [✓ Cr], [✓ Co], [✓ Cu], [✓ Fe], [✓ Pb], [✓ Mg], [✓ Mn], Hg, [✓ Ni], [✓ K], Se, Ag, [✓ Na], Tl, [✓ V], [✓ Zn], [✓ Mo], [✓ B], [✓ Sn], [✓ Ti], [✓ Li] [✓ P] [✓ Zr]
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, [✓ Se], [✓ Ag], Na, [✓ Tl], V, Zn, Mo, B, Sn, Ti, [✓ Sr]
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 36425D4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were ICP interference check samples performed as required?

Y [✓ N] N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	04/26/16	ICSAB (9:59)	Sr	68.0	All	J/UJ/P (det) (I)
	04/26/16	ICSAB (10:53)	Sr	64.0	All	J/UJ/P (det) (I)

Comments:

LDC #: 36425D4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 864 Method 6010/6020/7000)
Soil preparation factor applied:
Sample Concentration units, unless otherwise noted: mg/L
Associated Samples: All (B)

					Sample Identification									
Analyte	**Maximum PB[a] (mg/Kg)**	**Maximum PB[a] (ug/L)**	**Maximum ICB/CCB[a] (ug/L)**	**Blank Action Limit (mg/L)**	1	2								
Al			53.6	0.268000		0.113								
Cd			0.37	0.001850										
Ca		117.760	66.9	0.588800										
Cr			0.97	0.004850	0.0023	0.0025								
Co			0.73	0.003650										
Cu			2.1	0.010500	0.0033									
Mg		18.420	67.5	0.337500										
Ti			0.21	0.001050										

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 36425D4a

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010C/6020A/7471B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A If analyte concentrations were > 50X the MDL (ICP) ,or >100X the MDL (ICP/MS), was a serial dilution analyzed?

Y [✓ N] N/A Were ICP serial dilution percent differences (%D) ≤10%?

Y [✓ N] N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D (Limits)	Associated Samples	Qualifications
	SP-424C_041316_01_L (SDG: PH268)	W	Sr	13	All	J/UJ/A (det) (A)

Comments:

LDC#: 36425D4a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer: SM

METHOD: Metals (EPA Method 6010B/7000)

[✓ Y] N NA Were field duplicate pairs identified in this SDG?
[✓ Y] N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/L)		RPD (≤35)	Qual. (Parent Only)
	1	2		
Aluminum	0.400U	0.113	112	NQ
Barium	0.0319	0.0336	5	
Boron	0.0627	0.0756	19	
Calcium	82.6	82.7	0	
Chromium	0.0023	0.0025	8	
Copper	0.0033	0.0200U	143	NQ
Iron	0.0717	0.0456	45	NQ
Lithium	0.0510	0.0532	4	
Magnesium	23.7	24.7	4	
Manganese	0.230	0.242	5	
Molybdenum	0.0022	0.0200U	160	NQ
Potassium	3.25	3.36	3	
Sodium	80.5	82.7	3	
Titanium	0.0058	0.0059	2	
Strontium	0.419	0.410	2	

NQ = No qual. because one or both results < 5X RL

LDC #: 36425D4a

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

METHOD: Trace Metals (See cover)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV 11:13	ICP (Initial calibration)	Ti	608 ug/L	600ug/L	101.3%R	101.3%R	Y
ICV 9:48	ICP/MS (Initial calibration)	Sr	49.56ug/L	50ug/L	99.1%R	99.1%R	↓
ICV 5:17	CVAA (Initial calibration)	Hg	2.48ug/L	2.5ug/L	99.2%R	99.2%R	↓
CCV 11:34	ICP (Continuing calibration)	V	505.3ug/L	500 ug/L	101.1%R	101.1%R	↓
CCV 10:04	ICP/MS (Continuing calibration)	Tl	25.94ug/L	25ug/L	103.8%R	103.8%R	↓
CCV 9:32	CVAA (Contining calibration)	Hg	0.95ug/L	1ug/L	95%R	95%R	↓
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: ______________________________

LDC #: 36425D4a

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICS AB 11:31	ICP interference check	Co	466 ug/L	500 ug/L	93.2%R	93.2%R	Y
LCS 9:20	Laboratory control sample	Hg	1.06 ug/L	1 ug/L	106%R	106%R	↓
MS 11:59	Matrix spike	Pb	(SSR-SR) 153.2ug/L	150 ug/L	102%R	102%R	
DUP 11:56	Duplicate	K	3.40 mg/L	3.36 mg/L	1%RPD	1%RPD	
SER 12:07	ICP serial dilution	Na	78.48 mg/L	82.69 mg/L	5%D	5%D	

Comments:

TOTCLC.4SW

LDC #: 36425D4a

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd reviewer: SM

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
[✓ Y] N N/A Are all detection limits below the CRDL?

Detected analyte results for (1) Ca were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In. Vol.)}$

Recalculation:

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

RD = 82.65 mg/L ≈ 82.7 mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	Ca	82.6	82.7	Y*
	2	Sr	0.410	0.410	Y

Note:

LDC Report# 36425D6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 29, 2016

Parameters: Fluoride

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH269

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424A_041416_01_L	8337439	Water	04/14/16
SP-424A_041416_36_L	8337440	Water	04/14/16
SP-424A_041416_01_LDUP	8337439DUP	Water	04/14/16
SP-424A_041416_01_LMS	8337439MS	Water	04/14/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Fluoride by Environmental Protection Agency (EPA) Method 300.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicates

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples SP-424A_041416_01_L and SP-424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD (Limits)	Flag	A or P
	SP-424A_041416_01_L	SP-424A_041416_36_L			
Fluoride	1.9	2.0	5 (≤35)	-	-

X. Sample Result Verification

All sample result verifications were acceptable.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Fluoride - Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Fluoride - Laboratory Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Fluoride - Field Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

LDC #: 36425D6
SDG #: PH269
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/28/16
Page: 1 of 1
Reviewer: SD
2nd Reviewer:

METHOD: (Analyte) Fluoride (EPA Method 300.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/14/16
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS=(4)
VII.	Duplicate sample analysis	A	DUP
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	FD= (1,2)
X.	Sample result verification	A	
XI	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-424A_041416_01_L	8337439	Water	04/14/16
2	SP-424A_041416_36_L	8337440	Water	04/14/16
3	SP-424A_041416_01_LDUP	8337439DUP	Water	04/14/16
4	#1 MS			
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36425D6

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JD
2nd Reviewer: SM

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients > 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) < 20% for waters and < 35% for soil samples? A control limit of < CRDL(< 2X CRDL for soil) was used for samples that were < 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 30425D6

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC#: 36425D6

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

Inorganics, Method See Cover

Analyte	Concentration (mg/L)		RPD (≤35)	Qualification (Parent only)
	1	2		
Fluoride	1.9	2.0	5	

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LDC #: 36425A0

Validation Findings Worksheet

Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JS
2nd Reviewer: SM

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of F was recalculated. Calibration date: 4/2/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100 / True

Where,
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	F	s1	0.0	0	*0.999925*	0.999929	Y*
		s2	0.1	0.0205			
		s3	0.4	0.0735			
		s4	1	0.18			
		s5	2	0.3534			
		s6	3	0.5352			
ICV 17:12 Calibration verification	↓	Found 0.774 mg/L	True 0.75 mg/L		103%R	NR	Y
CCV 13:57 Calibration verification	↓	0.78 mg/L	0.75 mg/L		96%R	NR	↓
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

*Rounding

LDC #: 36425D6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JSP
2nd Reviewer: Sm

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where,
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS 11:16	Laboratory control sample	F	0.689 mg/L	0.75 mg/L	92%R	91%R	Y*
MS 15:19	Matrix spike sample		(SSR-SR) 5.198 mg/L	5 mg/L	104%R	104%R	Y
DUP 14:52	Duplicate sample		1.949 mg/L	1.921 mg/L	1%RPD	2%RPD	Y*

Comments: *Rounding

LDC #: 36425D6

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?
[✓ Y] N N/A Are all detection limits below the CRQL?

Compound (analyte) results for (1) F reported with a positive detect were recalculated and verified using the following equation:

Concentration = $\frac{A-0.002}{0.177}$

Recalculation: $\left(\frac{0.07-0.002}{0.177}\right)\times5 = 1.9$ mg/L

A = 0.07
Dil = 5

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	F	1.9	1.9	Y
	2	↓	2.0	2.1	Y*

Note: *Rounding

LDC Report# 36425D87

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Perchlorate

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH269

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424A_041416_01_L	8337439	Water	04/14/16
SP-424A_041416_36_L	8337440	Water	04/14/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perchlorate by Environmental Protection Agency (EPA) SW 846 Method 6850

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance check was performed prior to initial calibration.

All perchlorate ion signal to noise ratio requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

The isotope ratios were within QC limits.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 15.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 15.0%.

The percent differences (%D) of the limit of detection verification (LODV) standard were less than or equal to 30.0%.

The isotope ratios were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples SP-424A_041416_01_L and SP-424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria.

XII. Target Compound Identifications

All target compound identifications were within validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Perchlorate - Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Perchlorate - Laboratory Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Perchlorate - Field Blank Data Qualification Summary - SDG PH269

No Sample Data Qualified in this SDG

LDC #: 36425D87
SDG #: PH269
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 06/17/18
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: SA

METHOD: LC/MS Perchlorate (EPA SW846 Method 6850)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A, A	r^2 ICV ≤ 15%
IV.	Continuing calibration	A	CCV ≤ 15% LODV ≤ 30%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	N	
VIII.	Matrix spike/Matrix spike duplicates	~~N~~ A	cs SP-424C_041316_01_L
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	ND	D = 1/2
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-424A_041416_01_L	8337439	Water	04/14/16
2	SP-424A_041416_36_L	8337440	Water	04/14/16
3				
4				
5				
6				
7				
8				
9				

Notes:

	PBLK25112						

LDC #: 36425D87

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer: Sm

Method: Perchlorate (EPA SW 846 Method 6850)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	✓			
Were the Perchlorate ions within ±0.3 m/z of mass 99,101 and 107?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?			✓	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Was the isotope ratio of ^{35}Cl/^{37}Cl or m/z 99/101 within 2.3 to 3.8?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 15%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) of the mid-range continuing calibration ≤ 15%?	✓			
Were all percent differences (%D) of the low-range continuing calibration ≤ 50%?	✓			
Was the isotope ratio of ^{35}Cl/^{37}Cl or m/z 99/101 within 2.3 to 3.8?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 36425D87

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?.		✓		
XI. Internal standards				
Were internal standard area counts within ± 50% of the associated calibration standard?	✓			
Were retention times of m/z 89 ($Cl^{18}O_3^-$) within 0.2 minutes of m/z 83 (ClO_3^-)?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within 0.98 to 1.02?	✓			
Was the isotope ratio of $^{35}Cl/^{37}Cl$ or m/z 99/101 within 2.3 to 3.8?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC # 36425D87

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LCMS Perchlorate (EPA SW 846 Method 6850)

Parameter: Perchlorate

Order of regression: Linear

Date	Instrument	Compound	Points	y Response ratio	x Conc ratio
26-Apr-16	MS5P11616	Perchlorate	Point 1	0.1386	0.040
			Point 2	0.3517	0.100
			Point 3	0.7130	0.200
			Point 4	1.4656	0.400
			Point 5	3.9184	1.000
			Point 6	10.7827	2.500

Regression Output: Regression Output:			Reported	
Constant	c =	-0.17043	c =	-0.0604
Std Err of Y Est		0.04		
R Squared	r^2 =	0.99869	r^2 =	0.99666
No. of Observations		6.00		
Degrees of Freedom		5.00		
X Coefficient(s)	m =	0.23023	m =	0.41820
Std Err of Coef.	0.01			

041616 CLO4 L

LDC#: 36425D87

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: LCMS Perchlorate (EPA SW 846 Method 6850)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	CCV Conc	Reported Conc	Recalculated Conc	Reported % D	Recalculated %D
1	ms5P11616032 lodv	4/26/2016	Perchlorate	0.40	0.50	0.50	25.00	25.00

LDC #: 36425D87

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850/6860)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS 25112

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
Perchlorate	5.00	NA	5.39	NA	108	108				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC Report# 36425F22

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Gross Alpha & Beta

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30179860

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02D_040616_01_L	30179860001	Water	04/06/16
SP-T02D_040616_36_L	30179860002	Water	04/06/16
SP-T02B_041216_01_L	30179860003	Water	04/12/16
SP-T02C_04122016_01_L	30179860004	Water	04/12/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gross Alpha and Beta by Environmental Protection Agency (EPA) Method 900.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP-T02D_040616_01_L and SP-T02D_040616_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD (Limits)	Flag	A or P
	SP-T02D_040616_01_L	SP-T02D_040616_36_L			
Gross alpha	19.6	14.8	28 (≤35)	-	-
Gross beta	8.74	9.15	5 (≤35)	-	-

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Laboratory Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Field Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

LDC #: 36425F22

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/16/16

SDG #: 30179860

Page: 1 of 1

Laboratory: Pace Analytical Services, Inc.

Reviewer:

2nd Reviewer:

METHOD: Gross Alpha & Beta (EPA SW846 Method 900.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	CS
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	(1,2)
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-T02D_040616_01_L	30179860001	Water	04/06/16
2	SP-T02D_040616_36_L	30179860002	Water	04/06/16
3	SP-T02B_041216_01_L	30179860003	Water	04/12/16
4	SP-T02C_04122016_01_L	30179860004	Water	04/12/16
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36123F22

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer: SM

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) <1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36425F22

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: CR
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC# 36425F22

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

Radiochemistry, Method see cover

Isotope	Activity (pCi/L)		RPD (≤35)	Qual (Parent Only)
	1	2		
Gross Alpha	19.6	14.8	28	
Gross Beta	8.74	9.15	5	

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LDC #: 36425F22

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer: PG

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

					Recalculated	Reported	
Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	%R or RPD	%R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Gross α	11.303	15.885	71.16	71.16	Y
N	Matrix spike sample						
N	Duplicate RPD						
N	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425F22

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer:

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for Gross α reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm} - \text{background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

1 = ~~0.25-0.06 / 2.22(0.0448)(0.111)~~ = 17a

0.505 - 0.061 / 2.22(0.12031)(0.0847) = 19.63 pCi/L

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	Gross α	19.6	19.6	Y
	2	↓	14.8	14.8	Y
	~~3~~	~~Gross β~~			
	~~4~~	~~↓~~ a			

Note:

RECALC.35

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Tritium

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30179860

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02D_040616_01_L	30179860001	Water	04/06/16
SP-T02D_040616_36_L	30179860002	Water	04/06/16
SP-T02B_041216_01_L	30179860003	Water	04/12/16
SP-T02C_04122016_01_L	30179860004	Water	04/12/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Tritium by Environmental Protection Agency (EPA) Method 906.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

Quench curves were generated for each sample when applicable.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP-T02D_040616_01_L and SP-T02D_040616_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD (Limits)	Flag	A or P
	SP-T02D_040616_01_L	SP-T02D_040616_36_L			
Tritium	1272	1219	4 (≤35)	-	-

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Tritium - Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Tritium - Laboratory Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Tritium - Field Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

LDC #: 36425F34

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/16/16

SDG #: 30179860

Page: 1 of 1

Laboratory: ~~Test America, Inc.~~ Pace Analytical Services Inc.

Reviewer:

2nd Reviewer:

METHOD: Tritium (EPA Method 906.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration	A	
III.	Calibration verification	A	✓ Quench curve
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	Not required
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	(1,2)
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-T02D_040616_01_L	30179860001	Water	04/06/16
2	SP-T02D_040616_36_L	30179860002	Water	04/06/16
3	SP-T02B_041216_01_L	30179860003	Water	04/12/16
4	SP-T02C_04122016_01_L	30179860004	Water	04/12/16
5				
6				
7				
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12				
13				
14				

Notes:

LDC #: 36425F34

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: OZ
2nd Reviewer: Sm

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) <1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 30425F34

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: OL
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC# 36425F34

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

Radiochemistry, Method see cover

Isotope	Activity (pCi/L)		RPD (≤35)	Qual (Parent Only)
	1	2		
Tritium	1272	1219	4	

LDC #: 36425F34

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	H-3	2235.11	2375.81	94.08	94.08	Y
N	Matrix spike sample						
N	Duplicate RPD						
N	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425F34

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for H-3 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

Recalculation:

$$\#1 = \frac{6.6-2.2}{2.22(0.164)(0.01)(0.9967)(0.953)} = 1272.3\,pCi/L$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	H-3	1272	1272	y
	2	↓	1219	1219	↓
	3	↓	802	802	↓
	4	↓	520	520	↓

Note:

LDC Report# 36425F35

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Gamma Spectroscopy

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30179860

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02D_040616_01_L	30179860001	Water	04/06/16
SP-T02D_040616_36_L	30179860002	Water	04/06/16
SP-T02B_041216_01_L	30179860003	Water	04/12/16
SP-T02C_04122016_01_L	30179860004	Water	04/12/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gamma Spectroscopy by Environmental Protection Agency (EPA) Method 901.1

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP-T02D_040616_01_L and SP-T02D_040616_36_L were identified as field duplicates. No results were detected in any of the samples.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GWs
Gamma Spectroscopy - Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gamma Spectroscopy - Laboratory Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gamma Spectroscopy - Field Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

LDC #: 36425F35

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/16/16
SDG #: 30179860
Page: 1 of 1
Laboratory: Pace Analytical Services, Inc.
Reviewer:
2nd Reviewer:

METHOD: Gamma Spectroscopy (EPA Method 901.1)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	Duplicates	N	↓
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	(1,2)
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-T02D_040616_01_L	30179860001	Water	04/06/16
2	SP-T02D_040616_36_L	30179860002	Water	04/06/16
3	SP-T02B_041216_01_L	30179860003	Water	04/12/16
4	SP-T02C_04122016_01_L	30179860004	Water	04/12/16
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 36425F35

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: OL
2nd Reviewer: Sm

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) <1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?	✓			
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36425F35

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.		✓		
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36425F35

VALIDATION FINDINGS WORKSHEET

Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	Cs-137	90.351	85.355	105.9	105.9	Y
N	Matrix spike sample						
N	Duplicate RPD						
N	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36125T3S

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______________________ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{\text{(cpm - background)}}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

all ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note:____

LDC Report# 36425F59

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Isotopic Uranium

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30179860

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02D_040616_01_L	30179860001	Water	04/06/16
SP-T02D_040616_36_L	30179860002	Water	04/06/16
SP-T02B_041216_01_L	30179860003	Water	04/12/16
SP-T02C_04122016_01_L	30179860004	Water	04/12/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Isotopic Uranium by the Health and Safety Laboratory (HASL) Method 300

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA) with the following exceptions:

Blank ID	Isotope	Activity	Associated Samples
PB (prep blank)	Uranium-233/234 Uranium-235 Uranium-238	0.101 pCi/L 0.058 pCi/L 0.075 pCi/L	All samples in SDG 30179860

Sample activities were compared to activities detected in the laboratory blanks. The sample activities were either not detected or were significantly greater (>5X blank activity) than the activities found in the associated laboratory blanks with the following exceptions:

Sample	Isotope	Reported Activity	Modified Final Activity
SP-T02C_04122016_01_L	Uranium-235	0.125 pCi/L	0.125U pCi/L

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP-T02D_040616_01_L and SP-T02D_040616_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD (Limits)	Flag	A or P
	SP-T02D_040616_01_L	SP-T02D_040616_36_L			
Uranium-233/234	4.77	4.90	3 (≤35)	-	-
Uranium-235	0.398	0.298	29 (≤35)	-	-
Uranium-238	4.63	4.83	4 (≤35)	-	-

X. Tracer Recovery

All tracer recoveries were within validation criteria with the following exceptions:

Sample ID	Tracer Isotope	%R (Limits)	Affected Isotope	Flag	A or P
SP-T02B_041216_01_L	Uranium-232	23.94 (30-110)	All isotopic uranium	J (all detects) UJ (all non-detects)	P

XI. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to tracer recovery %R, data were qualified as estimated in one sample.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Isotopic Uranium - Data Qualification Summary - SDG 30179860

Sample	Isotope	Flag	A or P	Reason (Code)
SP-T02B_041216_01_L	All isotopic uranium	J (all detects) UJ (all non-detects)	P	Tracer recovery (%R) (*X)

Santa Susana Field Laboratory, GW
Isotopic Uranium - Laboratory Blank Data Qualification Summary - SDG 30179860

Sample	Isotope	Modified Final Activity	A or P	Code
SP-T02C_04122016_01_L	Uranium-235	0.125U pCi/L	A	B

Santa Susana Field Laboratory, GW
Isotopic Uranium - Field Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

LDC #: 36425F59

SDG #: 30179860

Laboratory: Pace Analytical Services, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/16/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Isotopic Uranium (HASL-300)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	SW	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	(1,2)
X.	Tracer Recovery	SW	
XI.	Minimum detectable activity (MDA)	A	
XII.	Sample result verification	A	
XIII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-T02D_040616_01_L	30179860001	Water	04/06/16
2	SP-T02D_040616_36_L	30179860002	Water	04/06/16
3	SP-T02B_041216_01_L	30179860003	Water	04/12/16
4	SP-T02C_04122016_01_L	30179860004	Water	04/12/16
5				
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11				
12				
13				
14				
15				

Notes:

LDC #: 36425F59

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer: SM

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) <1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?		✓		
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?				

LDC #: 36425F59

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: OL
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36425F59

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: a
2nd Reviewer: F

METHOD: Radiochemistry, Method See Cover

Conc. units: pCi/L **Associated Samples:** All (Reason: B)

Isotope	Blank ID	Blank Action Limit	Sample Identification										
	PB		4										
U-233/234	0.101	0.505											
U-235	0.058	0.29	0.125										
U-238	0.075	0.375											

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC# 36425F59

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

Radiochemistry, Method see cover

Isotope	Activity (pCi/L) 1	Activity (pCi/L) 2	RPD (≤35)	Qual (Parent Only)
U-233/234	4.77	4.90	3	
U-235	0.398	0.298	29	
U-238	4.63	4.83	4	

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\36425F59.wpd

LDC #: 3642SF54

VALIDATION FINDINGS WORKSHEET
Sample Chemical Recovery

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a tracer/carrier added to each sample?

Y [✓ N] N/A Were tracer/carrier recoveries within the control limits?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Tracer/~~Carrier~~	%R (limits)	Associated Isotopes	Associated Samples	Qualifications
	U-232	23.94 (30-110)	All isotopic U	3	J/UJ/P (Det/ND)

Comments:

SAM-CHEM.35

LDC #: 36425F59

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable
					%R or RPD	%R or RPD	(Y/N)
LCS	Laboratory control sample	U-234	9.06	8.781	103.18	103.18	Y
N	Matrix spike sample						
N	Duplicate RPD						
1	Chemical recovery	U-232	4.9127	10.4419	47.05	47.05	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425F5A

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for U-233/234 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

Recalculation:

$$1 = 0.683 / 2.22(0.4705)(0.2723)(0.5034) = 4.77\ pCi/L$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	U-233/234	4.77	4.77	Y
	2	~~U-298~~ U-235	0.298	0.298	↓
	3	U-238	0.384	0.384	
	4	U-235	0.125	0.125	

Note:

LDC Report# 36425F61

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Strontium-90

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30179860

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-T02D_040616_01_L	30179860001	Water	04/06/16
SP-T02D_040616_36_L	30179860002	Water	04/06/16
SP-T02B_041216_01_L	30179860003	Water	04/12/16
SP-T02C_04122016_01_L	30179860004	Water	04/12/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Strontium-90 by American Society for Testing and Material (ASTM) D5811-95

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP-T02D_040616_01_L and SP-T02D_040616_36_L were identified as field duplicates. No results were detected in any of the samples.

X. Carrier Recovery

All carrier recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Strontium-90 - Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Strontium-90 - Laboratory Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Strontium-90 - Field Blank Data Qualification Summary - SDG 30179860

No Sample Data Qualified in this SDG

LDC #: 36425F61

SDG #: 30179860

Laboratory: Pace Analytical Services, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/16/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Strontium-90 (ASTM D5811-95)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A,A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	(1,2)
X.	Carrier recovery	A	
XI.	Minimum detectable activity (MDA)	A	
XII.	Sample result verification	A	
XIII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-T02D_040616_01_L	30179860001	Water	04/06/16
2	SP-T02D_040616_36_L	30179860002	Water	04/06/16
3	SP-T02B_041216_01_L	30179860003	Water	04/12/16
4	SP-T02C_04122016_01_L	30179860004	Water	04/12/16
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 36425F6

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) ≤1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?	✓			
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 30425F61

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.		✓		
XI. Field blanks				
Field blanks were identified in this SDG.			✓	
Target analytes were detected in the field blanks.			✓	

LDC #: 36421F81

VALIDATION FINDINGS WORKSHEET

Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	Sr-90	18.38	16.711	109.99	109.99	Y
✓	Matrix spike sample						
✓	Duplicate RPD						
1	Chemical recovery	Sr	11.5	12.22	94.11	94.11	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36425F61

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: sm

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______________________ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm} - \text{background})}{2.22 \times E \times SA \times Vol}$$

Recalculation:

All ND

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note:

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099
LDC

CDM
555 17th Street, Suite 1100
Denver, CO 80202
ATTN: Mrs. Cherie Zakowski

June 29, 2016

SUBJECT: Santa Susana Field Laboratory, GW, Data Validation

Dear Mrs. Zakowski,

Enclosed is the final validation report for the fractions listed below. This SDG was received on June 1, 2016. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #36433:

SDG #	**Fraction**
PH270	1,4-Dioxane, Metals, Fluoride, TPH as Gasoline, Perchlorate

The data validation was performed under Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1, December 2010
- USEPA Contract Laboratory Program National Functional Guidelines, CLPNFG, for Superfund Organic Data Review, June 2008
- USEPA Contract Laboratory Program National Functional Guidelines, CLPNFG, for Inorganic Superfund Data Review, January 2010
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Shauna McKellar
Project Manager/Chemist

497 pages-CD

Attachment 1

Level IV EDD

LDC #36433 (CDM Federal Programs-Chantilly VA / Santa Susana Field Laboratory, GW)

LDC	SDG#	DATE REC'D	(4) DATE DUE	1,4-Dioxane (8260C-S)		Metals SW846		TPH-G (8015B)		CLO$_4$ (6850)		F (300.0)																									
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	PH270	06/01/16	06/29/16	3	0	2	0	3	0	2	0	2	0																										
Total	T/SM			3	0	2	0	3	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12

Shaded cells indicate Level IV validation (all other cells are ADR review). These sample counts do not include MS/MSD, and DUPs

L:\CDM\SSFL\ETEC GW\36433ST-Eurofins.wpd

LDC Report# 36433A1b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: 1,4-Dioxane

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH270

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-19A_041916_01_L	8344299	Water	04/19/16
SP-19B_041916_01_L	8344300	Water	04/19/16
TB_041916	8344301	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8260B in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB_041916 was identified as a trip blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
1,4-Dioxane - Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
1,4-Dioxane - Field Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

LDC #: 36433A1b
SDG #: PH270
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/21/16
Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8260B-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	% RSD ≤ 15 ICV ≤ 20
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 3
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCS /D
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-19A_041916_01_L	8344299	Water	04/19/16
2	SP-19B_041916_01_L	8344300	Water	04/19/16
3	TB_041916	8344301	Water	04/19/16
4				
5				
6				
7				
8				
9				

Notes:

	VBLKE39						

LDC #: 36433A1b

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: FT
2nd Reviewer: Sm

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			✓	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?		✓		
Were all percent relative standard deviations (%RSD) ≤ 30%/15% and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			✓	
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target compounds detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

LDC #: 36433A1b

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: FT
2nd Reviewer: YM

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.			✓	
Was a MS/MSD analyzed every 20 samples of each matrix?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within + 30 seconds of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methyl cyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

LDC #: 36433A1b

VALIDATION FINDINGS WORKSHEET

Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GCMS 8260B

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 std)	Recalculated (RRF 10 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	3/11/2016	1,4 Dioxane	1.2758	1.2758	1.2762	1.2762	4.0	4.0

LDC #: 36433A1b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound,
C_x = Concentration of compound,
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	ccv 21:17	~~3/11/16~~ FT 4/25/16	1,4- Dioxane (IS1)	1.2762	1.3640	1.3640	7	7
			(IS2)					
			(IS3)					
			(IS4)					
			(IS5)					
2			(IS1)					
			(IS2)					
			(IS3)					
			(IS4)					
			(IS5)					
3								
4								

LDC #: 36433A1b

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: FT
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8	10.0	9.785	98	98	0
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 36433A1b

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GC/MS VOA (EPA Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA   Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)   LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: LCS/D E39

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,4-Dioxane ~~1,1-Dichloroethene~~	5.0	5.0	4.78	5.09	96	96	102	102	6	6
Trichloroethene										
Benzene										
Toluene										
~~Chlorobenzene~~										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 34433A1b

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: FT
2nd reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured
A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
I_s = Amount of internal standard added in nanograms (ng)
RRF = Relative response factor of the calibration standard.
V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).
Df = Dilution factor.
%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. LCSE39 1,4-Dioxane

Conc. = $\frac{(8468)(10)}{(13885)(1.2762)}$

= 4.78 ug/L

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Metals

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH270

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-19A_041916_01_L	8344299	Water	04/19/16
SP-19B_041916_01_L	8344300	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010C/6020A
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Level IV evaluation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	04/26/16 (09:59)	Strontium	68.0 (80-120)	All samples in SDG PH270	J (all detects)	P
ICSAB	04/26/16 (10:53)	Strontium	64.0 (80-120)	All samples in SDG PH270	J (all detects)	P

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Magnesium	117.760 ug/L 18.420 ug/L	All samples in SDG PH270
ICB/CCB	Aluminum Chromium Cobalt Copper Titanium	53.6 ug/L 1.1 ug/L 0.73 ug/L 1.7 ug/L 0.21 ug/L	All samples in SDG PH270

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SP-19A_041916_01_L	Chromium Cobalt Copper	0.0048 mg/L 0.00095 mg/L 0.0079 mg/L	0.0048U mg/L 0.00095U mg/L 0.0079U mg/L
SP-19B_041916_01_L	Chromium	0.0024 mg/L	0.0024U mg/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICP %R, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Metals - Data Qualification Summary - SDG PH270

Sample	Analyte	Flag	A or P	Reason (Code)
SP-19A_041916_01_L SP-19B_041916_01_L	Strontium	J (all detects)	P	ICP interference check sample (%R) (I)

Santa Susana Field Laboratory, GW
Metals - Laboratory Blank Data Qualification Summary - SDG PH270

Sample	Analyte	Modified Final Concentration	A or P	Code
SP-19A_041916_01_L	Chromium Cobalt Copper	0.0048U mg/L 0.00095U mg/L 0.0079U mg/L	A	B
SP-19B_041916_01_L	Chromium	0.0024U mg/L	A	B

Santa Susana Field Laboratory, GW
Metals - Field Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

LDC #: 36433A4a
SDG #: PH270
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 6/27/16
Page: 1 of 1
Reviewer: JD
2nd Reviewer: SM

METHOD: Metals (EPA SW 846 Method 6010C/6020A/7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/19/16
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	N	CS
VIII.	Duplicate sample analysis	N	
IX.	Serial Dilution	N	Not Performed
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	A	
XIV.	Overall Assessment of Data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-19A_041916_01_L	8344299	Water	04/19/16
2	SP-19B_041916_01_L	8344300	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 26433A4a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.			✓	
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 36433A4a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36423A4a

VALIDATION FINDINGS WORKSHEET

Sample Specific Element Reference

Page: 1 of 1
Reviewer: JVD
2nd reviewer: SM

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-2	W	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, Li, Zr, Sr
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, Li, Zr
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, Sr
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: Mercury by CVAA if performed

LDC #: 36433A4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were ICP interference check samples performed as required?
Y [✓ N] N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	04/26/16	ICSAB (9:59)	Sr	68.0	All	J/UJ/P (det) (I)
	04/26/16	ICSAB (10:53)	Sr	64.0	All	J/UJ/P (det) (I)

Comments:

LDC #: 36433A4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 864 Method 6010/6020/7000)
Soil preparation factor applied:
Sample Concentration units, unless otherwise noted: mg/L
Associated Samples: All (8)

					Sample Identification									
Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit	1	2								
Al			53.6	0.268000										
Ca		117.760		0.588800										
Cr			1.1	0.005500	0.0048	0.0024								
Co			0.73	0.003650	0.00095									
Cu			1.7	0.008500	0.0079									
Mg		18.420		0.092100										
Ti			0.21	0.001050										

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 36433A4a

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Trace Metals (See cover)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV 11:13	ICP (Initial calibration)	Al	30027ug/L	30000ug/L	100.1%R	100.1%R	Y
ICV 9:48	ICP/MS (Initial calibration)	Se	50.12ug/L	50 ug/L	100.2%R	100.2%R	↓
ICV 5:17	CVAA (Initial calibration)	Hg	2.48ug/L	2.5ug/L	99.2%R	99.2%R	
CCV 12:17	ICP (Continuing calibration)	Sb	480ug/L	500ug/L	96.0%R	96.0%R	
CCV 10:33	ICP/MS (Continuing calibration)	Ag	25.85ug/L	25ug/L	103.4%R	103.4%R	
CCV 9:57	CVAA (Contining calibration)	Hg	0.94ug/L	1ug/L	94.0%R	94.0%R	
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments:

LDC #: 36433A4a

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICS AB 11:31	ICP interference check	As	100.3 ug/L	100 ug/L	100.3%R	100.3%R	Y
LCS 9:20	Laboratory control sample	Hg	1.06 ug/L	1 ug/L	106%R	106%R	Y
N	Matrix spike		(SSR-SR)				
N	Duplicate						
N	ICP serial dilution						

Comments:

TOTCLC.4SW

LDC #: 30433A4a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JSD
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
[✓ Y] N N/A Are all detection limits below the CRDL?

Detected analyte results for (1) Ca were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In. Vol.)}$

Recalculation:

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

RD= 215 mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	Ca	215	215	Y
	2	Sr	0.789	0.789	Y

Note:

LDC Report# 36433A6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Fluoride

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH270

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-19A_041916_01_L	8344299	Water	04/19/16
SP-19B_041916_01_L	8344300	Water	04/19/16
SP-19A_041916_01_LMS	8344299MS	Water	04/19/16
SP-19A_041916_01_LDUP	8344299DUP	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Fluoride by Environmental Protection Agency (EPA) Method 300.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicates

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

All sample result verifications were acceptable.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Fluoride - Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Fluoride - Laboratory Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Fluoride - Field Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

LDC #: 36433A6
SDG #: PH270
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/27/16
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: (Analyte) Fluoride (EPA Method 300.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/19/16
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS= (3)
VII.	Duplicate sample analysis	A	DUP
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Sample result verification	A	
XI	Overall assessment of data	A	

Note:				
	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP-19A_041916_01_L	8344299	Water	04/19/16
2	SP-19B_041916_01_L	8344300	Water	04/19/16
3	SP-19A_041916_01_LMS	8344299MS	Water	04/19/16
4	SP-19A_041916_01_LDUP	8344299DUP	Water	04/19/16
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36433A10

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients > 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) < 20% for waters and < 35% for soil samples? A control limit of < CRDL(< 2X CRDL for soil) was used for samples that were < 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 36433A10

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36433A6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of F was recalculated.Calibration date: 4/2/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where,

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	F	s1	0.0	0	0.999925	0.999929	Y*
		s2	0.1	0.0205			
		s3	0.4	0.0735			
		s4	1	0.18			
		s5	2	0.3534			
		s6	3	0.5352			
ICV 17:12 Calibration verification		Found 0.774 mg/L	True 0.75 mg/L		103%R	NR	Y
CCV 2:44 Calibration verification		0.751 mg/L	0.75 mg/L		100%R	NR	Y
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

* Rounding

LDC #: 36433A6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100   Where,   Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / ((S+D)/2) x 100   Where,   S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS 11:43	Laboratory control sample	F	0.729mg/L	0.75mg/L	97%R	97%R	Y
MS 2:16	Matrix spike sample		(SSR-SR) 4.63mg/L	5mg/L	93%R	92%R	
DUP 1:49	Duplicate sample		1.07mg/L	1.13mg/L	5%RPD	5%RPD	

Comments:

LDC #: 36433A6

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?
[✓ Y] N N/A Are all detection limits below the CRQL?

Compound (analyte) results for (1) F reported with a positive detect were recalculated and verified using the following equation:

Concentration = $\frac{A - 0.002}{0.177}$

A = 0.042

Recalculation: $\left(\frac{0.042 - 0.002}{0.177}\right) \times 5 = 1.1$ mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	F	1.1	1.1	Y
	2	↓	0.75	0.76	Y*

Note: *Rounding

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH270

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-19A_041916_01_L	8344299	Water	04/19/16
SP-19B_041916_01_L	8344300	Water	04/19/16
TB_041916	8344301	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Petroleum Hydrocarbons (TPH) as Gasoline by Environmental Protection Agency (EPA) SW 846 Method 8015B

All sample results were subjected to Level IV data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0%.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

Sample TB_041916 was identified as a trip blank. No contaminants were found.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

All compound quantitations met validation criteria.

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

LDC #: 36433A7

SDG #: PH270

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/21/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: GC TPH as Gasoline (EPA SW 846 Method 8015B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A / A	% RSD / ICV ≤ 20
III.	Continuing calibration	A	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	TB = 3
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	A	LCS / D
IX.	Field duplicates	N	
X.	Compound quantitation RL/LOQ/LODs	A	
XI.	Target compound identification	A	
XII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-19A_041916_01_L	8344299	Water	04/19/16
2	SP-19B_041916_01_L	8344300	Water	04/19/16
3	TB_041916	8344301	Water	04/19/16
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

	16117B20A							

LDC #: 36433A7

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: FR
2nd Reviewer: SM

Method: [✓ GC] HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?		✓		
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?		✓		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.			✓	
Was a MS/MSD analyzed every 20 samples of each matrix?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 36433A7

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: FT
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 36433A7

VALIDATION FINDINGS WORKSHEET

Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GC X GC Method 8015C TPH Gasoline

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported 550	Recalculated 550	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	1/3/2150	Gasoline	3928.724	3928.724	3827.346	3827.346	10.0	10.0
	PT2 Luft 20246								

LDC #: 3643307

VALIDATION FINDINGS WORKSHEET

Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GC ✓ HPLC ____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF -CF)/ave.CF

Where:
ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

					Reported	Recalculated	Reported	Recalculated
#	**Standard ID**	**Calibration Date**	**Compound**	**Average CF(ICAL)/ CCV Conc.**	**CF/ Conc. CCV**	**CF/ Conc. CCV**	**%D**	**%D**
1	ccv 1627	4/27/16	GRO	1100.60	1097.84	1097.84 FT	0	0
2								
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36433A7

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

Page: 1 of 1
Reviewer: FT
2nd reviewer:

METHOD: [✓ GC] ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
TFT		30.0	28.1736	94	94	0

Sample ID: ___

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	2-Bromonaphthalene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin	AA	Chloro-octadecane
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin	BB	2,4-Dichlorophenylacetic acid
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate	CC	2,5-Dibromotoluene
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #: 36433A7

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: [✓ GC] ___HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC/SA)
RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100

Where SSC = Spiked sample concentration
LCS = Laboratory Control Sample
SA = Spike added
LCSD = Laboratory Control Sample duplicate

LCS/LCSD samples: Lcs/D

Compound		Spike Added (ug/L)		Spike Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
		LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline	(8015)	1100	1100	983.5	980.36	89	89	89	89	0	0
Diesel	(8015)										
Benzene	(8021B)										
Methane	(RSK-175)										
2,4-D	(8151)										
Dinoseb	(8151)										
Naphthalene	(8310)										
Anthracene	(8310)										
HMX	(8330)										
2,4,6-Trinitrotoluene	(8330)										
Phorate	(8141A)										
Malathion	(8141A)										
Formaldehyde	(8315A)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36433A7

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: ✓ **GC** __ **HPLC**

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs\ or\ Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound In the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. LCS Compound Name GRO

Concentration = (3872431 - 108558) / F7 ~~1100.6~~ 3827.0 =

= 983 ug/L

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: June 27, 2016

Parameters: Perchlorate

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH270

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-19A_041916_01_L	8344299	Water	04/19/16
SP-19B_041916_01_L	8344300	Water	04/19/16
SP-19A_041916_01_LMS	8344299MS	Water	04/19/16
SP-19A_041916_01_LMSD	8344299MSD	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perchlorate by Environmental Protection Agency (EPA) SW 846 Method 6850

All sample results were subjected to Level IV data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance check was performed as prior to initial calibration.

All perchlorate ion signal to noise ratio requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

The isotope ratios were within QC limits.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 15.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 15.0%.

The percent differences (%D) of the limit of detection verification (LODV) calibration standard were less than or equal to 30.0%.

The isotope ratios were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria.

XII. Target Compound Identifications

All target compound identifications were within validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Perchlorate - Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Perchlorate - Laboratory Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Perchlorate - Field Blank Data Qualification Summary - SDG PH270

No Sample Data Qualified in this SDG

LDC #: 36433A87

VALIDATION COMPLETENESS WORKSHEET

Level IV

SDG #: PH270
Laboratory: Eurofins

Date: 6/21/16
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW846 Method 6850)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	r^2 ICV ≤ 15
IV.	Continuing calibration	A	CCV ≤ 15 LODV ≤ 30
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	N	not required
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-19A_041916_01_L	8344299	Water	04/19/16
2	SP-19B_041916_01_L	8344300	Water	04/19/16
3	SP-19A_041916_01_LMS	8344299MS	Water	04/19/16
4	SP-19A_041916_01_LMSD	8344299MSD	Water	04/19/16
5				
6				
7				
8				
9				

Notes:

	PBLK08117					

LDC #: 36433A87

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: F7
2nd Reviewer:

Method: Perchlorate (EPA SW 846 Method 6850)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	✓			
Were the Perchlorate ions within ±0.3 m/z of mass 99,101 and 107?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%? F7	~~✓~~	✓		
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Was the isotope ratio of $^{35}Cl/^{37}Cl$ or m/z 99/101 within 2.3 to 3.8?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 15%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) of the mid-range continuing calibration ≤ 15%?	✓			
Were all percent differences (%D) of the low-range continuing calibration ≤ 50%?	✓			
Was the isotope ratio of $^{35}Cl/^{37}Cl$ or m/z 99/101 within 2.3 to 3.8?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

LDC #: 36433A87

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: FT
2nd Reviewer: Cph

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?.			✓	
XI. Internal standards				
Were internal standard area counts within ± 50% of the associated calibration standard?	✓			
Were retention times of m/z 89 ($Cl^{18}O_3^-$) within 0.2 minutes of m/z 83 (ClO_3^-)?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within 0.98 to 1.02?	✓			
Was the isotope ratio of $^{35}Cl/^{37}Cl$ or m/z 99/101 within 2.3 to 3.8?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC#: 36433A87
SDG#: per cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Perchlorate (6850)

Calibration Date	System	Compound	Standard	(Y) Response	(X) Concentration
4/27/2016	LCMS MS5P11716	Perchlorate	1	0.141202359	0.4
			2	0.36791282	1
			3	0.679327168	2
			4	1.38163546	4
			5	3.902347418	10
			6	10.40220669	25

Regression Output		*Reported*
Constant	*-0.149181*	*-0.049600*
Std Err of Y Est		
R Squared	*0.999097*	*0.996510*
Degrees of Freedom		
X Coefficient(s)	*0.419097*	*0.405000*
Std Err of Coef.		
Correlation Coefficient	*0.999549*	
Coefficient of Determination (r^2)	*0.999097*	*0.996510*

042716 MS5P11716

LDC #: 36433A87

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850)
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound,
A_{is} = Area of associated internal standard
C_x = Concentration of compound,
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	ccv 18:18	4/26/16	Perchlorate (1st IS)	4.0	4.3	4.3	8.0	8.0
2	ccv 20:37	4/26/16	Perchlorate (1st IS)	0.4	0.51	0.51	28	28
3			(1st IS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36433A87

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850)
The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added

SC = Sample concentation

RPD = I MSC - MSC I * 2/(MSC + MSDC)

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD samples: 3 + 4

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration (ug/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
Perchlorate	5.0	5.0	ND	5.52	5.58	110	110	112	112	1	1

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36433A87

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: lcs08117

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Perchlorate	5.0	NA	5.13	NA	103	103	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36433A87

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: FT
2nd reviewer:

METHOD: LC/MS Perchlorate (EPA SW 846 Method 6850)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured
A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
I_s = Amount of internal standard added in nanograms (ng)
V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i = Volume of extract injected in microliters (ul)
V_t = Volume of the concentrated extract in microliters (ul)
Df = Dilution Factor.
%S = Percent solids, applicable to soil and solid matrices only.
2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. LCS , Perchlorate

Conc. = $\frac{(\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)(\quad)(\quad)(\quad)(\quad)}$

= 5.13 ug/L

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification
	$\frac{68907}{34000}$	= 0.405(X) −0.0496			
	X =	5.13 ug/L			

06/29/16

The attached zipped file contains two files:

File	Format	Description
1) Readme_SSFL_062916.doc	MS Word 2003	A "Readme" file (this document).
2) PH270.EZ.v1.xls	MS Excel 2003	A spreadsheet for the following SDG(s): PH270 36433A

No discrepancies were observed between the hardcopy data packages and the electronic data deliverables during EDD population of validation qualifiers. A 100% verification of the EDD was not performed.

Please contact Shauna McKellar at (760) 827-1100 if you have any questions regarding this electronic data submittal.

LDC Report# 36488A4a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 5, 2016

Parameters: Metals

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH271

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-19A_041916_01_L	8361892	Water	04/19/16
SP-19B_041916_01_L	8361893	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010C/6020A
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Level IV evaluation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	05/10/16 (07:31)	Strontium	70.0 (80-120)	All samples in SDG PH271	J (all detects)	P
ICSAB	05/10/16 (08:38)	Strontium	72.0 (80-120)	All samples in SDG PH271	J (all detects)	P

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Manganese	54.750 ug/L 1.740 ug/L	All samples in SDG PH271
ICB/CCB	Copper	1.9 ug/L	All samples in SDG PH271

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For SP-424C_041316_01_LMS/MSD, no data were qualified for Calcium and Strontium percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

IX. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICS %R, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Metals - Data Qualification Summary - SDG PH271

Sample	Analyte	Flag	A or P	Reason (Code)
SP-19A_041916_01_L SP-19B_041916_01_L	Strontium	J (all detects)	P	ICP interference check sample (%R) (I)

Santa Susana Field Laboratory, GW
Metals - Laboratory Blank Data Qualification Summary - SDG PH271

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Metals - Field Blank Data Qualification Summary - SDG PH271

No Sample Data Qualified in this SDG

LDC #: 36488A4a
SDG #: PH271
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/28/16
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Metals (EPA SW 846 Method 6010C/6020A/7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/19/16
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	A	MS/D=SP-424C_041316_01_LMS/D(SDG:PH273)=Ca, Sr 7
VIII.	Duplicate sample analysis	A	DUP=SP-424C_041316_01_LDUP(SDG:PH273)
IX.	Serial Dilution	A	SER=SP-424C_041316_01_L(SDG: PH273)
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	A	
XIV.	Overall Assessment of Data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-19A_041916_01_L	8361892	Water	04/19/16
2	SP-19B_041916_01_L	8361893	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 36488A4a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.			✓	
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 36488A4a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36488A4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: JO
2nd reviewer: SM

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-2	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,] [✓ Li] [✓ P] [✓ Zr] [✓ Sr]
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, __ __
		Analysis Method
ICP		[✓ Al], [✓ Sb], [✓ As], [✓ Ba], [✓ Be], [✓ Cd], [✓ Ca], [✓ Cr], [✓ Co], [✓ Cu], [✓ Fe], [✓ Pb], [✓ Mg], [✓ Mn], Hg, [✓ Ni], [✓ K], Se, Ag, [✓ Na], Tl, [✓ V], [✓ Zn], [✓ Mo], [✓ B], [✓ Sn], [✓ Ti], [✓ Li] [✓ P] [✓ Zr]
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, [✓ Se], [✓ Ag], Na, [✓ Tl], V, Zn, Mo, B, Sn, Ti, [✓ Sr]
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 36488A4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were ICP interference check samples performed as required?
Y [✓ N] N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	05/10/16	ICSAB (7:31)	Sr	70.0	All	J/UJ/P (det) (I)
	05/10/16	ICSAB (8:38)	Sr	72.0	All	J/UJ/P (det) (I)

Comments:

LDC #: 36488A4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 864 Method 6010/6020/7000)
Soil preparation factor applied: ____
Sample Concentration units, unless otherwise noted: mg/L
Associated Samples: All (B)

					Sample Identification									
Analyte	**Maximum PB[a] (mg/Kg)**	**Maximum PB[a] (ug/L)**	**Maximum ICB/CCB[a] (ug/L)**	**Blank Action Limit (mg/L)**	No Qual.									
Ca		54.750		0.273750										
Cu			1.9	0.009500										
Mn		1.740		0.008700										

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 36488A4a

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (See cover)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found / True x 100

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV 17:50	ICP (Initial calibration)	Al	30497 ug/L	30000 ug/L	101.7 %R	101.7 %R	Y
ICV 7:19	ICP/MS (Initial calibration)	Ag	51.97 ug/L	50 ug/L	103.9 %R	103.9 %R	↓
ICV 6:12	CVAA (Initial calibration)	Hg	2.47 ug/L	2.5 ug/L	98.8 %R	98.8 %R	
CCV 18:10	ICP (Continuing calibration)	Sb	491.3 ug/L	500 ug/L	98.3 %R	98.3 %R	
CCV 7:36	ICP/MS (Continuing calibration)	Tl	26.32 ug/L	25 ug/L	105.3 %R	105.3 %R	
CCV 9:16	CVAA (Contining calibration)	Hg	1.01 ug/L	1 ug/L	101 %R	101 %R	
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments:

LDC #: 36488A4c

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICS AB 18:06	ICP interference check	Zn	994.4 ug/L	1000ug/L	99.4%R	99.4%R	Y
LCS 9:20	Laboratory control sample	Hg	0.921 ug/L	1ug/L	92%R	92%R	↓
MS 18:32	Matrix spike	Cd	(SSR-SR) 49.2 ug/L	50 ug/L	98%R	98%R	↓
DUP 18:29	Duplicate	K	3.10 mg/L	3.04 mg/L	2%RPD	2%RPD	↓
SER 18:38	ICP serial dilution	Mg	22.60 mg/L	22.43 mg/L	1%D	1%D	↓

Comments:

LDC #: 30488A4a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
[✓ Y] N N/A Are all detection limits below the CRDL?

Detected analyte results for (2) Mg were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

Recalculation:

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

RD = 30.4 mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	Se	1.77	1.77	Y
	2	Mg	30.4	30.4	Y

Note:

LDC Report# 36488B4a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 5, 2016

Parameters: Metals

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH272

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424A_041416_01_L	8361894	Water	04/14/16
SP-424A_041416_36_L	8361895	Water	04/14/16

Introduction

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The analyses were performed by the following methods:

Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010C/6020A
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Level IV evaluation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

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UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
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A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	05/10/16 (07:31)	Strontium	70.0 (80-120)	All samples in SDG PH272	J (all detects)	P
ICSAB	05/10/16 (08:38)	Strontium	72.0 (80-120)	All samples in SDG PH272	J (all detects)	P

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Manganese	54.750 ug/L 1.740 ug/L	All samples in SDG PH272
ICB/CCB	Copper	2.2 ug/L	All samples in SDG PH272

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For SP-424C_041316_01_LMS/MSD, no data were qualified for Calcium and Strontium percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

IX. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

Samples SP-424A_041416_01_L and SP-424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

	Concentration (mg/L)				
Analyte	SP-424A_041416_01_L	SP-424A_041416_36_L	RPD (Limits)	Flag	A or P
Barium	0.0319	0.0323	1 (≤35)	-	-
Boron	0.0659	0.0668	1 (≤35)	-	-
Calcium	85.2	86.0	1 (≤35)	-	-
Chromium	0.0021	0.0300U	174 (≤35)	NQ	-
Lithium	0.0508	0.0508	0 (≤35)	-	-
Magnesium	23.8	24.1	1 (≤35)	-	-

Analyte	Concentration (mg/L)		RPD (Limits)	Flag	A or P
	SP-424A_041416_01_L	SP-424A_041416_36_L			
Manganese	0.234	0.239	2 (≤35)	-	-
Potassium	3.34	3.39	1 (≤35)	-	-
Sodium	83.6	85.0	2 (≤35)	-	-
Strontium	0.436	0.415	5 (≤35)	-	-

NQ = One or both results were less than 5x the reporting limit, therefore no data were qualified.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICS %R, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Metals - Data Qualification Summary - SDG PH272

Sample	Analyte	Flag	A or P	Reason (Code)
SP-424A_041416_01_L SP-424A_041416_36_L	Strontium	J (all detects)	P	ICP interference check sample (%R) (I)

Santa Susana Field Laboratory, GW
Metals - Laboratory Blank Data Qualification Summary - SDG PH272

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Metals - Field Blank Data Qualification Summary - SDG PH272

No Sample Data Qualified in this SDG

LDC #: 36488B4a

SDG #: PH272

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/28/16

Page: 1 of 1

Reviewer: JD

2nd Reviewer: Sm

METHOD: Metals (EPA SW 846 Method 6010C/6020A/7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4/14/16
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	A	MS/D=SP-424C-041316-01-LMS/D (SDG:PH273)=Ca ,Sr
VIII.	Duplicate sample analysis	A	DUP = SP-424C-041316-01-LDUP (SDG:PH273)
IX.	Serial Dilution	A	SER=SP-424C-041316-01-L(SDG:PH273)
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	SW	FD=(1,2)
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	A	
XIV.	Overall Assessment of Data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP-424A_041416_01_L	8361894	Water	04/14/16
2	SP-424A_041416_36_L	8361895	Water	04/14/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 36488B4a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JD
2nd Reviewer:

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.			✓	
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 36488B4a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36488B4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: JD
2nd reviewer: SM

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-2	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,] [✓ Li] [✓ P] [✓ Zr] [✓ Sr]
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___

Analysis Method

ICP		[✓ Al], [✓ Sb], [✓ As], [✓ Ba], [✓ Be], [✓ Cd], [✓ Ca], [✓ Cr], [✓ Co], [✓ Cu], [✓ Fe], [✓ Pb], [✓ Mg], [✓ Mn], Hg, [✓ Ni], [✓ K], Se, Ag, [✓ Na], Tl, [✓ V], [✓ Zn], [✓ Mo], [✓ B], [✓ Sn], [✓ Ti], [✓ Li] [✓ P] [✓ Zr]
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, [✓ Se], [✓ Ag], Na, [✓ Tl], V, Zn, Mo, B, Sn, Ti, ___ [✓ Sr]
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 36488B4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were ICP interference check samples performed as required?

Y [✓ N] N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	05/10/16	ICSAB (7:31)	Sr	70.0	All	J/UJ/P (det) (3)
	05/10/16	ICSAB (8:38)	Sr	72.0	All	J/UJ/P (det) (3)

Comments:

LDC #: 36488B4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 864 Method 6010/6020/7000)
Soil preparation factor applied: ____
Sample Concentration units, unless otherwise noted: mg/L
Associated Samples: All (5)

					Sample Identification									
Analyte	**Maximum PB^a (mg/Kg)**	**Maximum PB^a (ug/L)**	**Maximum ICB/CCB^a (ug/L)**	**Blank Action Limit (mg/L)**	No Qual.									
Ca		54.750		0.273750										
Cu			2.2	0.011000										
Mn		1.740		0.008700										

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#: 36488B4a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Metals (EPA Method 6010B/7000)

[✓ Y] N NA Were field duplicate pairs identified in this SDG?
[✓ Y] N NA Were target analytes detected in the field duplicate pairs?

Analyte	**Concentration (mg/L)**		**RPD (≤35)**	**Qual. (Parent Only)**
	1	**2**		
Barium	0.0319	0.0323	1	
Boron	0.0659	0.0668	1	
Calcium	85.2	86.0	1	
Chromium	0.0021	0.0300U	174	NQ
Lithium	0.0508	0.0508	0	
Magnesium	23.8	24.1	1	
Manganese	0.234	0.239	2	
Potassium	3.34	3.39	1	
Sodium	83.6	85.0	2	
Strontium	0.436	0.415	5	

NQ = No qual. because one or both results < 5X RL

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LDC #: 36488B4a

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: SD
2nd Reviewer:

METHOD: Trace Metals (See cover)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where,
Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV 17:50	ICP (Initial calibration)	Zr	594 ug/L	600ug/L	99.0%R	99.0%R	Y
ICV 7:19	ICP/MS (Initial calibration)	Tl	51.62ug/L	50ug/L	103.2%R	103.2%R	↓
ICV 6:12	CVAA (Initial calibration)	Hg	2.47 ug/L	2.5ug/L	98.8%R	98.8%R	
CCV 18:48	ICP (Continuing calibration)	V	506.2 ug/L	500ug/L	101.2%R	101.2%R	
CCV 8:03	ICP/MS (Continuing calibration)	Se	26.41ug/L	25ug/L	105.6%R	105.7%R	Y*
CCV 9:41	CVAA (Contining calibration)	Hg	1.0ug/L	1 ug/L	100%R	100%R	Y
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: *Rounding

LDC #: 36488B4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICSAB 7:31	ICP interference check	Sr	3.54 ug/L	5ug/L	71%R	70%R	Y*
LCS 18:19	Laboratory control sample	Sb	481.2ug/L	500ug/L	96%R	96%R	Y
MS 18:32	Matrix spike	Cu	(SSR-SR) 252 ug/L	250 ug/L	101%R	101%R	↓
DUP 18:29	Duplicate	Na	90.2 mg/L	87.2 mg/L	3%RPD	3%RPD	
SER 18:38	ICP serial dilution	Ca	75.43mg/L	76.27 mg/L	1%D	1%D	

Comments: *Rounding

LDC #: 36488B4a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd reviewer: SM

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
[✓ Y] N N/A Are all detection limits below the CRDL?

Detected analyte results for (1) Na were recalculated and verified using the following equation:

Concentration = (RD)(FV)(Dil) / (In. Vol.)

Recalculation:

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

RD = 83.6 mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	Na	83.6	83.6	Y
	2	Sr	0.415	0.415	Y

Note:

LDC Report# 36488C4a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 5, 2016

Parameters: Metals

Validation Level: Level IV

Laboratory: Eurofins

Sample Delivery Group (SDG): PH273

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP-424B_041316_01_L	8361908	Water	04/13/16
SP-424C_041316_01_L	8361909	Water	04/13/16
SP-424C_041316_01_LMS	8361909MS	Water	04/13/16
SP-424C_041316_01_LMSD	8361909MSD	Water	04/13/16
SP-424C_041316_01_LDUP	8361909DUP	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, and Zirconium by Environmental Protection Agency (EPA) SW 846 Methods 6010C/6020A
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Level IV evaluation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
ICSAB	05/10/16 (07:31)	Strontium	70.0 (80-120)	All samples in SDG PH273	J (all detects)	P
ICSAB	05/10/16 (08:38)	Strontium	72.0 (80-120)	All samples in SDG PH273	J (all detects)	P

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Manganese	54.750 ug/L 1.740 ug/L	All samples in SDG PH273
ICB/CCB	Copper	1.9 ug/L	All samples in SDG PH273

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For SP-424C_041316_01_LMS/MSD, no data were qualified for Calcium and Strontium percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

IX. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

All sample result verifications were acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICS %R, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Metals - Data Qualification Summary - SDG PH273

Sample	Analyte	Flag	A or P	Reason (Code)
SP-424B_041316_01_L SP-424C_041316_01_L	Strontium	J (all detects)	P	ICP interference check sample (%R) (I)

Santa Susana Field Laboratory, GW
Metals - Laboratory Blank Data Qualification Summary - SDG PH273

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Metals - Field Blank Data Qualification Summary - SDG PH273

No Sample Data Qualified in this SDG

LDC #: 36488C4a
SDG #: PH273
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6\29\16
Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Metals (EPA SW 846 Method 6010C/6020A/7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	4\13\16
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	A	MS/D = (3,4) = Ca, Sr > 4x
VIII.	Duplicate sample analysis	A	DUP
IX.	Serial Dilution	A	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	A	
XIV.	Overall Assessment of Data	A	

Note:				
	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP-424B_041316_01_L	8361908	Water	04/13/16
2	SP-424C_041316_01_L	8361909	Water	04/13/16
3	SP-424C_041316_01_LMS	8361909MS	Water	04/13/16
4	SP-424C_041316_01_LMSD	8361909MSD	Water	04/13/16
5	SP-424C_041316_01_LDUP	8361909DUP	Water	04/13/16
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 31048C4a

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JD
2nd Reviewer: CR

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		✓		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 5X the RL.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 36488C4a

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	✓			
Were all percent differences (%Ds) < 10%?	✓			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		✓		
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36488C4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-2	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti], [✓ Li] [✓ P] [✓ Zr] [✓ Sr]
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
QC:3-5	W	[✓ Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti], [✓ Li] [✓ P] [✓ Zr] [✓ Sr]
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
Analysis Method		
ICP		[✓ Al], [✓ Sb], [✓ As], [✓ Ba], [✓ Be], [✓ Cd], [✓ Ca], [✓ Cr], [✓ Co], [✓ Cu], [✓ Fe], [✓ Pb], [✓ Mg], [✓ Mn], Hg, [✓ Ni], [✓ K], Se, Ag, [✓ Na], Tl, [✓ V], [✓ Zn], [✓ Mo], [✓ B], [✓ Sn], [✓ Ti], [✓ Li] [✓ P] [✓ Zr]
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, [✓ Se], [✓ Ag], Na, [✓ Tl], V, Zn, Mo, B, Sn, Ti, [✓ Sr]
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: [✓ Mercury by CVAA if performed]

LDC #: 36488C4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Page: 1 of 1
Reviewer: JO
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were ICP interference check samples performed as required?
Y [✓ N] N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

[✓ Y] N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	05/10/16	ICSAB (7:31)	Sr	70.0	All	J/UJ/P (det) (I)
	05/10/16	ICSAB (8:38)	Sr	72.0	All	J/UJ/P (det) (I)

Comments:

LDC #:36488C4a

VALIDATION FINDINGS WORKSHEET

PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1

Reviewer: JD

2nd Reviewer:

METHOD: Metals (EPA SW 864 Method 6010/6020/7000)

Soil preparation factor applied:

Sample Concentration units, unless otherwise noted: mg/L

Associated Samples: All (B)

					Sample Identification									
Analyte	**Maximum PB^a (mg/Kg)**	**Maximum PB^a (ug/L)**	**Maximum ICB/CCB^a (ug/L)**	**Blank Action Limit (mg/L)**	No Qual.									
Ca		54.750		0.273750										
Cu			1.9	0.009500										
Mn		1.740		0.008700										

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 3648864c

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (See cover)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True   Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV 17:50	ICP (Initial calibration)	Fe	29834 ug/L	30000 ug/L	99.4%R	99.4%R	Y
ICV 7:19	ICP/MS (Initial calibration)	Se	51.06 ug/L	50 ug/L	102.1%R	102.1%R	
ICV 6:12	CVAA (Initial calibration)	Hg	2.47 ug/L	2.5 ug/L	98.8%R	98.8%R	
CCV 18:10	ICP (Continuing calibration)	Pb	487.6 ug/L	500 ug/L	97.5%R	97.5%R	
CCV 7:36	ICP/MS (Continuing calibration)	Ag	26.16 ug/L	25 ug/L	104.6%R	104.6%R	
CCV 9:16	CVAA (Contining calibration)	Hg	1.01 ug/L	1 ug/L	101%R	101%R	↓
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments:

LDC #: 36488C4a

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: JD
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICS AB 18:06	ICP interference check	Ni	884.6 ug/L	1000 ug/L	88.5%R	88.5%R	Y
LCS 9:20	Laboratory control sample	Hg	0.921 ug/L	1 ug/L	92%R	92%R	
MS 18:32	Matrix spike	V	(SSR-SR) 523 ug/L	500 ug/L	105%R	105%R	
DUP 7:49	Duplicate	Sr	419.1 ug/L	419.7 ug/L	0%RPD	0%RPD	
SER 7:56	ICP serial dilution	Sr	437.0 ug/L	419.7 ug/L	4%D	4%D	↓

Comments:

LDC #: 36488C4a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JD
2nd reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
[✓ Y] N N/A Are all detection limits below the CRDL?

Detected analyte results for (1) Sr were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

Recalculation:

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

$RD = 403.2\ ug/L \times \frac{1mg}{1000ug} = 0.403\ mg/L$

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	1	Sr	0.403	0.403	Y
	2	Ca	76.3	76.3	I

Note:

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

CDM
555 17th Street, Suite 1100
Denver, CO 80202
ATTN: Mrs. Cherie Zakowski

July 26, 2016

SUBJECT: Santa Susana Field Laboratory, GW, Data Validation

Dear Mrs. Zakowski,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 7, 2016. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #36501:

SDG #	**Fraction**
30180275 30180731	Gross Alpha Beta, Tritium, Gamma Spectroscopy, Isotopic Uranium, Strontium-90

The data validation was performed under Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1, December 2010
- Multi Agency Radiological Laboratory Analytical Protocols, July 2004
- USEPA Contract Laboratory Program National Functional Guidelines, CLPNFG, for Inorganic Superfund Data Review, January 2010

Please feel free to contact us if you have any questions.

Sincerely,

Shauna McKellar
Project Manager/Chemist

1,807 pages-CD

Attachment 1

Level IV EDD

LDC #36501 (CDM Federal Programs-Chantilly VA / Santa Susana Field Laboratory, GW)

LDC	SDG#	DATE REC'D	(4) DATE DUE	Gross α&β (900.0)		Gamma Spec. (901.1)		Sr-90 (D5811-95)		Iso.U (HASL-300)		Tritium (906.0)																											
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	30180275	06/07/16	07/06/16	4	0	4	0	4	0	4	0	4	0																										
B	30180731	06/07/16	07/06/16	2	0	2	0	2	0	2	0	2	0																										
Total	T/SM			6	0	6	0	6	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30

Shaded cells indicate Level IV validation (all other cells are ADR review). These sample counts do not include MS/MSD, and DUPs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Gross Alpha & Beta

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180275

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_424A_041416_01_L	30180275001	Water	04/14/16
SP_424A_041416_36_L	30180275002	Water	04/14/16
SP_424B_041316_01_L	30180275003	Water	04/13/16
SP_424C_041316_01_LMS	30180275004	Water	04/13/16
SP_424C_041316_01_LMS MS	30180275005	Water	04/13/16
SP_424C_041316_01_LMS MSD	30180275006	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gross Alpha and Beta by Environmental Protection Agency (EPA) Method 900.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP_424A_041416_01_L and SP_424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD (Limits)	Flag	A or P
	SP_424A_041416_01_L	SP_424A_041416_36_L			
Gross alpha	5.71	4.38	26 (≤35)	-	-
Gross beta	5.98	6.70	11 (≤35)	-	-

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Laboratory Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Field Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

LDC #: 36501A22

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/25/16

SDG #: 30180275

Page: 1 of 1

Laboratory: Pace Analytical

Reviewer:

2nd Reviewer:

METHOD: Gross Alpha & Beta (EPA SW 846 Method 900.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	(1,2)
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:

A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP_424A_041416_01_L	30180275001	Water	04/14/16
2	SP_424A_041416_36_L	30180275002	Water	04/14/16
3	SP_424B_041316_01_L	30180275003	Water	04/13/16
4	SP_424C_041316_01_LMS	30180275004	Water	04/13/16
5	SP_424C_041316_01_LMS MS	30180275005	Water	04/13/16
6	SP_424C_041316_01_LMS MSD	30180275006	Water	04/13/16
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36501A22

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error rations (DER) $\leq$1.42?.	✓			
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36504A22

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: CR
2nd Reviewer: JM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC#_36501A22____

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

Radiochemistry, Method_ see cover

Isotope	Activity (pCi/L)		RPD (≤35)	Qual (Parent Only)
	1	2		
Gross Alpha	5.71	4.38	26	
Gross Beta	5.98	6.70	11	

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\36501A22.wpd

LDC #: 36501A22

VALIDATION FINDINGS WORKSHEET

Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	Gross α	13.416	15.806	84.88	84.88	Y
5	Matrix spike sample	Gross β	74.398	62.212	119.59	119.59	↓
5/6	Duplicate RPD	Gross α	47.005	51.559	9.76	9.26	↓
Y	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36504A22

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for Gross β reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

$$4 - \frac{1.367 - 0.752 - 0.040152}{2.22(0.13814)(0.4224)} = 4.438\ \text{pCi/L}$$

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	Gross α	5.71	5.71	Y
	2	Gross β	6.70	6.70	↓
	3	Gross α	6.65	6.65	
	4	Gross β	4.44	4.44	

Note:

RECALC.35

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Tritium

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180275

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_424A_041416_01_L	30180275007	Water	04/14/16
SP_424A_041416_36_L	30180275008	Water	04/14/16
SP_424B_041316_01_L	30180275009	Water	04/13/16
SP_424C_041316_01_LMS	30180275010	Water	04/13/16
SP_424C_041316_01_LMS MS	30180275011	Water	04/13/16
SP_424C_041316_01_LMS MSD	30180275012	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Tritium by Environmental Protection Agency (EPA) Method 906.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

Quench curves were generated for each sample when applicable.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP_424A_041416_01_L and SP_424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Tritium - Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Tritium - Laboratory Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Tritium - Field Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

LDC #: 36501A34

VALIDATION COMPLETENESS WORKSHEET

Level IV

SDG #: 30180275

Laboratory: Pace Analytical

Date: 6/25/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Tritium (EPA Method 906.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A-A	
II.	Initial calibration	A	
III.	Calibration verification	A	✓ Quench curve
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	(1,2)
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:

A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP_424A_041416_01_L	30180275007	Water	04/14/16
2	SP_424A_041416_36_L	30180275008	Water	04/14/16
3	SP_424B_041316_01_L	30180275009	Water	04/13/16
4	SP_424C_041316_01_LMS	30180275010	Water	04/13/16
5	SP_424C_041316_01_LMS MS	30180275011	Water	04/13/16
6	SP_424C_041316_01_LMS MSD	30180275012	Water	04/13/16
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36501A34

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Was a duplicate sample anayIzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error rations (DER) ≤1.42?.	✓			
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓	✓	
Were the performance evaluation (PE) samples within the acceptance limits?				
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501A34

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.		✓		
XI. Field blanks				
Field blanks were identified in this SDG.	~~✓~~	∩		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501A34

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated %R or RPD	Reported %R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	H-3	2235.11	2375.81	94.08	94.08	Y
5	Matrix spike sample	↓	4963.42	5044.58	98.39	98.39	↓
5/6	Duplicate RPD	↓	5032.70	4504.67	10.67	10.67	↓
N	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501A34

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

All ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note:

LDC Report# 36501A35

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Gamma Spectroscopy

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180275

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_424A_041416_01_L	30180275001	Water	04/14/16
SP_424A_041416_36_L	30180275002	Water	04/14/16
SP_424B_041316_01_L	30180275003	Water	04/13/16
SP_424C_041316_01_LMS	30180275004	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gamma Spectroscopy by Environmental Protection Agency (EPA) Method 901.1

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA) with the following exceptions:

Blank ID	Isotope	Activity	Associated Samples
PB (prep blank)	Barium-133	9.330 pCi/L	All samples in SDG 30180275

Sample activities were compared to activities detected in the laboratory blanks. The sample activities were either not detected or were significantly greater (>5X blank activity) than the activities found in the associated laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP_424A_041416_01_L and SP_424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GWs
Gamma Spectroscopy - Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gamma Spectroscopy - Laboratory Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gamma Spectroscopy - Field Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

LDC #: 36501A35

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date 6/25/16

SDG #: 30180275

Page: 1 of 1

Laboratory: Pace Analytical

Reviewer:

2nd Reviewer:

METHOD: Gamma Spectroscopy (EPA Method 901.1)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A,A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	SW	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	MS not required
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	(1,2)
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_424A_041416_01_L	30180275001	Water	04/14/16
2	SP_424A_041416_36_L	30180275002	Water	04/14/16
3	SP_424B_041316_01_L	30180275003	Water	04/13/16
4	SP_424C_041316_01_LMS	30180275004	Water	04/13/16
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 3650A35

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) ≤1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501A35

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.		✓		
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501A35

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Radiochemistry, Method See Cover

Conc. units: pCi/L

Associated Samples: All

Isotope	Blank ID	Blank Action Limit	Sample Identification										
	PB		No Qualifiers										
Ba-133	9.330	46.65											

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 36501A35

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

%R = Found / True x 100 Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / (S+D)/2 x 100 Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated %R or RPD	Reported %R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Am241	422.24	529.75	79.7	79.7	Y
N	Matrix spike sample						
N	Duplicate RPD						
N	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501A35

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ____________________ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

all ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note:

LDC Report# 36501A59

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Isotopic Uranium

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180275

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_424A_041416_01_L	30180275001	Water	04/14/16
SP_424A_041416_36_L	30180275002	Water	04/14/16
SP_424B_041316_01_L	30180275003	Water	04/13/16
SP_424C_041316_01_LMS	30180275004	Water	04/13/16
SP_424C_041316_01_LMS MS	30180275005	Water	04/13/16
SP_424C_041316_01_LMS MSD	30180275006	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Isotopic Uranium by the Health and Safety Laboratory (HASL) Method 300

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP_424A_041416_01_L and SP_424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD (Limits)	Flag	A or P
	SP_424A_041416_01_L	SP_424A_041416_36_L			
Uranium-233/234	1.09	1.28	16 (≤35)	-	-
Uranium-235	0.122	0.083U	38 (≤35)	NQ	-
Uranium-238	0.742	0.885	18 (≤35)	-	-

NQ = One or both results were < 5x the reporting limit, therefore no data were qualified.

X. Tracer Recovery

All tracer recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Isotopic Uranium - Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Isotopic Uranium - Laboratory Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Isotopic Uranium - Field Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

LDC #: 36501A59
SDG #: 30180275
Laboratory: Pace Analytical

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 6/25/16
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Isotopic Uranium (HASL 300)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	(1,2)
X.	Tracer Recovery	A	
XI.	Minimum detectable activity (MDA)	A	
XII.	Sample result verification	A	
XIII.	Overall assessment of data	A	

Note:

A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	SP_424A_041416_01_L	30180275001	Water	04/14/16
2	SP_424A_041416_36_L	30180275002	Water	04/14/16
3	SP_424B_041316_01_L	30180275003	Water	04/13/16
4	SP_424C_041316_01_LMS	30180275004	Water	04/13/16
5	SP_424C_041316_01_LMS MS	30180275005	Water	04/13/16
6	SP_424C_041316_01_LMS MSD	30180275006	Water	04/13/16
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 30501A59

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer: SA

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error rations (DER) ≤1.42?.	✓			
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?	✓			
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501A59

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: OL
2nd Reviewer: Sm

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC# 36501A59

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

Radiochemistry, Method see cover

Isotope	Activity (pCi/L)		RPD (≤35)	Qual (Parent Only)
	1	2		
U-233/234	1.09	1.28	16	
U-235	0.122	0.083U	38	NQ (<5xRL)
U-238	0.742	0.885	18	

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LDC #: 36501A59

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
~~U234~~ LCS	Laboratory control sample	U-234	14.80	14.625	101.2	101.2	Y
5	Matrix spike sample	~~8~~U-238	16.2	17.445	92.86	92.87	
5/6	Duplicate RPD	U-234	17.4	18.2	4.24	4.24	
1	Chemical recovery	U-232	8.845	10.4433	84.70	84.70	

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501A59

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for U-233/234 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm} - \text{background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

$$1 = \frac{67.52}{2.22(0.2723)(0.847)(240)(0.504)} = 1.091 \text{ pCi/L}$$

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	U-233/234	1.09	1.09	Y
	2	U-238	0.885	0.885	Y
	3	U-238	0.858	0.858	
	4	U-233/234	1.20	1.20	

Note:

RECALC.35

LDC Report# 36501A61

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Strontium-90

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180275

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_424A_041416_01_L	30180275001	Water	04/14/16
SP_424A_041416_36_L	30180275002	Water	04/14/16
SP_424B_041316_01_L	30180275003	Water	04/13/16
SP_424C_041316_01_LMS	30180275004	Water	04/13/16
SP_424C_041316_01_LMS MS	30180275005	Water	04/13/16
SP_424C_041316_01_LMS MSD	30180275006	Water	04/13/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Strontium-90 by American Society for Testing and Material (ASTM) D5811-95

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples SP_424A_041416_01_L and SP_424A_041416_36_L were identified as field duplicates. No results were detected in any of the samples.

X. Carrier Recovery

All carrier recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Strontium-90 - Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Strontium-90 - Laboratory Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Strontium-90 - Field Blank Data Qualification Summary - SDG 30180275

No Sample Data Qualified in this SDG

LDC #: 36501A61

SDG #: 30180275

Laboratory: Pace Analytical

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/25/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Strontium-90 (ASTM D5811-95)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A,A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	(1,2)
X.	Carrier recovery	A	
XI.	Minimum detectable activity (MDA)	A	
XII.	Sample result verification	A	
XIII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_424A_041416_01_L	30180275001	Water	04/14/16
2	SP_424A_041416_36_L	30180275002	Water	04/14/16
3	SP_424B_041316_01_L	30180275003	Water	04/13/16
4	SP_424C_041316_01_LMS	30180275004	Water	04/13/16
5	SP_424C_041316_01_LMS MS	30180275005	Water	04/13/16
6	SP_424C_041316_01_LMS MSD	30180275006	Water	04/13/16
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36501A61

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: OL
2nd Reviewer: SM

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiired frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error rations (DER) ≤1.42?.	✓			
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?	✓			
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?				

LDC #: 36501A61

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.		✓		
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501A61

VALIDATION FINDINGS WORKSHEET

Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated %R or RPD	Reported %R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Sr-90	18.38	16.711	109.99	109.99	Y
5	Matrix spike sample	↓	32.012	32.825	97.52	97.52	↓
5/6	Duplicate RPD	↓	32.05	31.28	2.92	2.92	↓
1	Chemical recovery	Sr	11.9	12.22	97.38	97.38	↓

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501A61

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

all ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note: ______

LDC Report# 36501B22

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Gross Alpha & Beta

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180731

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_19B_041916_01_L	30180731001	Water	04/19/16
SP_19A_041916_01_L	30180731002	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gross Alpha and Beta by Environmental Protection Agency (EPA) Method 900.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Laboratory Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gross Alpha & Beta - Field Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

LDC #: 36501B22

SDG #: 30180731

Laboratory: Pace Analytical

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/25/16

Page: 1 of 1

Reviewer: a

2nd Reviewer: Sm

METHOD: Gross Alpha & Beta (EPA SW 846 Method 900.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A,A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	CS
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_19B_041916_01_L	30180731001	Water	04/19/16
2	SP_19A_041916_01_L	30180731002	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36501B22

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer: [illegible]

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) ≤1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501B22

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: OL
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501B22

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	Gross β	20.72	20.64	100.39	100.39	Y
N	Matrix spike sample						
N	Duplicate RPD						
N	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501B22

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: Sn

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for Gross α reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(cpm - background)}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

$$\frac{0.12-0.048}{2.22(00168)(0.0891)} = 7.865 \text{ pCi/L}$$

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	Gross α	7.86	7.87	Y
	2	Gross β	2.43	2.43	Y

Note:

LDC Report# 36501B34

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Tritium

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180731

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_19B_041916_01_L	30180731001	Water	04/19/16
SP_19A_041916_01_L	30180731002	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Tritium by Environmental Protection Agency (EPA) Method 906.0

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

Quench curves were generated for each sample when applicable.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Tritium - Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Tritium - Laboratory Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Tritium - Field Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

LDC #: 36501B34

SDG #: 30180731

Laboratory: Pace Analytical

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/25/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Tritium (EPA Method 906.0)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	Initial calibration	A	
III.	Calibration verification	A	✓Quench curve
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	CS
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_19B_041916_01_L	30180731001	Water	04/19/16
2	SP_19A_041916_01_L	30180731002	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36521B34

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CL
2nd Reviewer: Sm

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) ≤1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?				

LDC #: 36501B35

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: CR
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501B34

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	H-3	2764.77	2557.347	108.11	108.11	Y
✓	Matrix spike sample						
✓	Duplicate RPD						
✓	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501B35

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer:

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______________________ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

all ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note: ______________________

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Gamma Spectroscopy

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180731

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_19B_041916_01_L	30180731001	Water	04/19/16
SP_19A_041916_01_L	30180731002	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Gamma Spectroscopy by Environmental Protection Agency (EPA) Method 901.1

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA) with the following exceptions:

Blank ID	Isotope	Activity	Associated Samples
PB (prep blank)	Barium-133	9.330 pCi/L	All samples in SDG 30180731

Sample activities were compared to activities detected in the laboratory blanks. The sample activities were either not detected or were significantly greater (>5X blank activity) than the activities found in the associated laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XI. Sample Result Verification

All sample result verifications were acceptable.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GWs
Gamma Spectroscopy - Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gamma Spectroscopy - Laboratory Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Gamma Spectroscopy - Field Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

LDC #: 36501B35 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/25/16
SDG #: 30180731 Level IV Page: 1 of 1
Laboratory: Pace Analytical Reviewer: G
2nd Reviewer: SM

METHOD: Gamma Spectroscopy (EPA Method 901.1)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	SW	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Minimum detectable activity (MDA)	A	
XI.	Sample result verification	A	
XII.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_19B_041916_01_L	30180731001	Water	04/19/16
2	SP_19A_041916_01_L	30180731002	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 36501B35

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the required frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) ≤1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?			✓	
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501B35

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501B35

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Radiochemistry, Method See Cover

Conc. units: pCi/L **Associated Samples:** All

Isotope	Blank ID	Blank Action Limit	Sample Identification										
	PB		No Qualifiers										
Ba-133	9.330	46.65											

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 36501B35

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD	
LCS	Laboratory control sample	Am-241	422.24	529.75	79.7	79.7	Y
	Matrix spike sample						
	Duplicate RPD						
	Chemical recovery						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501B35

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: al
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______________________ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

All ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note:

LDC Report# 36501B59

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Isotopic Uranium

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180731

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_19B_041916_01_L	30180731001	Water	04/19/16
SP_19A_041916_01_L	30180731002	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Isotopic Uranium by the Health and Safety Laboratory (HASL) Method 300

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA) with the following exceptions:

Blank ID	Isotope	Activity	Associated Samples
PB (prep blank)	Uranium-233/234	0.034 pCi/L	All samples in SDG 30180731

Sample activities were compared to activities detected in the laboratory blanks. The sample activities were either not detected or were significantly greater (>5X blank activity) than the activities found in the associated laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Tracer Recovery

All tracer recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Isotopic Uranium - Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Isotopic Uranium - Laboratory Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Isotopic Uranium - Field Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

LDC #: 36501B59

SDG #: 30180731

Laboratory: Pace Analytical

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/25/16

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Isotopic Uranium (HASL 300)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	SW	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	Duplicates	N	↓
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Tracer Recovery	A	
XI.	Minimum detectable activity (MDA)	A	
XII.	Sample result verification	A	
XIII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_19B_041916_01_L	30180731001	Water	04/19/16
2	SP_19A_041916_01_L	30180731002	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 36501B59

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?			✓	
Were all duplicate sample duplicate error rations (DER) ≤1.42?.			✓	
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?	✓			
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501B5T

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: OR
2nd Reviewer: SN

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501B59

VALIDATION FINDINGS WORKSHEET

Blanks

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: Radiochemistry, Method See Cover

Conc. units: pCi/L

Associated Samples: All

Isotope	Blank ID	Blank Action Limit	Sample Identification										
	PB		No Qualifiers										
U-233/234	0.034	0.17											

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 36501B59

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

					Recalculated	Reported	
Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	%R or RPD	%R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	U-234	13.3	14.133	94.11	94.11	Y
N	Matrix spike sample						
N	Duplicate RPD						
1	Chemical recovery	U-232	7.5853	10.4432	72.63	72.63	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501B5S1

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: a
2nd reviewer: SM

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?

[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for U-238 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

Recalculation:

1 = 856.01 / 2.22(0.80482)(0.7263)(1000 min)(0.317) = 208 pCi/L

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

#	Sample ID	Analyte	Reported Concentration (pCi/L)	Calculated Concentration (pCi/L)	Acceptable (Y/N)
	1	U-238	2.08	2.08	Y
	2	U-235	0.038	0.038	Y

Note:

LDC Report# 36501B61

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Santa Susana Field Laboratory, GW

LDC Report Date: July 1, 2016

Parameters: Strontium-90

Validation Level: Level IV

Laboratory: Pace Analytical Services, Inc.

Sample Delivery Group (SDG): 30180731

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SP_19B_041916_01_L	30180731001	Water	04/19/16
SP_19A_041916_01_L	30180731002	Water	04/19/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, CA, Revision 1 (December 2010), the Multi Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual (July 2004), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Strontium-90 by American Society for Testing and Material (ASTM) D5811-95

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

Counting and detector efficiency were determined for each detector and each radionuclide.

III. Continuing Calibration

Continuing calibration and background determination were performed at the required frequencies. Results were within laboratory control limits.

IV. Blanks

Laboratory blanks were analyzed as required by the method. Blank results contained less than the minimum detectable activity (MDA).

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was not required by the method.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Carrier Recovery

All carrier recoveries were within validation criteria.

XI. Minimum Detectable Concentration

All minimum detectable concentrations (MDC) met the requested reporting limits (RL).

XII. Sample Result Verification

All sample result verifications were acceptable.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Santa Susana Field Laboratory, GW
Strontium-90 - Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Strontium-90 - Laboratory Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

Santa Susana Field Laboratory, GW
Strontium-90 - Field Blank Data Qualification Summary - SDG 30180731

No Sample Data Qualified in this SDG

LDC #: 36501B61 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/25/16
SDG #: 30180731 Level IV Page: 1 of 1
Laboratory: Pace Analytical Reviewer:
2nd Reviewer:

METHOD: Strontium-90 (ASTM D5811-95)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A /A	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS/D (from 30180275)
VII.	Duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Carrier recovery	A	
XI.	Minimum detectable activity (MDA)	A	
XII.	Sample result verification	A	
XIII.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	SP_19B_041916_01_L	30180731001	Water	04/19/16
2	SP_19A_041916_01_L	30180731002	Water	04/19/16
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 36501B61

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CR
2nd Reviewer:

Method: Radiochemistry

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error rations (DER) ≤1.42?.	✓			
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?	✓			
Were tracer/carrier recoveries within the QC limits?	✓			
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 36501B61

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: OL
2nd Reviewer: SM

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 36501B6)

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Radiochemistry (Method: See cover)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated %R or RPD	Reported %R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Sr-90	18.38	6.711	109.99	109.99	Y
SP-124C_041316-01_LMS	Matrix spike sample		32.012	32.825	97.52	97.52	
	Duplicate RPD		32.05	31.28	2.92	2.92	
1	Chemical recovery	Sr	11.4	12.22	93.29	93.29	

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 36501B61

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: Radiochemistry (Method: See cover)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Have results been reported and calculated correctly?
[✓ Y] N N/A Are results within the calibrated range of the instruments?

Analyte results for ______________________ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$$\frac{(\text{cpm - background})}{2.22 \times E \times SA \times Vol}$$

E = Counter Efficiency
SA = Self-absorbance factor
Vol = Volume of sample

Recalculation:

all ND

#	Sample ID	Analyte	Reported Concentration ( )	Calculated Concentration ( )	Acceptable (Y/N)

Note:

Appendix B
Seep Field Forms

69
4-5-16

SSFL FLUTE REMOVAL + SEEPS
RD-57

0700 MORNING H&S MEETING.
~~0830~~ 4-5-16 M. JUSAYAN (CDM SMITH)
CAM HERBER (BC2)
AARON HEAVLIN (BC2)
TY MCCONNELY (BC2)
PPE = LEVEL D
WEATHER: SUNNY, 70s, CLEAR (AM)
0830 DRILLERS HEAD TO NBZ TO DEMOBE EQUIPMENT FROM RD-57.
1000 COLLECT LIQUID IDW SAMPLE FROM BAKER TANK IDW-040516
1015 BC2 DECONNING RODS + TOOLING.
1245 CAM H., AARON H., & TY. M. DEPART SITE.
1300 CONFERENCE CALL.
1415 RECON SEEPS SP-T02D, SP-T02B SP-T02C, ~~AAND~~ 4-5-16 AND SP-T02A
1450 FOUND SEEP LOCATIONS, HAVE LOCKS, ABLE TO OPEN SP-T02D WITHOUT KEY WL = 7.41' BTOC
1600 BACK AT TRAILER. CLEAN UP.
1635 END OF DAY / OFFSITE.

4-5-16

SSFL ~~FLUTE REMOVAL~~ 4-6-16 70
SEEP ~~RD~~ 4-6-16 SAMPLING 4-6-16

0700 MORNING H&S MEETING
M. JUSAYAN (CDM SMITH)
P. BUTLER (CDM SMITH)
WEATHER: SUNNY, 70s, BREEZE (AM)
PPE = LEVEL D
0800 PREP FOR SEEP SAMPLING.
0945 HIKE TO SP-T02D
1050 COLLECT SAMPLE SP-T02D_040616-9_L
1200 LUNCH
1300 COLLECT DUPLICATE SAMPLE:
SP-T02D-040616_36_L (PARENT SAMPLE WAS COLLECTED AT 1050
1415 FILLING OUT FSDS'
1445 RECON SP-19 LOCATION
1530 TRUCK RUNNING LOW ON GAS HAVE TO TURN AROUND.
1600 M.J. OFFSITE

4-6-16

SSFL SEEP SAMPLING

4-7-16

0700 M. JUSAYAN ARRIVES TO SITE
0720 MORNING H&S MEETING.
P. BUTLER (CDM SMITH)
M. JUSAYAN (CDM SMITH NOTETAKER)
J. SOLE (BC2)
S. MYSAL (CDM SMITH)
PPE = LEVEL D
WEATHER: 60'S, OVERCAST, (AM)
0815 HEAD OUT TO BRANDEIS PROPERTY TO RECON SP-424 SEEP CLUSTER.
0900 FOUND REMNANTS OF ROAD LEADING TO CLUSTER, BUT THERE IS A BARBEDWIRE FENCE.
1000 BEGIN HIKING TO SP-19 CLUSTER
1045 REACH AREA MARKED ON MAP. RUNNING A SWEEP WITHIN ~150' RADIUS.
1230 CANNOT FIND SP-19 CLUSTER.
1245 LUNCH.
1315 GO TO NBZ TO SCOPE OUT SP-900
1400. ~~FOO~~ 4-7-16 FOUND SP-900A. PREP FOR SAMPLING.
1418 SP-900A DRY AFTER ~2 MIN, BEGIN TO RAIN, HEADING BACK.
1600 END OF DAY/OFFSITE

4-7-

SSFL SEEP SAMPLING

4-8-16

0700 MORNING H&S MEETING.
M. JUSAYAN (CDM SMITH NOTETAKER)
P. BUTLER (CDM SMITH)
S. WILLIFORD (NORTHWIND)
0730 LOAD TRUCK WITH SAMPLE GEAR.
0820 MOBE TO NORTH RMHF
0830 HIKE TO SP-T02 CLUSTER.
0935 SP-T02B PUMPS DRY WITHIN A MINUTE
1005 SP-T02C PUMPS DRY WITHIN 3 MINUTES OF PURGING. THESE 2 WELLS WILL NOT PRODUCE SUFFICIENT ~~WATER~~ 4-8-16 VOLUME FOR SAMPLES.
1030 BEGINNING TO RAIN. HEADING BACK & CLEANING UP.
1200 LUNCH.
1230 FILL OUT PAPERWORK
1330 END OF DAY/OFFSITE

4-8-16

GW SSFL

4/13/16 SEEPS SP-424

0645 PH arrive @ trailer. Whitney Treadway @ SSFL to help me collect SEEPS. We have permission from Brandeis owners to get seep samples by accessing from the Simi Valley entrance.

0800 leave SSFL for Brandeis w/ pumps, sample bottles, maps etc.

0850 Entered Brandeis property. Ready to hike in and locate seeps SP424 cluster. Taking path South along drainage.

1020 We successfully located seeps. Taking break for food + water.

1040 Opened 1st seep - Water came gushing out. Next time, bring FACE SHIELD. Flow is strong. Will have to return w/ pressure gauge to measure PSI. SP-424B Depth = 16.8' BTOC Casing: 3"

1050 Water flowing without pump. Purging volume before sampling (636 mL) 1 VOL =

GW SSFL

4/13/16 SEEPS SP-424

1120 Collected full bottle set for SP-424B

SP-424B_041316_01_L

VOCs, RAD, Tritium, Flouride, Metals Perch,

1130 Set up for SP-424C. Depth = 19.0' Tagged

Also flowing w/out pump.

Allow to purge - (738 mL)

1200 Collect sample + MS/MSD!

SP-424C_041316-01_L

collected for same as SP-424B double volume bottles.

1300 Packed up w/ samples, ice packs, equipment and purge water. Hiking out to truck. GPS tracker says distance is 1.2 miles

1340 At truck, loading samples from ice pack soft coolers to large hard iced coolers.

1355 leaving Brandeis property.

1430 At trailer. Processing sample. Sending one cooler to Lancaster. Cooler scanned RAY = 9uk

Fedex #: 804713346500

1630 PHartman offsite to drop off.

4/14/16 GW SEEPS THURSDAY
SP-424

0700 P.Hartman onsite. Whitney Treadway + I headed to Brandeis for SP-424 follow-up + sampling.
0825 Headed to Brandeis property
0900 Parked and headed into seeps w/ backpacks - equipment, bottles, etc.
1008 At seep. Tough getting locks open. Have to cut wire because locks rusted shut. Will come back and replace wire.
1025 SP-424A also flowing w/out pump (only 8.8 ft depth)
WL = ~~not~~ flowing @ surface
1030 Collect
SP-424A_041416_01_L
for full suite RAD, tritium, flouride VOCs, Perchlorate, Metals (3000mL)
1050 Collect Duplicate
SP-424A_041416_36_L
1125 Packed + hiking out.
1250 Off Brandeis Property
1350 Packing Cooler - shipping tomorrow keeping on ice overnight.
1650 P.Hartman offsite

Pamela Hart

4/15/16 SEEPS FRI
SP-424 Cluster

0630 P.Hartman onsite. Frank Morris + Whitney Treadway onsite.
COLOG truck still not ready. Video truck being driven here by COLOG from Sacramento.
Winds extremely high today - ~60mph wind bursts.
0800 Calling work off due to high winds, projected to last all day + all night.
0930 Packing coolers for shipping to Pace Analytical + Lancaster.
Both coolers cleared RAD scan Background (8uR + 8uR)
Fedex # 804713345537
776118778802
1330 P. Hartman offsite

PH
4/15/16

Pamela Hartman

GW SEEPS

4/18/16
0650 PHartman onsite.
COLOG onsite w/ 2 hydro-
videat geophysicl. Well
development w/ BCz also
1000 Conf call w/ Denver
DOE audit happening this
week.
1100 Prepping for seeps sampling
tomorrow
1500 Whitney Treadway
out w/ James Sole for
well development.
1650 PHartman offsite

PH
4/18/16

GW SEEPS

4/19/16
0550 PHartman + W.Treadway
@ DOE office in Simi Valley.
Leave one car and take 4WD
truck to Brandeis Property.
Access from Tapo Canyon (#1648)
0640 Find 1st seep in drainage
near Red Water Tank SP-19B
(most northern one) LOTS OF
Poison Oak! We are wearing
Tyvek w/ taped sleeves +
nitrile gloves.
0700 SP-19B tagged @ 19' BTOC
WL = 8.65' BTOC casing stickup = 2"
Set up peristaltic pump and
remove one volume casing
(1 inch pipe at this one!) = 4L
0740 Collect sample after purge
SP-19B_041916-01_L
All required bottles filled RAD, Tritium,
VOCs, Perchlorate, Metals, Fluoride
0800 Hike to SP-19A. Steep
terrain - have to crawl a bit
Purge + sample DTB = 10.4' BTOC
DTW = 7.05' BTOC casing = 1.8".

PH
4/19/16

SEEPS SP19A TUESDAY

4/19/16
0825 Collect sample
SP-19A_041916_01_L
0900 Hike back to truck Both locks rusted shut - Had to break into casing. Pulled the wire thru gap in eyelet on one and other twisted off w/ wire cr.
1050 At DOE office - Whitney have conf call. I am startin sample processing and printing needed items for trailer.
1600 leave DOE office. Whitney took samples from coolers to site for overnight storage on ice @ trailers.

PH
4/19/16

Pamela Hanks

SEEPS WEDNESDAY
SP-19A+B

4/20/16
0650 PHartman onsite. COLOG + BC2 onsite also. Frank Morris w/ COLOG for geophysic + Video P. Butler w/ BC2 for well Development. Almost done w/ all well development.
0800 Packing coolers for shipment today sending to Lancaster + Pace. Both coolers scan RAD @ Background (Bkt + qwk) FedEx #'s
Pace = 7761 5134 6442
Lan = 804713345548
1130 Offsite to deliver Coolers to Fedex and get trailer supplies (ink + labels).
1400 Back onsite. Preparing for audit w/ DTSC tomorrow.
1700 PHartman offsite

PH
4/20/16

Pamela Hanks

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-19A-041916-016 | Well No. SP-19A

Project: SSFL - GW monitoring 2016
Date: 19 April 2016
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: P. Hartman
Weather: Sunny, 70's
Reviewed By: W Treadway

PURGING

Static Water Level (TOC) 7.05 ft	**Time** 0850	**Comments**
Water Volume in Casing 0.15 gal	**Total Well Depth (TOC)** 10.4 ft	
Volume Purged Before Sampling	**Screened Interval (TOC)** 7-10 ft	
Purging Method low flow	**Stabilized Flow Rate**	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
0848	–	–	17.9	1159	7.63	53.6	–	–
0849	–	–	16.7	1175	7.62	18.0	–	–
0850	–	–	17.5	1197	7.53	3.96	–	–

SAMPLING

Sampling Method low flow

Analytical Matrix ☐ Yes ☒ No ☐ Attached   Time Sampled 0850

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
6-40mL VOA	HCL	N/A	N/A	ice
1-250mL glass	none	↓	↓	none
2-1L poly	nitric	↓	↓	none
2-40 mL VOA	none			ice
1-250 mL poly	nitric	N/A ↓	N/A ↓	ice ↓
1-250 mL poly	none			

SAMPLE DATA

Appearance / Odor Clear, none

pH (last stabilized) 7.53   Temperature (°C) 17.5

Eh (millivolts) –   Specific Conductance (microsiemens/cm) 1197

OVM-PID Headspace (ppm) 0.0   ORP –

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No   Chain-of-Custody ID

Duplicate Sample ID N/A   Replicate Sample Nos.

Analytical Lab	Lab Name	Date Sent to Lab
	Shipment Method	
Split with	Name (s)	
	Organization (s)	

Other

Comments

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-19B_041916_01L ~~SP-42~~ UT

Well No. SP-19B

Project: Santa Susana Field Lab - GW Program 2016 Date: 19 April, 2016
Project No.: 94489.1204.009.909.09092.GWFIM Sampled By: P. Hartman
Weather: Sunny, 60's Reviewed By: G. Treadway

PURGING

Static Water Level (TOC) 8.65 ft Time 0800 Comments pumped 0715-0800
Water Volume in Casing 0.5 gal Total Well Depth (TOC) 19.2 ft
Volume Purged Before Sampling ≈1.5 gal Screened Interval (TOC) 16 - 18.8 ft
Purging Method low flow Stabilized Flow Rate ≈ 0.033gpm

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
0718	–	–	17.1	2050	8.53	4.98	–	–
0731	–	–	16.7	2100	7.28	0.83	–	–
0741	–	–	20.0	2103	7.16	2.60	–	–
0748	–	–	18.4	2103	7.02	1.08	–	–
0756	–	–	16.6	2105	6.89	1.36	–	–

SAMPLING

Sampling Method low flow
Analytical Matrix ☐ Yes ☒ No ☐ Attached Time Sampled 0800

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
6-40mL VOA	HCL	N/A	N/A	ice
1-250 mL glass	none	↓	↓	none
2-1L poly	nitric	↓	↓	none
2-40mL VOA	none	↓	↓	ice
1-250 mL poly	none	N/A	N/A	ice
1-250 mL poly	nitric	↓	↓	↓

SAMPLE DATA

Appearance / Odor clear, none
pH (last stabilized) 6.89 Temperature (°C) 16.6
Eh (millivolts) – Specific Conductance (microsiemens/cm) 2105
OVM-PID Headspace (ppm) 0.0 ORP –

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No Chain-of-Custody ID
Duplicate Sample ID N/A Replicate Sample Nos.
Analytical Lab: Lab Name Date Sent to Lab
Shipment Method
Split with: Name (s)
Organization (s)
Other
Comments

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-424A_041416 01L

Well No. SP-424A

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4/14/16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: P. Hartman
Weather: Sunny 70's
Reviewed By: W Treadway

PURGING

Static Water Level (TOC) ags	Time 10:30	Comments	
Water Volume in Casing	Total Well Depth (TOC)		
Volume Purged Before Sampling	Screened Interval (TOC)		
Purging Method low flow	Stabilized Flow Rate		

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1015	–	–	16.9	910.0	8.71	11.4	–	–
1020	–	–	16.6	892.6	8.37	1.48	–	–
1025	–	–	16.6	891.3	8.22	0.72	–	–

SAMPLING

Sampling Method low flow

Analytical Matrix ☐ Yes ☒ No ☐ Attached Time Sampled 10:30

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
6-40mL VOA	HCL	N/A	N/A	ice
1-250mL glass	none	↓	↓	none
2-1L poly	nitric	↓	↓	none
2-40 mL VOA	none	↓	↓	ice

SAMPLE DATA

Appearance / Odor clear, none	
pH (last stabilized) 8.22	Temperature (°C) 16.6
Eh (millivolts)	Specific Conductance (microsiemens/cm) 891.3
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No Chain-of-Custody ID 20160415-01, 20160415-02

Duplicate Sample ID SP-424A_041416_36L Replicate Sample Nos.

Analytical Lab	Lab Name Pace, Eurofins Lancaster Date Sent to Lab 4/15/16
	Shipment Method Fed Ex
Split with	Name (s)
	Organization (s)

Other duplicate sample taken at 10:50

Comments water level above ground, not able to measure accurately

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1-250mL poly	nitric	N/A	N/A	ice
1-250 mL poly	none	↓	↓	↓

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-424B-041316-01L

Well No. SP-424B

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4/13/16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: P. Hartman
Weather: sunny, 70's
Reviewed By: G Treadway

PURGING

Static Water Level (TOC)	ags	Time	11:20
Water Volume in Casing		Total Well Depth (TOC)	
Volume Purged Before Sampling		Screened Interval (TOC)	
Purging Method	low flow	Stabilized Flow Rate	

Comments

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
11:10	—	—	17.5	925.2	8.9	3.6	—	—
11:15	—	—	17.2	889.5	8.44	0.44	—	—

SAMPLING

Sampling Method low flow

Analytical Matrix ☐ Yes ☒ [✓ No] ☐ Attached Time Sampled 11:20

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
6-40mL VOA	HCL	N/A	N/A	cooler, ice
1-250 mL glass	none	↓	↓	cooler, N/A
2-1L poly	Nitric	↓	↓	cooler, N/A
2-40mL VOAs	none	↓	↓	cooler, ice
1 250mL poly	nitric	N/A	N/A	cooler, ice
1 250 mL poly	none	↓	↓	cooler, ice

SAMPLE DATA

Appearance / Odor clear, none

pH (last stabilized) 8.44	Temperature (°C) 17.2
Eh (millivolts)	Specific Conductance (microsiemens/cm) 889.5
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No Chain-of-Custody ID 20160415-02, 20160413-01

Duplicate Sample ID Replicate Sample Nos.

Analytical Lab	Lab Name Pace, Eurofins-Lancaster	Date Sent to Lab 4/13/16, 4/15/16
	Shipment Method Fed Ex, cooler	
Split with	Name (s)	
	Organization (s)	

Other

Comments Water level above ground, not able to measure accurately

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-424C-041316-01L

Well No. SP-424C

Project: Santa Susana Feild Lab- GW Program 2016

Date: 4/13/16

Project No.: 94489.1204.009.909.09092.GWFIM

Sampled By: P. Hartman

Weather: Sunny, 70's

Reviewed By: W Treadway

PURGING

Static Water Level (TOC) ags	Time 12:00	Comments
Water Volume in Casing	Total Well Depth (TOC)	
Volume Purged Before Sampling	Screened Interval (TOC)	
Purging Method low flow	Stabilized Flow Rate	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
11:45	–	~250	17.3	881.1	8.21	35.5	–	–
11:50	–	~500	17.4	885.1	8.03	1.21	–	–
11:55	–	~800	17.4	885.0	7.94	0.36	–	–

SAMPLING

Sampling Method low flow

Analytical Matrix ☐Yes ☒No ☐Attached Time Sampled 12:00

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
6-40 mL VOA	HCL	–	–	ice
1-250 mL glass	none	–	–	–
2-1L poly	nitric	–	–	–
2-40mL VOA	none	–	–	ice

SAMPLE DATA

Appearance / Odor clear, none	
pH (last stabilized) 7.94	Temperature (°C) 17.4
Eh (millivolts)	Specific Conductance (microsiemens/cm) 885.0
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☒Yes ☐No Chain-of-Custody ID 20160413-01, 20160415-02

Duplicate Sample ID

Replicate Sample Nos. MS/MSD same name

Analytical Lab	Lab Name Pace, Eurofins Lancaster Date Sent to Lab 4/13/16, 4/15/16
	Shipment Method FedEx
Split with	Name (s)
	Organization (s)

Other MS/MSD collected

Comments water level above ground surface, not able to measure accurately

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1-250 mL poly	nitric	ice
1-250 mL poly	none	ice

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID No Sample

Well No. SP-900A

Project: SSFL - GW Program 2016
Date: 4-7-16
Project No.: 94489.1204.009.909.09092.UNFIW
Sampled By: MJusagen
Weather: overcast to partly cloudy
Reviewed By: PHartman

PURGING

Static Water Level (TOC)		**Time**	**Comments**
Water Volume in Casing		**Total Well Depth (TOC)**	
Volume Purged Before Sampling		**Screened Interval (TOC)**	
Purging Method		**Stabilized Flow Rate**	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1418	—	went dry after pumping 30sec						

SAMPLING

Sampling Method
Analytical Matrix ☐ Yes ☐ No ☐ Attached
Time Sampled

Sample Container	Preserved By	At What pH	Filter Type	Cooled By

SAMPLE DATA

Appearance / Odor	
pH (last stabilized)	Temperature (°C)
Eh (millivolts)	Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☐ Yes ☐ No		Chain-of-Custody ID
Duplicate Sample ID		Replicate Sample Nos.
Analytical Lab	Lab Name	Date Sent to Lab
	Shipment Method	
Split with	Name (s)	
	Organization (s)	
Other		
Comments	Water level meter / Probe will not fit in casing completion	

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID NA

Well No. SP-9[illegible]B

Project: SSFL GW Program 2016
Date: 4-7-16
Project No.: 94489.1201.009.909.09092.GWFIM
Sampled By: m Jusayer
Weather: OVERCAST TO PARTLY CLOUDY
Reviewed By: P Hartman

PURGING

Static Water Level (TOC)	Time	Comments
Water Volume in Casing	Total Well Depth (TOC)	
Volume Purged Before Sampling	Screened Interval (TOC)	
Purging Method	Stabilized Flow Rate	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1105	—	DRY	—	—	—	—	—	—

SAMPLING

Sampling Method

Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled

Sample Container	Preserved By	At What pH	Filter Type	Cooled By

SAMPLE DATA

Appearance / Odor

pH (last stabilized)	Temperature (°C)
Eh (millivolts)	Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☐ Yes ☐ No Chain-of-Custody ID

Duplicate Sample ID Replicate Sample Nos.

Analytical Lab	Lab Name	Date Sent to Lab
	Shipment Method	
Split with	Name (s)	
	Organization (s)	

Other

Comments

REV. 2007

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID ____________ Well No. SP 900C

Project: SSFL - GW Program 2016 Date: 4-7-16
Project No.: 944891204.009 909.D9092.GWFIM Sampled By: M Jusaycm
Weather: OVERCAST TO PARTLY CLOUDY Reviewed By: P Hartman

PURGING

Static Water Level (TOC)	**Time**	**Comments**
Water Volume in Casing	**Total Well Depth (TOC)**	
Volume Purged Before Sampling	**Screened Interval (TOC)**	
Purging Method	**Stabilized Flow Rate**	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1305	—	DRY		—				

SAMPLING

Sampling Method
Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled

Sample Container	Preserved By	At What pH	Filter Type	Cooled By

SAMPLE DATA

Appearance / Odor
pH (last stabilized) Temperature (°C)
Eh (millivolts) Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm) ORP

DISPOSITION

Chain-of-Custody ☐ Yes ☐ No Chain-of-Custody ID
Duplicate Sample ID Replicate Sample Nos.
Analytical Lab: Lab Name Date Sent to Lab
Shipment Method
Split with: Name (s)
Organization (s)
Other
Comments

REV. 2007 forms\low flow groundwater sampling record.doc

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

SP-TO3A

Sample ID No Sample

Well No. M-

Project: SSFL GW Program 2016 Date: 4-8-16

Project No.: 94489.1204.009.909 Sampled By: M Jusayan

Weather: OVERCAST MIST Reviewed By: PHartman

PURGING

Static Water Level (TOC)	**Time**	**Comments**
Water Volume in Casing	**Total Well Depth (TOC)**	
Volume Purged Before Sampling	**Screened Interval (TOC)**	
Purging Method	**Stabilized Flow Rate**	

Time	**DTW**	**Cumulative Volume**	**Temp (°C)**	**Specific Conductance (microsiemens/cm)**	**pH**	**Turbidity**	**Dissolved Oxygen**	**Oxidation-Reduction Potential**
		DRY						

SAMPLING

Sampling Method

Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled

Sample Container	**Preserved By**	**At What pH**	**Filter Type**	**Cooled By**

SAMPLE DATA

Appearance / Odor	
pH (last stabilized)	Temperature (°C)
Eh (millivolts)	Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☐ Yes ☐ No		Chain-of-Custody ID
Duplicate Sample ID		Replicate Sample Nos.
Analytical Lab	Lab Name	Date Sent to Lab
	Shipment Method	
Split with	Name (s)	
	Organization (s)	
Other		
Comments		

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID NA

Well No. SP-T02B

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4-8-16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: M Jusayan
Weather: OVERCAST, MIST
Reviewed By: P. Hartman

PURGING

Static Water Level (TOC) 7.10'	**Time** 0915	**Comments**
Water Volume in Casing	**Total Well Depth (TOC)** 12.42'	
Volume Purged Before Sampling —	**Screened Interval (TOC)** 10 - 12.42'	
Purging Method PERI. PUMP	**Stabilized Flow Rate**	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
0935	—	—	DRY	—	—	—	—	—

SAMPLING

Sampling Method

Analytical Matrix ☐ Yes ☐ No ☐ Attached

Time Sampled

Sample Container	Preserved By	At What pH	Filter Type	Cooled By

SAMPLE DATA

Appearance / Odor

pH (last stabilized)

Temperature (°C)

Eh (millivolts)

Specific Conductance (microsiemens/cm)

OVM-PID Headspace (ppm)

ORP

DISPOSITION

Chain-of-Custody ☐ Yes ☐ No

Chain-of-Custody ID

Duplicate Sample ID

Replicate Sample Nos.

Analytical Lab	Lab Name	Date Sent to Lab
	Shipment Method	
Split with	Name (s)	
	Organization (s)	

Other

Comments

CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-T02B_041216-01

Well No. SP-T02B

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4/12/16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: P. Hartman
Weather:
Reviewed By: W Treadway

PURGING

Static Water Level (TOC) 7.07	Time 14:00	Comments
Water Volume in Casing	Total Well Depth (TOC)	
Volume Purged Before Sampling	Screened Interval (TOC)	
Purging Method low flow	Stabilized Flow Rate	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential

SAMPLING

Sampling Method low flow

Analytical Matrix ☐ Yes ☒ No ☐ Attached Time Sampled

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
2-1L poly	nitric			none
1-250mL glass	none			none
3-40mL VOAs	HCL			ice

SAMPLE DATA

Appearance / Odor

pH (last stabilized)	Temperature (°C)
Eh (millivolts)	Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No Chain-of-Custody ID 20160406-02, 20160413-01

Duplicate Sample ID Replicate Sample Nos.

Analytical Lab	Lab Name Pace, Eurofins Lancaster Date Sent to Lab 4/12/16, 4/13/16
	Shipment Method Fed Ex
Split with	Name (s)
	Organization (s)

Other

Comments

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID NA

Well No.: RP-T02C

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4-8-16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: M Jusayen
Weather: OVERCAST, MIST
Reviewed By: P Hartman

PURGING

Static Water Level (TOC) 7.84'	**Time** 0945	**Comments**
Water Volume in Casing	**Total Well Depth (TOC)** ~~19 24.3~~ 24.3'	
Volume Purged Before Sampling —	**Screened Interval (TOC)** 19 - 24.3'	
Purging Method PERI. PUMP	**Stabilized Flow Rate**	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1000	—	—	15.5	1089	6.16		NM	-107
1003	—	— DRY	—	—	—	—	—	—

SAMPLING

Sampling Method

Analytical Matrix ☐ Yes ☐ No ☐ Attached Time Sampled

Sample Container	Preserved By	At What pH	Filter Type	Cooled By

SAMPLE DATA

Appearance / Odor

pH (last stabilized)
Temperature (°C)

Eh (millivolts)
Specific Conductance (microsiemens/cm)

OVM-PID Headspace (ppm)
ORP

DISPOSITION

Chain-of-Custody ☐ Yes ☐ No
Chain-of-Custody ID

Duplicate Sample ID
Replicate Sample Nos.

Analytical Lab: Lab Name
Date Sent to Lab
Shipment Method

Split with: Name (s)
Organization (s)

Other

Comments

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-T02C-041216-01

Well No. SP-T02C

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4/12/16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: P. Hartman
Weather:
Reviewed By: W Treadway

PURGING

Static Water Level (TOC)		Time 14:30	Comments
Water Volume in Casing		Total Well Depth (TOC)	
Volume Purged Before Sampling		Screened Interval (TOC)	
Purging Method low flow		Stabilized Flow Rate	

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential

SAMPLING

Sampling Method low flow

Analytical Matrix ☐ Yes ☒ No ☐ Attached
Time Sampled 14:30

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
2-1L poly	nitric	N/A	N/A	none
1-250 ml glass	none	↓	↓	none
3-40ml VOAs	HCl	↓	↓	ice

SAMPLE DATA

Appearance / Odor

pH (last stabilized)	Temperature (°C)
Eh (millivolts)	Specific Conductance (microsiemens/cm)
OVM-PID Headspace (ppm)	ORP

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No
Chain-of-Custody ID 20160406-02, 20160413-01

Duplicate Sample ID
Replicate Sample Nos.

Analytical Lab	Lab Name Pace, Eurofins Lancaster	Date Sent to Lab 4/12/16, 4/13/16
	Shipment Method Fed Ex	
Split with	Name (s)	
	Organization (s)	

Other

Comments

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CDM Smith

LOW FLOW GROUNDWATER SAMPLING RECORD

Sample ID SP-T02D-040616.01_L

Well No. SP-T02D

Project: Santa Susana Feild Lab- GW Program 2016
Date: 4-6-16
Project No.: 94489.1204.009.909.09092.GWFIM
Sampled By: MJusayen
Reviewed By: P Hartman
Weather: SUNNY, 80s, BREEZE

PURGING

Static Water Level (TOC) 7.47'	Time 1010	Comments INTAKE AT ~32' BTOC	
Water Volume in Casing	Total Well Depth (TOC) 35		
Volume Purged Before Sampling	Screened Interval (TOC) 30-35		
Purging Method PERI PUMP	Stabilized Flow Rate ~300 mL/min		

Time	DTW	Cumulative Volume	Temp (°C)	Specific Conductance (microsiemens/cm)	pH	Turbidity	Dissolved Oxygen	Oxidation-Reduction Potential
1025	NM		19.6	1079	6.69	22.7	NM	79
1030	↓		18. ~~16.9~~ 16.6	1079	6.69	16.3	NM	73
1035	↓		19.2	1077	6.72	5.18	NM	69
1040	↓		17.9	1078	6.73	4.85	NM	68
1045	↓		17.8	1078	6.75	4.21	NM	66

SAMPLING

Sampling Method LOW-FLOW

Analytical Matrix ☐ Yes ☒ No ☐ Attached

Time Sampled 1050

Sample Container	Preserved By	At What pH	Filter Type	Cooled By
3X 40mL VOAs	HCl	<2	—	ICE
1X 200mL AMBER	NONE	—	—	↓
2X 1L POLY	HNO3	<2	—	↓

SAMPLE DATA

Appearance / Odor CLEAR, NO SHEEN; NO ODOR

pH (last stabilized) 6.75
Temperature (°C) 17.8
Eh (millivolts) —
Specific Conductance (microsiemens/cm) 1078
OVM-PID Headspace (ppm)
ORP 66

DISPOSITION

Chain-of-Custody ☒ Yes ☐ No
Chain-of-Custody ID

Duplicate Sample ID SP-T02D-040616-30_L
Replicate Sample Nos.

Analytical Lab	Lab Name	Date Sent to Lab
	Shipment Method	
Split with	Name (s)	
	Organization (s)	

Other DUPLICATE COLLECTED AT 1300

Comments CAN NOT MEASURE DRAWDOWN DUE TO WELL Ø