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NASJRB WILLOW GROVE
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VALIDATED DATA PACKAGE, PC14023, NAS WILLOW GROVE PA
11/24/2014
RESOLUTION CONSULTANTS



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Data Validation Report

Project:	NAS JRB Willow Grove, PA	
Laboratory:	Shealy Environmental, Inc.	
Service Request:	PC14023	
Analyses/Method:	EPA SW-846 Method 6010C (ICP-AES), EPA SW-846 Method 7470A for Mercury in Liquid Waste (Manual Cold-Vapor Technique) EPA SW-846 Method 7471B for Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique)	
Validation Level:	Limited	
Resolution Consultants Project Number:	60276503.PP.QS	
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Reviewed by:	Lori Herberich/Resolution Consultants	File Name: PC14023 Metals.docx

SUMMARY

The samples listed below were collected by Resolution Consultants from the NAS JRB Willow Grove, PA site on March 13, 2014.

Sample ID	Matrix/Sample Type
SOM-EB-01-031314	Equipment blank
SOM-S-02D-031314	Field Duplicate of SOM-S-02-031314
APSSOM-S-01-031314	Soil
APSSOM-S-02-031314	Soil
APSSOM-S-03-031314	Soil
APSSOM-S04-0-031314	Soil
SOM-S-01-031314	Soil
SOM-S-02-031314	Soil
SOM-S-03-031314	Soil
SOM-S-04-031314	Soil
SOM-S-05-031314	Soil
SOM-S-06-031314	Soil
SOM-S-07-031314	Soil
SOM-S-08-031314	Soil
SOM-S-09-031314	Soil
SOM-S-10-031314	Soil

Data validation activities were conducted with reference to

- *DoD Quality Systems Manual (QSM) for Environmental Laboratories, version 4.2 (10/2010)* (October 2010);
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW846, specifically SW-846 Method 6010C, Inductively Coupled Plasma-Atomic Emission Spectrometry* (USEPA, 1996);
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW846, specifically SW-846 Method 7470A, Mercury in Liquid Waste (Manual Cold-Vapor Technique)* (USEPA, 1996) and/or *SW-846 Method 7471B Mercury In Solid or Semisolid Waste (Manual Cold-Vapor Technique)* (USEPA, 1996);
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (January 2010);
- the project-specific Sampling and Analysis Plan; and
- laboratory quality control (QC) limits, as applicable.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

- ✓ Data completeness (chain-of-custody (COC)/sample integrity)
- ✓ Holding times and sample preservation
- X Initial calibration/continuing calibration verification
- X Laboratory blanks/equipment blanks
- X ICP interference check standards
- X Matrix spike (MS) and/or matrix spike duplicate (MSD) results
- NA Laboratory duplicate results
- ✓ Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- X Field duplicates
- X ICP serial dilution results
- ✓ Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. The symbol (X) indicates that a quality control (QC) nonconformance resulted in the qualification of data. Any QC nonconformance that resulted in the qualification of data is discussed below. In addition, nonconformances or other issues that were noted during validation, but did not result in qualification of data, may be discussed for informational purposes only.

The data appear valid as reported and may be used for decision making purposes. Selected data points were estimated, negated, and/or rejected due to nonconformances of certain QC criteria (see discussion below). Qualified sample results are presented in Table 1.

RESULTS

Data Completeness

The data package was reviewed and found to meet acceptance criteria for completeness:

- The COCs were reviewed for completeness of information relevant to the samples and requested analyses, and for signatures indicating transfer of sample custody.
- The laboratory sample login sheet(s) were reviewed for issues potentially affecting sample integrity, including the condition of sample containers upon receipt at the laboratory.
- Completeness of analyses was verified by comparing the reported results to the COC requests.

Holding Times/Sample Preservation

Sample preservation and preparation/analysis holding times were reviewed for conformance with the QC acceptance criteria.

The QC acceptance criteria were met.

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- all criteria were met for the calibration curves
- the initial calibration verification (ICV) percent recovery (%R) criteria were met;
- the continuing calibration verification standard (CCV) method percent difference (%Ds) were met; and
- the low level check standards (CRI or CRA) %R criteria were met.

Nonconformances are summarized in Attachment A in Table A-1. Data qualification to the analytes associated with the specific ICV, CCV and/or CRI/CRA was as follows:

ICV/CCV Nonconformances:

Qualification based on ICV/CCV	%R of Analyte in the ICV/CCV and Recommended Actions				
	< 75%	75 to 89%	111 to 125%	126 to 160%	> 160%
<u>ICP-AES and ICP-MS Metals (ICV/CCV) and Mercury (ICV)</u>	< 65%	65 to 79%	121 to 135%	136 to 170%	> 170%
<u>Mercury (CCV)</u>	< 65%	65 to 79%	121 to 135%	136 to 170%	> 170%
Detected Results	J- or R	J-	J+ [1]	J+ or R	R
Nondetects	R	UJ	Accept	Accept	Accept

Qualified sample results are shown in Table 1.

CRI/CRA Nonconformances:

Qualification based on CRI/CRA	%R of Analyte in the CRI/CRA and Recommended Actions			
	< 50%	50 to 79%	121 to 180%	> 180%
All Analytes				
Detected Results > 2x the CRI/CRA	J- [1]	Accept	Accept	R
Detected Results < 2x the CRI/CRA	R	J-	J+	R
Nondetects	R	UJ	Accept	Accept

[1] A "J" is the recommended qualifier in the NFGs; however, Resolution Consultants will indicate bias in these instances.

Qualified sample results are shown in Table 1.

Laboratory Blanks/Equipment Blanks

Laboratory method blanks and equipment rinsate blanks were evaluated as to whether there were contaminants detected above the detection limit (DL). Data validation qualifications for individual samples are based on the maximum contaminant concentration detected in all associated blanks.

Method and equipment rinsate results were reviewed for conformance with the QC acceptance criteria. Detected results in blanks are not discussed in this data validation report if the associated results were nondetect or if qualification of sample results was not required.

Nonconformances are summarized in Attachment A in Tables A-2a, A-2b, and A-2c. Sample results were qualified as follows:

Blank Type	Blank Result	Sample Result	Action for Samples
ICB/CCB (Positive)	≥DL but ≤ LOQ	Nondetect	No action
		≥DL but ≤LOQ	Qualify as nondetect (U) at the LOQ
		> LOQ	No action is taken based on Resolution Consultants professional judgment
	>LOQ	≥DL but ≤LOQ	Qualify as nondetect (U) at the LOQ
		> LOQ but < ICB/CCB Result	Qualify at level of Blank Result with a "U" or Qualify result as unusable
		>ICB/CCB but <10x the ICB/CCB result	Qualify as estimated (J)
	≥10x ICB/CCB	No action is taken based on Resolution Consultants professional judgment	
ICB/CCB (Negative)	< (-LOQ)	Nondetect	Use Resolution Consultants professional judgment and qualify as estimated (UJ)
		≥DL but < LOQ	Use Resolution Consultants professional judgment and qualify results < LOQ as estimated (J)
		< 10x LOQ	Qualify results >LOQ but <10x LOQ as estimated (J)
		≥10x LOQ	No action is taken based on Resolution Consultants professional judgment
	≤ -DL and ≥ -LOQ	Nondetect	Use Resolution Consultants professional judgment, qualify as estimated (UJ)
		≥DL and <5x [neg. blank]	Use Resolution Consultants professional judgment, qualify results as estimated (J)
PB / EB/ FB (Positive)	> LOQ	≥DL but ≤ LOQ	Qualify as nondetect (U) at the LOQ
		>LOQ but < 10x Blank Result	Qualify results as unusable
		≥10x Blank Result	No action

Blank Type	Blank Result	Sample Result	Action for Samples
	≥DL but ≤LOQ	Nondetect	No action
		>DL but <LOQ	Qualify as nondetect (U) at the LOQ
		> LOQ	No action is taken based on Resolution Consultants professional judgment
PB (Negative)	< (-LOQ)	< 10x LOQ	Qualify positive results <10x LOQ as estimated (J) and nondetects as estimated (UJ)
		≥10x LOQ	No action

Qualified sample results are shown in Table 1.

ICP Interference Check Standards

The ICP interference check standards (ICSA, ICSAB) were reviewed for conformance.

Nonconformances are summarized in Attachment A in Table A-3. Data qualification on the basis of the ICS A and ICS AB solutions was as follows:

ICS A and ICS AB Nonconformances:

Qualify Results	% R of Analyte in the ICS A and AB Solutions		
	%R < 50	%R = 50 - 79 or < true value - LOD	%R > 120 or > true value + LOD
Detected Results	J- / R (6010B/6020)	J-	J+
Nondetects	R	UJ	Accept

Limited Validation: Apply actions to all samples in the analytical sequence.

MS Results

The MS and/or MSD %Rs and/or RPDs were reviewed for conformance with the QC acceptance criteria. There were two samples analyzed as matrix spikes in this SDG.

Sample APSSOM-S-01-031314 (PC14023-001) was analyzed as an MS in this SDG. Due to recovery less than 30%, the nondetect result for thallium in sample APSSOM-S-01-031314 was rejected (R). The recoveries for antimony, barium, beryllium, lead, and nickel were below QC criteria in the MS. The results for antimony, calcium, beryllium, lead, and nickel in sample APSSOM-S-01-031314 were qualified as estimated (J-) and may be biased low. The recoveries for calcium, magnesium, manganese, and potassium were above QC criteria; therefore, the positive results for calcium, magnesium, manganese, and potassium in sample APSSOM-S-01-031314 were qualified as estimated (J+) and may be biased high. Since the results for aluminum and iron in the spiked sample were greater than 4X the spiked amount; no qualifications were required.

Sample SOM-S-01-031314 (PC4023-005) was analyzed as an MS/MSD in this SDG. Qualifications for sample APSSOM-S-01-031314 (PC14023-001) were based on the recoveries for the matrix spike performed on that sample. Qualifications for the other soil samples in this SDG were based on the recoveries and RPDs of the MS/MSD performed on sample SOM-S-01-031314 (PC4023-005).

For sample SOM-S-01-031314 (PC4023-005), the recovery for thallium was less than 30% in the MSD. As a result, the nondetect results for thallium in all soil samples in this SDG were rejected (R). The recoveries of potassium in the MS/MSD were above QC criteria; therefore, the positive results for potassium in all soil samples except APSSOM-S-01-031314 were qualified as estimated (J+) and may be biased high. The recoveries of antimony, barium, beryllium, cobalt, lead, nickel, selenium, and zinc were below QC criteria; therefore, the positive and nondetect results for

antimony, barium, beryllium, cobalt, lead, nickel, selenium, and zinc were qualified as estimated (J-) and may be biased low. The recovery of manganese was less than 30% in the MS and above criteria in the MSD, with relative percent difference (RPD) above criteria. Since the sample result for manganese was nearly 4X the spiked amount, professional judgment was used to qualify as estimated (J) and not reject results for manganese in all soil samples except APSSOM-S-01-031314. Since the results for aluminum and iron in the spiked sample were greater than 4X the spiked amount; no qualifications were required for these analytes.

Nonconformances are summarized in Attachment A in Table A-4. Data qualification on the basis of MS and/or MSD nonconformances was as follows:

Qualify Results	%R < 30	80 > %R ≥ 30	%R >120	RPD>20
Detected results	J-	J-	J+	J
Nondetects	R	UJ	Accept	UJ

Notes: MS actions apply to all samples of the same matrix. This qualification will also be applied to the results of all samples within a given area of the site, if deemed appropriate.

1. If the sample result (SR) > 4x the spike concentration (S), no action is taken.
2. If either the MS or MSD does not meet %R criteria, qualify all associated samples.

Qualified sample results are shown in Table 1.

Laboratory Duplicate Results

A laboratory duplicate was not analyzed in this SDG. The relative percent differences (RPDs) of the MS/MSD were reviewed for conformance. See Matrix Spike section for RPD criteria.

LCS/LCSD Results

The LCS/LCSD %Rs and/or RPDs were reviewed for conformance with the QC acceptance criteria.

The LCS and LCSD %Rs and RPDs were within the QC acceptance criteria.

Field Duplicate Results

Field duplicate RPDs were reviewed for conformance with the Resolution Consultants QC acceptance criterion of ≤50% for solid matrices and ≤30% for aqueous matrices. This criterion applies if both results were greater than 5 times the LOQ.

Sample SOM-S-02D-031314 was collected as the field duplicate of sample SOM-S-02-031314 in this SDG.

Nonconformances are summarized in Attachment A in Table A-5. Data qualifications on the basis of field duplicate RPDs were as follows:

Actions: (Based on Resolution Consultants professional judgment)

Criteria	RPD	Action	
		Detected	Nondetected
Sample and duplicate are nondetect results	Not calculable (NC)	No qualification	No qualification
Sample and duplicate results <LOQ	Not applicable	No qualification	No qualification
Sample and duplicate results $\geq 5 \times \text{LOQ}$	>30% Aqueous >50% All other sample types	J	Not Applicable
Sample and duplicate results are >SLOQ and <5xSLOQ	>60% Aqueous >100% All other sample types	J	Not Applicable
If sample or duplicate result is =LOQ and the other is not detected	NC	J	UJ
If sample or duplicate result is <LOQ and the other is not detected	NC	No qualification	No qualification

Qualified sample results are summarized in Table 1.

ICP Serial Dilution Results

The serial dilution percent differences (%Ds) were reviewed for conformance with the QC acceptance criteria.

Due to laboratory oversight, a post-digestion spike was not analyzed in this SDG when serial dilution recoveries were not within QC limits. Additional qualification of the data was not required.

Nonconformances are summarized in Attachment A in Table A-6. Data qualifications on the basis of serial dilution %Ds were as follows:

%D	Qualify Results
>10%	Estimate (J) detected results

Apply actions to all samples in the same preparation batch if sample results are >50X LOQ.

Qualified sample results are shown in Table 1.

Sample Results/Reporting Issues

All analytes detected at concentrations less than the LOQ but greater than the detection limit (DL) were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation.

Resolution Consultants professional judgment was used to qualify sample results with percent solids that were <30%.

All criteria were met.

QUALIFICATION ACTIONS

Sample results qualified as a result of validation actions are summarized in Table 1. All actions are described above.

ATTACHMENTS

Attachment A: Nonconformance Summary Tables

Attachment B: Qualifier Codes and Explanations

Attachment C: Reason Codes and Explanations

Table 1 - Data Validation Summary of Qualified Data

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
APSSOM-S-01-031314	SO	ALUMINUM	13000	6.5	13	MG/KG	J	y
APSSOM-S-01-031314	SO	ANTIMONY	0.77	0.32	0.63	MG/KG	J	c,m,fd
APSSOM-S-01-031314	SO	BARIUM	83	0.31	1.6	MG/KG	J	m,y
APSSOM-S-01-031314	SO	BERYLLIUM	0.41	0.13	0.25	MG/KG	J-	m
APSSOM-S-01-031314	SO	CALCIUM	4300	64	320	MG/KG	J+	m
APSSOM-S-01-031314	SO	CHROMIUM, TOTAL	27	0.16	0.32	MG/KG	J	y
APSSOM-S-01-031314	SO	IRON	21000	3.2	6.3	MG/KG	J	y
APSSOM-S-01-031314	SO	LEAD	18	0.32	0.63	MG/KG	J	m,y
APSSOM-S-01-031314	SO	MAGNESIUM	3800	64	320	MG/KG	J+	m
APSSOM-S-01-031314	SO	MANGANESE	340	0.19	0.95	MG/KG	J	m,y
APSSOM-S-01-031314	SO	NICKEL	12	0.50	2.5	MG/KG	J-	m
APSSOM-S-01-031314	SO	POTASSIUM	1400	32	320	MG/KG	J+	m
APSSOM-S-01-031314	SO	THALLIUM				MG/KG	R	m,z
APSSOM-S-01-031314	SO	ZINC	66	1.6	3.2	MG/KG	J	y
APSSOM-S-02-031314	SO	ALUMINUM	14000	6.0	12	MG/KG	J	y
APSSOM-S-02-031314	SO	ANTIMONY	2.2	0.31	0.62	MG/KG	J	c,m,fd
APSSOM-S-02-031314	SO	BARIUM	100	0.31	1.6	MG/KG	J	m,y
APSSOM-S-02-031314	SO	BERYLLIUM	0.47	0.13	0.25	MG/KG	J-	m
APSSOM-S-02-031314	SO	CHROMIUM, TOTAL	28	0.16	0.31	MG/KG	J	y
APSSOM-S-02-031314	SO	COBALT	6.4	0.31	1.6	MG/KG	J-	m
APSSOM-S-02-031314	SO	IRON	20000	3.1	6.2	MG/KG	J	y
APSSOM-S-02-031314	SO	LEAD	29	0.31	0.62	MG/KG	J	m,y
APSSOM-S-02-031314	SO	MANGANESE	410	0.19	0.93	MG/KG	J	m,md,y
APSSOM-S-02-031314	SO	NICKEL	12	0.50	2.5	MG/KG	J-	m
APSSOM-S-02-031314	SO	POTASSIUM	900	31	310	MG/KG	J+	m
APSSOM-S-02-031314	SO	SELENIUM		0.31	0.62	MG/KG	UJ	m
APSSOM-S-02-031314	SO	THALLIUM				MG/KG	R	m,z
APSSOM-S-02-031314	SO	ZINC	81	1.6	3.1	MG/KG	J	m,y
APSSOM-S-03-031314	SO	ALUMINUM	17000	7.0	14	MG/KG	J	y
APSSOM-S-03-031314	SO	ANTIMONY		0.69	0.69	MG/KG	UJ	bl,m,fd
APSSOM-S-03-031314	SO	BARIUM	91	0.35	1.8	MG/KG	J	m,y
APSSOM-S-03-031314	SO	BERYLLIUM	0.60	0.14	0.28	MG/KG	J-	m
APSSOM-S-03-031314	SO	CHROMIUM, TOTAL	29	0.18	0.35	MG/KG	J	y
APSSOM-S-03-031314	SO	COBALT	7.4	0.35	1.8	MG/KG	J-	m
APSSOM-S-03-031314	SO	IRON	24000	3.5	6.9	MG/KG	J	y
APSSOM-S-03-031314	SO	LEAD	19	0.34	0.69	MG/KG	J	m,y
APSSOM-S-03-031314	SO	MANGANESE	380	0.20	1.0	MG/KG	J	m,md,y
APSSOM-S-03-031314	SO	NICKEL	15	0.56	2.8	MG/KG	J-	m
APSSOM-S-03-031314	SO	POTASSIUM	2900	35	350	MG/KG	J+	m

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
APSSOM-S-03-031314	SO	SELENIUM		0.34	0.69	MG/KG	UJ	m
APSSOM-S-03-031314	SO	THALLIUM				MG/KG	R	m,z
APSSOM-S-03-031314	SO	ZINC	52	1.8	3.5	MG/KG	J	m,y
APSSOM-S04-0-031314	SO	ALUMINUM	15000	8.0	16	MG/KG	J	y
APSSOM-S04-0-031314	SO	ANTIMONY		0.79	0.79	MG/KG	UJ	bl,m,fd
APSSOM-S04-0-031314	SO	BARIUM	100	0.40	2.1	MG/KG	J	m,y
APSSOM-S04-0-031314	SO	BERYLLIUM	0.67	0.16	0.32	MG/KG	J-	m
APSSOM-S04-0-031314	SO	CHROMIUM, TOTAL	37	0.20	0.39	MG/KG	J	y
APSSOM-S04-0-031314	SO	COBALT	9.7	0.40	2.1	MG/KG	J-	m
APSSOM-S04-0-031314	SO	IRON	25000	4.0	7.9	MG/KG	J	y
APSSOM-S04-0-031314	SO	LEAD	23	0.40	0.79	MG/KG	J	m,y
APSSOM-S04-0-031314	SO	MANGANESE	450	0.24	1.2	MG/KG	J	m,md,y
APSSOM-S04-0-031314	SO	NICKEL	20	0.64	3.2	MG/KG	J-	m
APSSOM-S04-0-031314	SO	POTASSIUM	3500	39	390	MG/KG	J+	m
APSSOM-S04-0-031314	SO	SELENIUM		0.40	0.79	MG/KG	UJ	m
APSSOM-S04-0-031314	SO	THALLIUM				MG/KG	R	m,z
APSSOM-S04-0-031314	SO	ZINC	110	2.0	3.9	MG/KG	J	m,y
SOM-EB-01-031314	WQ	ARSENIC		0.010	0.010	MG/L	U	bl
SOM-EB-01-031314	WQ	MERCURY		0.00010	0.00010	MG/L	U	bl
SOM-S-01-031314	SO	ALUMINUM	17000	6.5	13	MG/KG	J	y
SOM-S-01-031314	SO	ANTIMONY		0.64	0.64	MG/KG	UJ	bl,m,fd
SOM-S-01-031314	SO	BARIUM	120	0.33	1.7	MG/KG	J	m,y
SOM-S-01-031314	SO	BERYLLIUM	0.56	0.13	0.26	MG/KG	J-	m
SOM-S-01-031314	SO	CHROMIUM, TOTAL	24	0.16	0.32	MG/KG	J	y
SOM-S-01-031314	SO	COBALT	6.6	0.33	1.7	MG/KG	J-	m
SOM-S-01-031314	SO	IRON	19000	3.2	6.4	MG/KG	J	y
SOM-S-01-031314	SO	LEAD	120	0.32	0.64	MG/KG	J	m,y
SOM-S-01-031314	SO	MANGANESE	510	0.19	0.96	MG/KG	J	m,md,y
SOM-S-01-031314	SO	NICKEL	12	0.52	2.6	MG/KG	J-	m
SOM-S-01-031314	SO	POTASSIUM	1100	32	320	MG/KG	J+	m
SOM-S-01-031314	SO	SELENIUM		0.32	0.64	MG/KG	UJ	m
SOM-S-01-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-01-031314	SO	ZINC	120	1.6	3.2	MG/KG	J	m,y
SOM-S-02-031314	SO	ALUMINUM	20000	6.0	12	MG/KG	J	y
SOM-S-02-031314	SO	ANTIMONY	0.91	0.31	0.62	MG/KG	J	m,fd
SOM-S-02-031314	SO	BARIUM	79	0.31	1.6	MG/KG	J	m,y
SOM-S-02-031314	SO	BERYLLIUM	0.41	0.13	0.25	MG/KG	J-	m
SOM-S-02-031314	SO	CHROMIUM, TOTAL	28	0.16	0.31	MG/KG	J	y
SOM-S-02-031314	SO	COBALT	5.7	0.31	1.6	MG/KG	J-	m

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
SOM-S-02-031314	SO	IRON	24000	3.1	6.2	MG/KG	J	y
SOM-S-02-031314	SO	LEAD	15	0.31	0.62	MG/KG	J	m,y
SOM-S-02-031314	SO	MANGANESE	320	0.19	0.93	MG/KG	J	m,md,y
SOM-S-02-031314	SO	NICKEL	12	0.50	2.5	MG/KG	J-	m
SOM-S-02-031314	SO	POTASSIUM	1300	31	310	MG/KG	J+	m
SOM-S-02-031314	SO	SELENIUM		0.31	0.62	MG/KG	UJ	m
SOM-S-02-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-02-031314	SO	ZINC	36	1.6	3.1	MG/KG	J	m,y
SOM-S-02D-031314	SO	ALUMINUM	21000	6.5	13	MG/KG	J	y
SOM-S-02D-031314	SO	ANTIMONY	2.8	0.32	0.63	MG/KG	J	c,m,fd
SOM-S-02D-031314	SO	BARIUM	84	0.31	1.6	MG/KG	J	m,y
SOM-S-02D-031314	SO	BERYLLIUM	0.39	0.13	0.25	MG/KG	J-	m
SOM-S-02D-031314	SO	CHROMIUM, TOTAL	28	0.16	0.32	MG/KG	J	y
SOM-S-02D-031314	SO	COBALT	5.7	0.31	1.6	MG/KG	J-	m
SOM-S-02D-031314	SO	IRON	25000	3.2	6.3	MG/KG	J	y
SOM-S-02D-031314	SO	LEAD	16	0.32	0.63	MG/KG	J	m,y
SOM-S-02D-031314	SO	MANGANESE	270	0.19	0.95	MG/KG	J	m,md,y
SOM-S-02D-031314	SO	NICKEL	13	0.50	2.5	MG/KG	J-	m
SOM-S-02D-031314	SO	POTASSIUM	1300	32	320	MG/KG	J+	m
SOM-S-02D-031314	SO	SELENIUM		0.32	0.63	MG/KG	UJ	m
SOM-S-02D-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-02D-031314	SO	ZINC	37	1.6	3.2	MG/KG	J	m,y
SOM-S-03-031314	SO	ALUMINUM	19000	6.5	13	MG/KG	J	y
SOM-S-03-031314	SO	ANTIMONY		0.63	0.63	MG/KG	UJ	bl,m,fd
SOM-S-03-031314	SO	BARIUM	110	0.31	1.6	MG/KG	J	m,y
SOM-S-03-031314	SO	BERYLLIUM	0.64	0.13	0.25	MG/KG	J-	m
SOM-S-03-031314	SO	CHROMIUM, TOTAL	21	0.16	0.32	MG/KG	J	y
SOM-S-03-031314	SO	COBALT	5.8	0.31	1.6	MG/KG	J-	m
SOM-S-03-031314	SO	IRON	17000	3.2	6.3	MG/KG	J	y
SOM-S-03-031314	SO	LEAD	16	0.32	0.63	MG/KG	J	m,y
SOM-S-03-031314	SO	MANGANESE	460	0.19	0.95	MG/KG	J	m,md,y
SOM-S-03-031314	SO	NICKEL	12	0.50	2.5	MG/KG	J-	m
SOM-S-03-031314	SO	POTASSIUM	1300	32	320	MG/KG	J+	m
SOM-S-03-031314	SO	SELENIUM		0.32	0.63	MG/KG	UJ	m
SOM-S-03-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-03-031314	SO	ZINC	35	1.6	3.2	MG/KG	J	m,y
SOM-S-04-031314	SO	ALUMINUM	19000	7.0	14	MG/KG	J	y
SOM-S-04-031314	SO	ANTIMONY	0.72	0.36	0.72	MG/KG	J	m,fd
SOM-S-04-031314	SO	BARIUM	120	0.37	1.9	MG/KG	J	m,y

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
SOM-S-04-031314	SO	BERYLLIUM	0.49	0.15	0.29	MG/KG	J-	m
SOM-S-04-031314	SO	CHROMIUM, TOTAL	23	0.18	0.36	MG/KG	J	y
SOM-S-04-031314	SO	COBALT	6.6	0.37	1.9	MG/KG	J-	m
SOM-S-04-031314	SO	IRON	19000	3.6	7.2	MG/KG	J	y
SOM-S-04-031314	SO	LEAD	62	0.36	0.72	MG/KG	J	m,y
SOM-S-04-031314	SO	MANGANESE	540	0.22	1.1	MG/KG	J	m,md,y
SOM-S-04-031314	SO	NICKEL	13	0.58	2.9	MG/KG	J-	m
SOM-S-04-031314	SO	POTASSIUM	1600	36	360	MG/KG	J+	m
SOM-S-04-031314	SO	SELENIUM		0.36	0.72	MG/KG	UJ	m
SOM-S-04-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-04-031314	SO	ZINC	86	1.8	3.6	MG/KG	J	m,y
SOM-S-05-031314	SO	ALUMINUM	20000	6.5	13	MG/KG	J	y
SOM-S-05-031314	SO	ANTIMONY	0.69	0.32	0.64	MG/KG	J	c,m,fd
SOM-S-05-031314	SO	BARIUM	110	0.33	1.7	MG/KG	J	m,y
SOM-S-05-031314	SO	BERYLLIUM	0.56	0.13	0.26	MG/KG	J-	m
SOM-S-05-031314	SO	CHROMIUM, TOTAL	24	0.16	0.32	MG/KG	J	y
SOM-S-05-031314	SO	COBALT	6.7	0.33	1.7	MG/KG	J-	m
SOM-S-05-031314	SO	IRON	18000	3.2	6.4	MG/KG	J	y
SOM-S-05-031314	SO	LEAD	30	0.32	0.64	MG/KG	J	c,m,y
SOM-S-05-031314	SO	MANGANESE	550	0.19	0.96	MG/KG	J	m,md,y
SOM-S-05-031314	SO	NICKEL	24	0.52	2.6	MG/KG	J-	m
SOM-S-05-031314	SO	POTASSIUM	1300	32	320	MG/KG	J+	m
SOM-S-05-031314	SO	SELENIUM		0.32	0.64	MG/KG	UJ	m
SOM-S-05-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-05-031314	SO	ZINC	62	1.6	3.2	MG/KG	J	m,y
SOM-S-06-031314	SO	ALUMINUM	18000	6.0	12	MG/KG	J	y
SOM-S-06-031314	SO	ANTIMONY		0.61	0.61	MG/KG	UJ	bl,m,fd
SOM-S-06-031314	SO	BARIUM	81	0.31	1.6	MG/KG	J	m,y
SOM-S-06-031314	SO	BERYLLIUM	0.42	0.12	0.24	MG/KG	J-	m
SOM-S-06-031314	SO	CHROMIUM, TOTAL	22	0.15	0.30	MG/KG	J	y
SOM-S-06-031314	SO	COBALT	5.8	0.31	1.6	MG/KG	J-	m
SOM-S-06-031314	SO	IRON	18000	3.1	6.1	MG/KG	J	y
SOM-S-06-031314	SO	LEAD	19	0.31	0.61	MG/KG	J	m,y
SOM-S-06-031314	SO	MANGANESE	350	0.18	0.91	MG/KG	J	m,md,y
SOM-S-06-031314	SO	NICKEL	11	0.48	2.4	MG/KG	J-	m
SOM-S-06-031314	SO	POTASSIUM	1000	30	300	MG/KG	J+	m
SOM-S-06-031314	SO	SELENIUM		0.31	0.61	MG/KG	UJ	m
SOM-S-06-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-06-031314	SO	ZINC	36	1.5	3.0	MG/KG	J	m,y

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
SOM-S-07-031314	SO	ALUMINUM	21000	6.5	13	MG/KG	J	y
SOM-S-07-031314	SO	ANTIMONY		0.66	0.66	MG/KG	UJ	bl,m,fd
SOM-S-07-031314	SO	BARIUM	90	0.33	1.7	MG/KG	J	m,y
SOM-S-07-031314	SO	BERYLLIUM	0.37	0.13	0.26	MG/KG	J-	m
SOM-S-07-031314	SO	CHROMIUM, TOTAL	23	0.17	0.33	MG/KG	J	y
SOM-S-07-031314	SO	COBALT	6.2	0.33	1.7	MG/KG	J-	m
SOM-S-07-031314	SO	IRON	19000	3.3	6.6	MG/KG	J	y
SOM-S-07-031314	SO	LEAD	32	0.33	0.66	MG/KG	J	m,y
SOM-S-07-031314	SO	MANGANESE	370	0.20	0.99	MG/KG	J	m,md,y
SOM-S-07-031314	SO	NICKEL	13	0.52	2.6	MG/KG	J-	m
SOM-S-07-031314	SO	POTASSIUM	1400	33	330	MG/KG	J+	m
SOM-S-07-031314	SO	SELENIUM		0.33	0.66	MG/KG	UJ	m
SOM-S-07-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-07-031314	SO	ZINC	68	1.7	3.3	MG/KG	J	m,y
SOM-S-08-031314	SO	ALUMINUM	18000	6.0	12	MG/KG	J	y
SOM-S-08-031314	SO	ANTIMONY	2.3	0.30	0.60	MG/KG	J	c,m,fd
SOM-S-08-031314	SO	BARIUM	110	0.31	1.6	MG/KG	J	m,y
SOM-S-08-031314	SO	BERYLLIUM	0.47	0.12	0.24	MG/KG	J-	m
SOM-S-08-031314	SO	CHROMIUM, TOTAL	25	0.15	0.30	MG/KG	J	y
SOM-S-08-031314	SO	COBALT	6.3	0.31	1.6	MG/KG	J-	m
SOM-S-08-031314	SO	IRON	19000	3.0	6.0	MG/KG	J	y
SOM-S-08-031314	SO	LEAD	77	0.30	0.60	MG/KG	J	m,y
SOM-S-08-031314	SO	MANGANESE	380	0.18	0.90	MG/KG	J	m,md,y
SOM-S-08-031314	SO	NICKEL	12	0.48	2.4	MG/KG	J-	m
SOM-S-08-031314	SO	POTASSIUM	1100	30	300	MG/KG	J+	m
SOM-S-08-031314	SO	SELENIUM		0.30	0.60	MG/KG	UJ	m
SOM-S-08-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-08-031314	SO	ZINC	71	1.5	3.0	MG/KG	J	m,y
SOM-S-09-031314	SO	ALUMINUM	18000	6.0	12	MG/KG	J	y
SOM-S-09-031314	SO	ANTIMONY	1.9	0.30	0.59	MG/KG	J	c,m,fd
SOM-S-09-031314	SO	BARIUM	86	0.29	1.5	MG/KG	J	m,y
SOM-S-09-031314	SO	BERYLLIUM	0.83	0.12	0.24	MG/KG	J-	m
SOM-S-09-031314	SO	CHROMIUM, TOTAL	24	0.15	0.29	MG/KG	J	y
SOM-S-09-031314	SO	COBALT	9.2	0.29	1.5	MG/KG	J-	m
SOM-S-09-031314	SO	IRON	20000	3.0	5.9	MG/KG	J	y
SOM-S-09-031314	SO	LEAD	29	0.30	0.59	MG/KG	J	m,y
SOM-S-09-031314	SO	MANGANESE	830	0.18	0.88	MG/KG	J	m,md,y
SOM-S-09-031314	SO	NICKEL	15	0.48	2.4	MG/KG	J-	m
SOM-S-09-031314	SO	POTASSIUM	790	29	290	MG/KG	J+	m

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
SOM-S-09-031314	SO	SELENIUM		0.30	0.59	MG/KG	UJ	m
SOM-S-09-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-09-031314	SO	ZINC	46	1.5	2.9	MG/KG	J	m,y
SOM-S-10-031314	SO	ALUMINIUM	15000	6.5	13	MG/KG	J	y
SOM-S-10-031314	SO	ANTIMONY		0.65	0.65	MG/KG	UJ	bl,m,fd
SOM-S-10-031314	SO	BARIUM	120	0.33	1.7	MG/KG	J	m,y
SOM-S-10-031314	SO	BERYLLIUM	0.63	0.13	0.26	MG/KG	J-	m
SOM-S-10-031314	SO	CHROMIUM, TOTAL	20	0.16	0.32	MG/KG	J	y
SOM-S-10-031314	SO	COBALT	6.3	0.33	1.7	MG/KG	J-	m
SOM-S-10-031314	SO	IRON	17000	3.3	6.5	MG/KG	J	y
SOM-S-10-031314	SO	LEAD	96	0.33	0.65	MG/KG	J	m,y
SOM-S-10-031314	SO	MANGANESE	450	0.19	0.97	MG/KG	J	m,md,y
SOM-S-10-031314	SO	NICKEL	11	0.52	2.6	MG/KG	J-	m
SOM-S-10-031314	SO	POTASSIUM	1000	32	320	MG/KG	J+	m
SOM-S-10-031314	SO	SELENIUM		0.33	0.65	MG/KG	UJ	m
SOM-S-10-031314	SO	THALLIUM				MG/KG	R	m,z
SOM-S-10-031314	SO	ZINC	92	1.6	3.2	MG/KG	J	m,y

Attachment A

Nonconformance Summary Tables

Table A-1 Initial Calibration/Continuing Calibration Verification

ICV/CCV/CRI ID	Compound	% Recovery	Lower Limit	Upper Limit	Associated Samples
CRDL1 3/24/14 23:35	ANTIMONY	79	90	110	APSSOM-S-01-031314 APSSOM-S-02-031314 SOM-S-02D-031314 SOM-S-05-031314 SOM-S-08-031314 SOM-S-09-031314
CRDL1 3/24/14 23:35	CADMIUM	135	90	110	SOM-S-05-031314
CRDL1 3/24/14 23:35	LEAD	74	90	110	SOM-S-05-031314

Table A-2a Lab Blanks

Blank ID	Compound	Result	LOD	LOQ	Units	Associated Samples
PQ42652-001	ALUMINUM	4.4	4.8	9.6	MG/KG	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
PQ42652-001	ANTIMONY	0.18	0.24	0.48	MG/KG	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314

Blank ID	Compound	Result	LOD	LOQ	Units	Associated Samples
PQ42652-001	CALCIUM	46	48	240	MG/KG	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
PQ42652-001	SELENIUM	0.20	0.24	0.48	MG/KG	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
PQ42652-001	THALLIUM	0.27	0.48	2.4	MG/KG	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
PQ42978-001	ANTIMONY	0.0032	0.0050	0.010	MG/L	SOM-EB-01-031314
PQ42978-001	ARSENIC	0.0067	0.0050	0.010	MG/L	SOM-EB-01-031314
PQ43215-001	MERCURY	0.000016	0.000050	0.00010	MG/L	SOM-EB-01-031314

Table A-2b Calibration Blanks

Blank ID	Compound	Result	LOD	LOQ	Units	Associated Samples
SOIL						
ICB1 3/21/14 19:55	SELENIUM	0.0036	0.0050	0.010	MG/L	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314
CCB2 3/21/14 21:06	ANTIMONY	0.0031	0.0050	0.010	MG/L	APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
CCB2 3/21/14 21:06	ARSENIC	0.0031	0.0050	0.0010	MG/L	APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
CCB3 3/21/14 21:51	ANTIMONY	0.0039	0.0050	0.010	MG/L	SOM-S-02-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-10-031314
CCB4 3/21/14 22:10	ANTIMONY	0.0031	0.0050	0.010	MG/L	SOM-S-10-031314
CCB1 3/25/14 00:12	ANTIMONY	0.0063	0.0050	0.010	MG/L	APSSOM-S-01-031314 APSSOM-S-02-031314
CCB2 3/25/14 00:57	ARSENIC	0.0059	0.0050	0.010	MG/L	SOM-S-07-031314

Blank ID	Compound	Result	LOD	LOQ	Units	Associated Samples
CCB3 3/25/14 01:42	ANTIMONY	0.0068	0.0050	0.010	MG/L	SOM-S-02D-031314 SOM-S-05-031314 SOM-S-08-031314 SOM-S-09-031314
CCB3 3/25/14 01:42	ARSENIC	0.0033	0.0050	0.010	MG/L	SOM-S-07-031314
AQUEOUS						
ICB1 3/25/14 07:30	ARSENIC	0.0038	0.0050	0.010	MG/L	SOM-EB-01-031314

Table A-2c Field Blanks

Blank ID	Compound	Result	LOD	LOQ	Units	Associated Samples
SOM-EB-01-031314	ARSENIC	0.0042	0.0050	0.010	MG/L	APSSOM-S-01-031314
SOM-EB-01-031314	IRON	0.030	0.050	0.10	MG/L	APSSOM-S-02-031314
SOM-EB-01-031314	MERCURY	0.000028	0.000050	0.00010	MG/L	APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-05-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314

Table A-3 Interference Check Sample

ICV/CCV/CRI ID	Compound	% Recovery	Lower Limit	Upper Limit	Concentration (mg/L)	LOD	Associated Samples
ICSAB 3/21/14 20:02	THALLIUM	76	80	120			APSSOM-S-01-031314 APSSOM-S-02-031314 APSSOM-S-03-031314 APSSOM-S04-0-031314 SOM-S-01-031314 SOM-S-02-031314 SOM-S-02D-031314 SOM-S-03-031314 SOM-S-04-031314 SOM-S-06-031314 SOM-S-07-031314 SOM-S-08-031314 SOM-S-09-031314 SOM-S-10-031314
ICSAB 3/24/14 23:53	THALLIUM	73	80	120			SOM-S-05-031314

Table A-4 Matrix Spikes

Sample ID	Compound	MS % Recovery	MSD % Recovery	Lower Limit	Upper Limit	RPD	RPD Limit
APSSOM-S-01-031314	NICKEL	78		80	120		20
APSSOM-S-01-031314	POTASSIUM	215		80	120		20
APSSOM-S-01-031314	MANGANESE	223		80	120		20
APSSOM-S-01-031314	THALLIUM	18		80	120		20
APSSOM-S-01-031314	MAGNESIUM	321		80	120		20
APSSOM-S-01-031314	LEAD	74		80	120		20
APSSOM-S-01-031314	IRON	421		80	120		20
APSSOM-S-01-031314	ALUMINUM	931		80	120		20
APSSOM-S-01-031314	ANTIMONY	33		80	120		20
APSSOM-S-01-031314	BARIUM	78		80	120		20
APSSOM-S-01-031314	BERYLLIUM	79		80	120		20
APSSOM-S-01-031314	CALCIUM	438		80	120		20
SOM-S-01-031314	NICKEL	74	74	80	120	4.9	20
SOM-S-01-031314	POTASSIUM	140	151	80	120	2.1	20
SOM-S-01-031314	THALLIUM	32	26	80	120	24	20
SOM-S-01-031314	ANTIMONY	33	32	80	120	7.8	20
SOM-S-01-031314	MANGANESE	7.2	143	80	120	29	20
SOM-S-01-031314	LEAD	68	65	80	120	6.1	20
SOM-S-01-031314	IRON	165	254	80	120	4.9	20
SOM-S-01-031314	ALUMINUM	646	649	80	120	1.3	20
SOM-S-01-031314	SILVER	74	80	80	120	3.1	20
SOM-S-01-031314	COBALT	77	76	80	120	5.5	20
SOM-S-01-031314	BARIUM	70	71	80	120	3.2	20
SOM-S-01-031314	BERYLLIUM	75	76	80	120	3.6	20
SOM-S-01-031314	ZINC	71	70	80	120	2.9	20
SOM-S-01-031314	SELENIUM	80	78	80	120	7.2	20

Table A-5 Field Duplicates

Sample ID	Duplicate ID	Compound	Sample Result	Qual	Duplicate Result	Qual	LOD	LOQ	Units	RPD
SOM-S-02-031314	SOM-S-02D-031314	ANTIMONY	0.91	B	2.8	B	0.31	0.62	MG/KG	101.9

Table A-6 Serial Dilution

Sample ID	Compound	Sample Result	Qual	Duplicate Result	Qual	LOQ	Units	%D
SOM-S-01-031314	ALUMINUM	261.894		306.303		0.50	MG/L	17.0
SOM-S-01-031314	BARIUM	1.938		2.407		0.025	MG/L	24.2
SOM-S-01-031314	CHROMIUM	0.368		0.458		0.0050	MG/L	24.5
SOM-S-01-031314	IRON	292.576		359.898		0.10	MG/L	23.0
SOM-S-01-031314	LEAD	1.888		2.687		0.010	MG/L	42.3
SOM-S-01-031314	MANGANESE	7.981		9.816		0.015	MG/L	23.0
SOM-S-01-031314	ZINC	1.827		2.364		0.020	MG/L	29.4

Attachment B**Qualifier Codes and Explanations**

Qualifier	Explanation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual quantitation limit necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Attachment C

Reason Codes and Explanations

Reason Code	Explanation
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
c	Calibration issue
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate RPDs
h	Holding times
i	Internal standard areas
k	Estimated Maximum Possible Concentration (EMPC)
l	LCS recoveries
lc	Labeled compound recovery
ld	Laboratory duplicate RPDs
lp	Laboratory control sample/laboratory control sample duplicate RPDs
m	Matrix spike recovery
md	Matrix spike/matrix spike duplicate RPDs
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column RPD
q	Quantitation issue
s	Surrogate recovery
su	Ion suppression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	ICS results



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Data Validation Report

Project:	NAS JRB Willow Grove, PA	
Laboratory:	Shealy Environmental, Inc.	
Service Request:	PC14023	
Analyses/Method:	EPA SW-846 Method 8270D for SVOCs (GC/MS) / 8270D	
Validation Level:	Limited	
Resolution Consultants Project Number:	60276503PP.QS	
Prepared by:	Paula DiMattei/Resolution Consultants	Completed on: 05/01/2014
Reviewed by:	Lori Herberich/Resolution Consultants	File Name: PC14023_SVOCs

SUMMARY

The samples listed below were collected by Resolution Consultants from the NAS JRB Willow Grove, PA site on March 13, 2014.

Sample ID	Matrix/Sample Type
SOM-EB-01-031314	Equipment blank
SOM-S-02D-031314	Field Duplicate of SOM-S-02-031314
APSSOM-S-01-031314	Soil
APSSOM-S-02-031314	Soil
APSSOM-S-03-031314	Soil
APSSOM-S04-0-031314	Soil
SOM-S-01-031314	Soil
SOM-S-02-031314	Soil
SOM-S-03-031314	Soil
SOM-S-04-031314	Soil
SOM-S-05-031314	Soil
SOM-S-06-031314	Soil
SOM-S-07-031314	Soil
SOM-S-08-031314	Soil
SOM-S-09-031314	Soil
SOM-S-10-031314	Soil

Data validation activities were conducted with reference to

- DoD Quality Systems Manual (QSM) for Environmental Laboratories, version 4.2 (10/2010) (October 2010);

- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW846, specifically SW-846 Method 8270D, Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (USEPA, 1996);
- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008);
- the project-specific Sampling and Analysis Plan; and
- laboratory quality control (QC) limits, as applicable.

The National Data Validation Functional Guidelines were modified to accommodate the non-CLP methodologies. In the absence of method-specific information, laboratory quality control (QC) limits, DoD QSM 4.2, or project-specific requirements, Resolution Consultants professional judgment was used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

- ✓ Data completeness (chain-of-custody (COC)/sample integrity)
- ✓ Holding times and sample preservation
- ✓ Instrument tuning
- ✗ Initial calibration/continuing calibration verification
- ✓ Laboratory blanks/equipment blanks
- ✓ Surrogate spike recoveries
- ✗ Matrix spike (MS) and/or matrix spike duplicate (MSD) results
- ✓ Laboratory control sample (LCS) results
- ✗ Field duplicates
- ✓ Internal standards
- ✓ Sample results/reporting issues

The symbol (✓) indicates that no results were qualified based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. The symbol (✗) indicates that a quality control (QC) nonconformance resulted in the qualification of data. Any QC nonconformance that resulted in the qualification of data is discussed below. In addition, nonconformances or other issues that were noted during validation, but did not result in qualification of data, may be discussed for informational purposes only.

The data appear valid as reported and may be used for decision making purposes. Selected data points were qualified as estimated due to nonconformances of certain QC criteria (see discussion below). Qualified sample results are presented in Table 1.

RESULTS

Data Completeness

The data package was reviewed and found to meet acceptance criteria for completeness:

- The COCs were reviewed for completeness of information relevant to the samples and requested analyses, and for signatures indicating transfer of sample custody.

- The laboratory sample login sheet(s) were reviewed for issues potentially affecting sample integrity, including the condition of sample containers upon receipt at the laboratory.
- Completeness of analyses was verified by comparing the reported results to the COC requests.

Holding Times/Sample Preservation

Sample preservation and preparation/analysis holding times were reviewed for conformance with the QC acceptance criteria. The QC acceptance criteria were met.

GC/MS Performance Checks

The data were reviewed to ensure that the decafluorotriphenylphosphine (DFTPP) tuning was performed at the correct frequency and that the method acceptance criteria were met. All samples were analyzed within 12 hours of the DFTPP tunes.

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- the initial calibration (ICAL) percent relative standard deviation (%RSD), correlation coefficient (r)/coefficient of determination (r²), and/or response factor method acceptance criteria were met;
- the initial calibration verification standard (ICV) percent recovery acceptance criteria were met;
- the continuing calibration verification standard (CCV) method percent difference or percent drift (%Ds) and RF acceptance criteria were met; and
- the retention time method acceptance criteria were met.

The percent recoveries (%Rs) for acenaphthylene (124%) and n-nitrosodiphenylamine (127%) in the ICV associated with all samples in this data set exceeded the QC acceptance limit of 80-120%. The initial calibration was not reanalyzed as a result of the ICV nonconformance as stipulated in the QSM. Data qualification to the compounds associated with the specific ICV nonconformance was as follows:

ICV Recovery Nonconformances

Criteria	Actions*	
	Detected Results	Nondetected Results
Recovery > 120	J	No qualification
Recovery < 80	J	UJ
* No guidance in NFG, thus Resolution Consultants professional judgment was used		

Qualified sample results are shown in Table 1.

Laboratory Blanks/Equipment Blanks

Laboratory method blanks and equipment rinsate blanks were evaluated as to whether there were contaminants detected above the method detection limit (MDL). Target compounds were not detected in the laboratory method blanks or in the equipment rinsate blank (SOM-EB-01-031314) associated with the samples in this data set.

Surrogate Spike Recoveries

The surrogate recoveries (%Rs) were reviewed for conformance with the QC acceptance criteria. All QC acceptance criteria were met.

MS/MSD Results

The MS/MSD %Rs and relative percent differences (RPDs) were reviewed for conformance with the QC acceptance criteria.

Nonconformances requiring qualification are summarized in Attachment A in Table A-1. Data qualification to the compounds associated with the specific MS/MSD nonconformances was as follows:

Actions: (Based on NFG 2008 and Resolution Consultants professional judgment)

Criteria	Action	
	Detected Compounds	Nondetected Compounds
%R > UL	J	No qualification
$10\% \leq \%R < LL^*$	J	UJ
%R < 10%*	J	R
%RPD > UL	J	No qualification

* NFG 2008 does not list a minimum limit. Based on Resolution Consultants professional judgment, a minimum limit of 10% was used.

Dibenzo(ah)anthracene recovered below 10% in the MS analysis. This recovery appears to be an anomaly since the MSD recovery was within the QC acceptance limits. Consequently, professional judgment was applied to qualify this result in sample SOM-S-01-031314 as estimated (UJ) rather than as rejected (R) as described in the table above.

Qualified sample results are shown in Table 1.

LCS/LCSD Results

The LCS %Rs were reviewed for conformance with the QC acceptance criteria. The %Rs for 2,4-dimethylphenol (111%), acenaphthylene (121%), and n-nitrosodiphenylamine (129%) in the aqueous LCS exceeded the associated QC acceptance limits of 30-110%, 50-105%, and 50-110%, respectively. The only aqueous sample in this data set was the equipment blank (SOM-EB-01-031314). Although the LCS and associated equipment blank were not reanalyzed as stipulated by the QSM, the data were not adversely impacted since these compounds were not detected in the equipment blank and thus, were not affected by the potential high bias. Qualification of the data was not required.

The %R for n-nitrosodiphenylamine (121%) in the soil LCS exceeded the associated QC acceptance limits of (50-115%). Although the LCS and associated soil samples were not reanalyzed as stipulated by the QSM, the data were not adversely impacted since this compound was not detected in the associated soil samples and thus, were not affected by the potential high bias. Qualification of the data was not required.

Field Duplicate Results

Field duplicate RPDs were reviewed for conformance with the Resolution Consultants QC criteria of $\leq 50\%$ for solid matrices and $\leq 30\%$ for aqueous matrices. These criteria apply if both results were greater than five times the limit of quantitation (LOQ).

Nonconformances are summarized in Attachment A in Table A-2. Data qualification to the analytes associated with the specific field duplicate RPDs was as follows:

Criteria	RPD	Action	
		Detected	Nondetected
Sample and duplicate are nondetect results	Not calculable (NC)	No qualification	No qualification
Sample and duplicate results $\geq 5xLOQ$	>30 (aqueous) >50 (solids)	J	Not Applicable
Sample and duplicate results $< 5xLOQ$	>60 (aqueous) >100 (solids)	J	Not Applicable
If sample or duplicate result is $> 5xLOQ$ and the other is not detected	NC	J	UJ
If sample or duplicate result is $< 5xLOQ$ and the other is not detected	NC	No qualification	No qualification

Actions: (Resolution Consultants professional judgment was used)

Qualified sample results are shown in Table 1.

Internal Standard Results

The internal standard (IS) recoveries were reviewed for conformance with the QC acceptance criteria. All QC acceptance criteria were met.

Sample Results/Reporting Issues

All compounds detected at concentrations less than the limit of quantitation (LOQ) but greater than the detection limit (DL) were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation.

Any sample that was analyzed at a dilution due to high concentrations of target or non-targets was checked to ensure that the results and/or sample specific LODs and LOQs were adjusted accordingly by the laboratory.

The percent solids data were reviewed to ensure that NFG 2008 specified criteria were met. All percent solids criteria were met.

QUALIFICATION ACTIONS

Sample results qualified as a result of validation actions are summarized in Table 1. All actions are described above.

ATTACHMENTS

Attachment A: Nonconformance Summary Tables

Attachment B: Qualifier Codes and Explanations

Attachment C: Reason Codes and Explanations

Table 1 - Data Validation Summary of Qualified Data

Sample ID	Matrix	Compound	Result	LOD	LOQ	Units	Validation Qualifiers	Validation Reason
SOM-S-01-031314	SO	ACENAPHTHYLENE	86	28	47	UG/KG	J	c,m
SOM-S-01-031314	SO	ANTHRACENE	74	28	47	UG/KG	J	m
SOM-S-01-031314	SO	BENZO[A]ANTHRACENE	500	28	47	UG/KG	J	m
SOM-S-01-031314	SO	BENZO[A]PYRENE	520	28	47	UG/KG	J	m
SOM-S-01-031314	SO	BENZO[K]FLUORANTHENE	280	28	47	UG/KG	J	m
SOM-S-01-031314	SO	DIBENZ[A,H]ANTHRACENE		28	47	UG/KG	UJ	m
SOM-S-01-031314	SO	FLUORANTHENE	910	28	47	UG/KG	J	m
SOM-S-01-031314	SO	PHENANTHRENE	280	28	47	UG/KG	J	m
SOM-S-02-031314	SO	BENZO[A]ANTHRACENE	14	5.3	8.9	UG/KG	J	fd
SOM-S-02-031314	SO	BENZO[B]FLUORANTHENE	18	5.3	8.9	UG/KG	J	fd
SOM-S-02D-031314	SO	BENZO[A]ANTHRACENE	4.5	5.4	9.0	UG/KG	J	fd
SOM-S-02D-031314	SO	BENZO[B]FLUORANTHENE		5.4	9.0	UG/KG	UJ	fd

Attachment A

Nonconformance Summary Tables

Table A-1 - Matrix Spikes

Sample ID	Compound	MS % Recovery	MSD % Recovery	Lower Limit	Upper Limit
SOM-S-01-031314	BENZO[A]PYRENE	120	114	50	110
SOM-S-01-031314	DIBENZ[A,H]ANTHRACENE	2.2	ok	40	125
SOM-S-01-031314	ACENAPHTHYLENE	112	106	45	105
SOM-S-01-031314	ANTHRACENE	107	ok	55	105
SOM-S-01-031314	FLUORANTHENE	137	134	55	115
SOM-S-01-031314	BENZO[K]FLUORANTHENE	132	ok	45	125
SOM-S-01-031314	BENZO[A]ANTHRACENE	112	ok	50	110
SOM-S-01-031314	PHENANTHRENE	120	113	50	110

Table A-2 - Field Duplicates

Sample ID	Duplicate ID	Compound	Sample Result	Qual	Duplicate Result	Qual	LOD	LOQ	Units	RPD
SOM-S-02-031314	SOM-S-02D-031314	BENZO[A]ANTHRACENE	14		4.5	J	5.3	8.9	ug/kg	102.7
SOM-S-02-031314	SOM-S-02D-031314	BENZO[B]FLUORANTHENE	18		5.4	U	5.3	8.9	ug/kg	107.7

Attachment B**Qualifier Codes and Explanations**

Qualifier	Explanation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual quantitation limit necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Attachment C

Reason Codes and Explanations

Reason Code	Explanation
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
c	Calibration issue
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate RPDs
h	Holding times
i	Internal standard areas
k	Estimated Maximum Possible Concentration (EMPC)
l	LCS or OPR recoveries
lc	Labeled compound recovery
ld	Laboratory duplicate RPDs
lp	Laboratory control sample/laboratory control sample duplicate RPDs
m	Matrix spike recovery
md	Matrix spike/matrix spike duplicate RPDs
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column RPD
q	Quantitation issue
s	Surrogate recovery
su	Ion suppression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	ICS results