Summer 7-2022

APPENDIX B - DATA VALIDATION REPORTS

Pioneer Technical Services, Inc.

APPENDIX B

DATA VALIDATION REPORTS

Appendix B.1 *2019 Remedial Investigation Sampling Data Validation Report*
Appendix B.2 *2020 Remedial Investigation Sampling Data Validation Report*
Appendix B.3 *2019-2020 Remedial Investigation Sampling Field-Portable X-Ray Fluorescence Data Validation Report*
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Appendix B-1

2019 Remedial Investigation Sampling Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Revised Final

2019 Remedial Investigation Sampling Laboratory Data Validation Report

Atlantic Richfield Company

July 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Revised Final

2019 Remedial Investigation Sampling Laboratory Data Validation Report

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LIST OF ATTACHMENTS

Attachment A Data Validation Checklists
Attachment B Level A/B Assessment Checklist
Attachment C Data Validation Quality Control Criteria

REVISION SUMMARY

Revision No.	Author	Version	Description	Date
Rev 0	L. Moon/ S. Smith	Draft Final	Issued for Agency Review	4/24/2020
Rev 1	J. Flammang/ S. Smith	Final	Revised to address Agency comments	7/21/2020
Rev 2	L. Moon	Final	Revised to address Agency comments	5/18/2022
Rev 2	Josie McElroy	Final	Issued for Agency Review	7/5/2022

1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes analytical results for West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) soil samples collected from October 23, 2019, through November 15, 2019. All data have undergone Stage 4 data validation (DV) as defined in the U.S. Environmental Protection Agency (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009). The DV was conducted in accordance with the Final Quality Assurance Project Plan (QAPP) for WSSOU RI sampling (CDM Smith, 2019) (referred to as WSSOU RI QAPP), the *Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation Plan* (DM/DV) (ARCO, 1992a) and addendum (AERL, 2000), the CFRSSI QAPP (ARCO, 1992b), and the EPA *National Functional Guidelines* (NFG) *for Inorganic Superfund Data Review* (EPA, 2017). This report details the evaluation of laboratory-reported data for the purpose of usability.

This document refers to the tables and attachments below.

- Table 1 contains the analytical results with laboratory qualifiers, DV qualifiers; enforcement, screening, and rejected classifications; and DV reason codes. Table 1a contains metals in soils results, Table 1b contains Synthetic Precipitation Leaching Procedure (SPLP) results, and Table 1c contains Acid-Base Accounting (ABA) results.
- Table 2 contains the field Quality Assurance / Quality Control (QA/QC) samples with results, laboratory flags, and DV qualifiers; enforcement, screening and rejected codes; DV reason codes; and QC criteria calculations
- Table 3 contains sample identification information including the field sample name, laboratory sample name, sample date, and analytical methods.
- Attachment A contains the DV checklists.
- Attachment B contains the Level A/B Assessment Checklist.
- Attachment C contains the QC criteria used in the DV process.

The full data packages, prepared by Pace Analytical Services Inc. (Pace), provided the information needed to perform Stage 4 DV. All data met the Level A and B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan (ARCO, 1992a), the quality of the data is ranked as enforcement quality, screening quality, or it is rejected. Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A and B criteria (Attachment B) and are not qualified as estimated or rejected after the validation process. Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, RI/feasibility study, evaluation of alternatives, conformational purposes, risk assessments, and engineering design. As all data met the Level A and B documentation criteria, all results that were not qualified as estimated or rejected during the DV process were considered “enforcement” quality data and were assigned an “E” in Table 1a, Table 1b, and Table 1c.

Screening quality data, as defined in the CFRSSI DM/DV Plan (ARCO, 1992a), are those samples that do not meet the Level B criteria and/or were qualified J, J+, J-, or UJ during the DV process. Potential uses of screening quality data, depending on their quality, include site

characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. As all data met the Level A and B documentation criteria, samples that were qualified as estimated during the validation process were considered "screening" quality data and were assigned an "S" in Table 1a, Table 1b, and Table 1c.

Data rejected during DV cannot be used for any Superfund activities. No results were rejected during the DV process.

Investigative soil samples were collected during October and November 2019 by Pioneer Technical Services, Inc. (Pioneer) to support developing risk assessments, determining the nature and extent of contamination present, and completing a feasibility study and a record of decision defining remedial action objectives for WSSOU. Samples were collected and data were validated in accordance with the WSSOU RI QAPP.

Soil samples for target analyte list (TAL) metals and SPLP analyses were sent to Pace in Minneapolis, Minnesota. Soil samples for ABA analysis and multi-increment sampling (MIS) sample preparation were sent to Pace in Billings, Montana. After MIS sample preparation, Pace sent the prepared sample to Minneapolis for TAL metals analysis. Table 3 lists the methods and analytes for each sample.

Field QC samples (field duplicate and field blank samples) results are used for assessing the data quality of natural samples. Please note that although the field QC samples may receive a qualifier during the DV process, the enforcement and screening quality summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summary.

From the 47 natural samples (not including field blanks or field duplicate samples) collected in 2019, 1,415 data points were generated by Pace. A summary is shown below:

Summary of Enforcement and Screening Quality Data Points

Analysis Group	Natural Samples[1]	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
Total Metals	47	1,175	1,119 (95%)	56 (5%)	0 (0%)
SPLP	9	216	205 (95%)	11 (5%)	0 (0%)
ABA	3	24	13 (54%)	11 (46%)	0 (0%)
Total	**47**	**1,415**	**1,337 (94%)**	**78 (6%)**	**0 (0%)**

[1]Total number of samples is not a summation of the number of samples for each analytical group because some samples had results for more than one analysis group as listed in Table 3.

Ten of the enforcement quality data points were data points that were qualified as "U" during the DV process due to detections in associated QC blanks. Data points qualified only with a U are considered enforcement quality in accordance with the CFRSSI DV/DM Plan (ARCO, 1992a) definitions of enforcement and screening quality data. Table 1a, Table 1b, and Table 1c show the

laboratory flags, DV qualifiers, enforcement or screening designators, and the reason code for the qualification for each data point.

2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW OF INORGANIC DATA

The QC criteria used during the DV process are listed in Attachment C. These QC criteria were derived from the WSSOU RI QAPP, CFRSSI QAPP (ARCO, 1992b), the EPA NFG for Inorganic Superfund Methods Data Review (EPA, 2017), the internal BP Laboratory Management Program, analytical methods, and method-specific laboratory Standard Operating Procedures (SOPs).

The DV checklists derived from the CFRSSI DM/DV Addendum (AERL, 2000) were completed for each laboratory report (Attachment A). Below are the deviations made to the checklists provided in the CFRSSI DM/DV Addendum guidance document:

- The Laboratory DV Checklist for Metals Analysis by Inductively Coupled Plasma (ICP) or Graphite Furnace Atomic Absorption Spectrometry (GFAA) was revised slightly to more accurately reflect the information provided in the full data package provided by Pace and the requirements listed in the EPA NFG for Inorganic Superfund Methods Data Review (EPA, 2017). The completed checklists are included in Attachment A.
- The DV Checklist for Field QC was not filled out for each data package. Sections on field blanks and field duplicates were added to each Laboratory DV Checklist worksheet.
- The Laboratory DV Checklist for Metals Analysis by ICP or GFAA was modified for the general chemistry validation. The completed checklists are included in Attachment A. The guidelines for general or wet chemistry laboratory QA and QC listed in Table 11-5 of the CFRSSI QAPP (ARCO, 1992b), along with laboratory QA/QC control limits, were used in evaluating the general chemistry results. The revised checklist more accurately reflects the information provided by the laboratory for these analyses.

The DV for methods EPA 6010D (ICP-AES) and EPA 7470A and EPA 7471B (mercury) are included in the metals checklists. The DV for the Modified Sobek 3.2 (ABA) is included in the general chemistry checklists. One Level A/B Assessment was completed for the 2019 sampling event (Attachment B).

2.1 Field Quality Control Samples

Field duplicate samples were collected at a rate greater than 1 in 20 and met the requirements listed in Section B5.1 Field QC Samples of the WSSOU RI QAPP. Field blank samples were not collected per the WSSOU RI QAPP because all sampling equipment was one-use (disposable).

The analytical reporting limits specified in the WSSOU RI QAPP were used to evaluate the field duplicates. The field duplicate QC criteria calculations are listed in Table 2. Any qualifications required based on the field QC sample results are detailed in the DV checklists (Attachment A) and are listed on Table 1a, Table 1b, Table 1c, and Table 2.

2.2 Laboratory Quality Control Samples

The laboratory method detection limits (MDLs) were used for the data review/validation of laboratory and field blanks as discussed in the CFRSSI QAPP (ARCO, 1992b). Based on information provided by the analytical laboratory, the chain of custody requirements were met for each of the five sample shipments for the 2019 sampling event. All samples were adequately preserved and were analyzed within method-specified holding times. Laboratory QA/QC samples were analyzed with each sample group and any qualifications required based on the laboratory QC sample results are detailed in the DV checklists (Attachment A) and are listed on Table 1a, Table 1b, Table 1c, and Table 2.

3.0 LEVEL A/B ASSESSMENT

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality data.

Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet Level A or B criteria are designated as unusable.

One Level A/B checklist for all analytical samples submitted for the 2019 sampling event is included in Attachment B. All sample collection information, including sample collection date, location, identification, and collection method, were recorded in the field logbook. This information was reviewed for Level A/B criteria. As shown in Attachment B, all the samples met both Level A and Level B criteria. No data were designated screening quality or rejected based on the results of Level A/B criteria.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, AND SENSITIVITY DATA SUMMARY

Data generated from WSSOU RI soil sampling in October and November 2019 were examined to ensure that project objectives were met. The data quality objectives for this investigation are listed in Section A7 of the WSSOU RI QAPP. The Stage 4 DV review was completed for each laboratory sample delivery group.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. Acceptance or rejection of precision measurements is based on the relative percent difference (RPD) of the laboratory and field duplicates. For example, perfect precision would be a 0% RPD between duplicate samples (both samples have the same analytical result) for results that are greater than 5 times the project specific reporting limits (RLs). For soil samples, the control limit of an RPD less than 35% was used when sample results were greater than 5 times the Contract-Required Quantitation Limit. If 1 or both of the sample results were less than 5 times the project specific RL, the control limit used was a difference between sample

results less than 2 times the project specific RL. This precision requirement is from the WSSOU RI QAPP. For these sampling events, precision was assessed based on laboratory prepared and field duplicate sample analysis.

Four field duplicate samples were collected during 2019 WSSOU RI sampling. If the duplicate sample results were outside the control limit, the respective data points for the natural and duplicate sample pair were qualified. Please note that the field duplicate sample result qualifications were not included in the enforcement/screening quality statistics.

Of the 1,415 data points derived from the natural samples collected, 13 data points were qualified due to poor field precision, and 10 samples were qualified due to poor laboratory precision. As a result, 98% of the 1,415 data points associated with the natural samples collected met the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. Accuracy is assessed based on the percent recovery (%R) and percent difference (%D) of various laboratory and field QC samples. Perfect %R is 100% and perfect %D is 0% (the analysis result is exactly the known concentration of the QC sample).

For EPA 6010D (ICP-AES), the %R of initial calibration verification (ICV) samples, low limit initial calibration verification (LLICV) samples (Contract Required Detection Limits Check Samples), continuing calibration verification (CCV) samples, laboratory control samples (LCS), laboratory matrix spike (LMS) samples, and interference check samples (ICS); the %D for the serial dilution (SD) samples; and the detection of analytes in the ICS are used as indicators of accuracy.

For EPA 7470A and EPA 7471B (mercury), the %R of ICV samples, LLICV samples, CCV samples, LCS, and LMS samples are used as indicators of accuracy.

For Modified Sobek 3.2 (ABA), the %R of ICV samples, CCV samples, and LCS are used as indicators of accuracy.

Specific accuracy requirements for these QC samples are listed in Attachment C.

Data points are often qualified for more than 1 laboratory QA/QC result outside of control limits. As an example, 1 data point for metals analysis was qualified J due to a SD %D outside of control limits and an LMS %R outside of control limits. For natural samples, 59 data points were qualified for some combination of ICV, CS, CCV, LCS, ICS, and LMS %R; SD %D; and/or a detection in the ICS outside of control limits. As a result, 96% of the 1,415 data points associated with the natural samples collected met the accuracy requirements.

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper design of the sampling program. The laboratory results were reviewed, and a Stage 4 DV completed. Holding times and preservation criteria were met. Chain of custody forms were complete and are included in the data packages. The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report includes soil samples collected by Pioneer and analyzed by Pace.

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and laboratory analytical methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in the SOPs and equipment use. Proper chain of custody and sample handling were observed during sample collection, delivery to the laboratory, and analysis. The analytical laboratories performed the sample analysis using industry standard methods.

Consequently, data from future soil sampling events at WSSOU using comparable sampling and analytical methods may be used in concert with this data set.

4.5 Completeness

Completeness is assessed to determine if enough valid data have been collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 90% or greater as designated in the WSSOU RI QAPP.

In total, 1,415 data points were generated by the sampling events. All natural data points were usable as no sample results were rejected, and all the planned data points were collected. Therefore, the completeness was 100% and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the laboratory RL or the laboratory MDL to the project-specific RL. The reporting limits on Table B-5 of the WSSOU RI QAPP were used as the project-specific RL for soil analyses, and the reporting limits on Tables B-4 were used as the project-specific RL for SPLP analyses. The laboratory RL met the project-specific RL for all analytes in soil. The laboratory RL did not meet the project-specific RL for SPLP for antimony, arsenic, beryllium, cadmium, copper, lead, manganese, molybdenum, selenium, silver, and zinc. The laboratory MDL did not meet the project-specific RL for SPLP for antimony, lead, selenium, and zinc. However, all the zinc SPLP results were detections above

the RL. For the ABA analyses, the WSSOU RI QAPP only provides a project-specific RL for analytes reported in tons per 1,000 tons (acid potential and neutralization potential). All samples had detectable levels of these analytes, so the data usability is not affected by the higher MDL.

The table below lists those SPLP samples for which the antimony, lead, and /or selenium results were below the MDL. All nine SPLP samples were non-detect for antimony and selenium. As can be seen in the table, the project-specific RL is less than the MDL for these analytes, though the difference is very small.

Analyte	Pace MDL	Project-specific RL	Units	Field Sample ID	Laboratory ID	Result
Antimony, SPLP	0.007	0.002	mg/L	WS19-0006-SO5092-N-102519	10498600008	ND
				WS19-0006-SO5123-N-110419	10498600010	ND
				WS19-0015-SO5181-N-110719	10499840008	ND
				WS19-0019-SO5193-N-110819	10499840009	ND
				WS19-0043-SO5047-N-102419	10498600007	ND
				WS19-0290-SO5017-N-111319	10499840010	ND
				WS19-0290-SO5207-N-111319	10499840011	ND
				WS19-0288-SO5222-N-111519	10499840012	ND
				WS19-1045-SO5027-N-102319	10498600006	ND
Lead, SPLP	0.002	0.001	mg/L	WS19-0043-SO5047-N-102419	10498600007	ND
				WS19-1045-SO5027-N-102319	10498600006	ND
Selenium, SPLP	0.0058	0.005	mg/L	WS19-0006-SO5092-N-102519	10498600008	ND
				WS19-0006-SO5123-N-110419	10498600010	ND
				WS19-0015-SO5181-N-110719	10499840008	ND
				WS19-0019-SO5193-N-110819	10499840009	ND
				WS19-0043-SO5047-N-102419	10498600007	ND
				WS19-0290-SO5017-N-111319	10499840010	ND
				WS19-0290-SO5207-N-111319	10499840011	ND
				WS19-0288-SO5222-N-111519	10499840012	ND
				WS19-1045-SO5027-N-102319	10498600006	ND

ND = non-detect. mg/L = milligrams per Liter. MDL = method detection limit. RL = reporting limit.
SPLP = Synthetic Precipitation Leaching Procedure.

These data points are considered usable with the recognition that the detection limits are higher than the project-specific RLs listed in Table B-5 and Table B-4 of the WSSOU RI QAPP.

4.7 Overall Data Summary

During the 2019 sampling event, the 47 natural samples collected by Pioneer and analyzed by Pace generated 1,415 data points. Of these, 78 data points were qualified as J, J- or UJ, and 10 data points were qualified U due to detections in the associated QC blanks. No data points were rejected. Data were also evaluated using the Level A/B Checklist (Attachment B). All samples met both the Level A and Level B criteria defined in the CFRSSI DM/DV Plan (ARCO, 1992a) and addendum (AERL, 2000).

Based on the qualifications assigned during the DV process, and the results of the Level A/B assessment, 78 natural data points (5.5%) were classified as screening quality, 1,337 natural data points (94.5%) were classified as enforcement quality, and no data points were rejected.

5.0 REFERENCES

AERL, 2000. Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation (DM/DV) Plan Addendum. Prepared for ARCO by Exponent, Lake Oswego, Oregon. June 2000.

ARCO, 1992a. Clark Fork River Superfund Site Investigations Data Management/Data Validation Plan, Atlantic Richfield Company, 1992.

ARCO, 1992b. Clark Fork River Superfund Site Investigation, Quality Assurance Project Plan, Atlantic Richfield Company, 1992.

CDM Smith, 2019, Final Quality Assurance Project Plan West Side Soils Operable Unit Remedial Investigation Sampling Silver Bow Creek/Butte Area Superfund Site, Prepared for U.S. Environmental Protection Agency, Helena, MT. April 26, 2019.

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EPA, 2017. U.S. Environmental Protection Agency National Functional Guidelines for Inorganic Superfund Data Review, January 2017.

TABLES

Table 1. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes
Table 1a. Metals in Soils
Table 1b.SPLP
Table 1c. ABA

Table 4. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Enforcement, Screening and Rejected Codes, Data Validation Reason Codes, and QC Criteria Calculations

Table 5. Sample Identification

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10498502					10498502					10498502					10498502					10498502					10498502					10498502					10498600					10498600				
Field Sample ID			WS19-0003-SO5039-N-102319					WS19-0003-SO5095-N-102819					WS19-0006-SO5124-N-110419					WS19-0006-SO5129-N-110419					WS19-0040-SO5063-N-102519					WS19-0041-SO5113-N-103119					WS19-0006-SO5092-N-102519					WS19-0006-SO5123-N-110419				
Lab Sample ID			10498502001					10498502004					10498502006					10498502007					10498502002					10498502005					10498600008					10498600010				
Sample Date			10/23/19					10/28/19					11/04/19					11/04/19					10/25/19					10/31/19					10/25/19					11/04/19				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	7,760	M6		E		11,200			E		9,920			E		11,600			E		6,400			E		11,400			E		12,800			E		5,070			E	
Antimony	SW-846 6010D	mg/kg	0.71	J,M1	J-	S	S%	0.67	J		E		2.2			E		0.87	J		E		3.3	J,D3		E		<1.9	U,D3		E		1.4			E		6.8			E	
Arsenic	SW-846 6010D	mg/kg	104	M6	J	S	S%	43.1			E		117			E		71.5			E		274			E		29.8			E		64.9			E		140			E	
Barium	SW-846 6010D	mg/kg	121	M6	J	S	S%	190			E		134			E		134			E		62.6			E		193			E		103			E		53.3			E	
Beryllium	SW-846 6010D	mg/kg	0.4	M1	J	S	S%, SD	0.3			E		0.21	J		E		0.14	J		E		0.28	J,D3		E		0.03	J		E		0.22	J		E		0.14	J		E	
Cadmium	SW-846 6010D	mg/kg	12.9			E		0.75			E		1.3			E		1.1			E		10.4			E		1			E		1.2			E		1.9			E	
Calcium	SW-846 6010D	mg/kg	20,500	M6		E		9,540			E		1,970			E		2,100			E		1,520			E		3,500			E		8,470			E		1,790			E	
Chromium	SW-846 6010D	mg/kg	4.3	J,D3		E		10.4			E		8.8			E		8.9			E		4.8	J,D3		E		9.4			E		5			E		2.2	J,D3		E	
Cobalt	SW-846 6010D	mg/kg	8.1			E		6			E		6.8			E		4.7			E		11.4			E		10.9			E		8.3			E		7.8			E	
Copper	SW-846 6010D	mg/kg	48.1			E		108			E		169			E		180			E		226			E		98.6			E		51.8			E		116			E	
Iron	SW-846 6010D	mg/kg	27,000	M6		E		19,300			E		23,100			E		15,000			E		31,500			E		24,300			E		23,300			E		21,800			E	
Lead	SW-846 6010D	mg/kg	2,430	M6		E		60.7			E		237			E		64.4			E		2,540			E		80.3			E		239		J	S	FD	355			E	
Magnesium	SW-846 6010D	mg/kg	7,390	M6		E		4,750			E		2,710			E		2,610			E		1,650			E		8,100			E		4,620			E		1,640			E	
Manganese	SW-846 6010D	mg/kg	42,800	M6		E		2,940			E		6,090			E		756			E		28,900			E		1,270			E		12,300			E		16,500			E	
Mercury	EPA 7471B	mg/kg	0.41	M1	J-	S	S%	0.048			E		0.093			E		0.089			E		0.2			E		0.047			E		0.19		J-	S	CS	0.071		J-	S	CS
Molybdenum	SW-846 6010D	mg/kg	2.5			E		1.2			E		3.6			E		0.91			E		13			E		2.2			E		2.9			E		2.9			E	
Nickel	SW-846 6010D	mg/kg	6.4	J,D3		E		6.6			E		4.4			E		5.3			E		6.1			E		7.3			E		4.8			E		4.1			E	
Potassium	SW-846 6010D	mg/kg	1,800	M1	J	S	S%, SD	3,330			E		2,270			E		2,470			E		2,020			E		4,910			E		2,980			E		1,670			E	
Selenium	SW-846 6010D	mg/kg	<3.3	U,D3		E		<0.33	U		E		<3.2	U,D3		E		<0.32	U		E		<3.2	U,D3		E		<0.32	U		E		<1.7	U,D3		E		<1.6	U,D3		E	
Silver	SW-846 6010D	mg/kg	4.9	J,D3		E		2			E		34.6			E		0.92			E		82.9			E		0.44	J		E		14.9			E		43.7			E	
Sodium	SW-846 6010D	mg/kg	62.8			E		80.9			E		37.6	J		E		49.2			E		62.7	J,D3		E		71.9			E		62.6			E		20.1	J		E	
Thallium	SW-846 6010D	mg/kg	<2.4	U,D3		E		0.65	J		E		<2.4	U,D3		E		0.33	J		E		<2.3	U,D3		E		<1.2	U,D3		E		<1.3	U,D3		E		<1.2	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	14.8		J	S	SD	38.5			E		33.1			E		29.1			E		16.4			E		60.3			E		36.4			E		15.2			E	
Zinc	SW-846 6010D	mg/kg	4,240	M6		E		118			E		339			E		120			E		3,380			E		140			E		467			E		471			E	
Percent Moisture	ASTM D2974	%	1.6	N2		E		1.6	N2		E		0.99	N2		E		1.1	N2		E		1.1	N2		E		0.74	N2		E		9.1	N2		E		6.3	N2		E	

Pace Laboratory Flags (Lab Flag)

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CCB = Qualified due to detections in the Continuing Calibration Blank.

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to Serial Dilution recovery problems.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

	Work Order		10498600					10498600					10498600					10498600					10498600					10498600					10498600					10498601				
	Field Sample ID		WS19-1131-SO5168-N-110519					WS19-0037-SO5142-N-110519					WS19-0037-SO5155-N-110519					WS19-0040-SO5105-N-103119					WS19-0043-SO5047-N-102419					WS19-0043-SO5094-N-102819					WS19-1045-SO5027-N-102319					WS19-0003-SO5038-N-102319				
	Lab Sample ID		10498600005					10498600003					10498600004					10498600002					10498600007					10498600001					10498600006					10498601005				
	Sample Date		11/05/19					11/05/19					11/05/19					10/31/19					10/24/19					10/28/19					10/23/19					10/23/19				
	Sample Type		Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	5,780	M6		E		2,800			E		1,920			E		2,830			E		7,180			E		6,970			E		1,930			E		8,500			E	
Antimony	SW-846 6010D	mg/kg	0.85	J,M1	J-	S	S%	1.6			E		2.2	J,D3		E		2.6			E		7.2			E		2.7	J,D3		E		1.3			E		1.5			E	
Arsenic	SW-846 6010D	mg/kg	224	M6		E		461			E		144			E		200			E		101			E		179			E		264			E		61			E	
Barium	SW-846 6010D	mg/kg	22.1	R1	J	S	D%, SD	62.4			E		19.5			E		54.8			E		176			E		52.1			E		37.5			E		147			E	
Beryllium	SW-846 6010D	mg/kg	0.11	J		E		<0.014	U		E		<0.066	U,D3		E		0.06	J		E		0.17	J,D3		E		0.26	J,D3		E		<0.014	U		E		0.094	J		E	
Cadmium	SW-846 6010D	mg/kg	9.4			E		11			E		25.8			E		3			E		2.7			E		1.9			E		0.32			E		1.2			E	
Calcium	SW-846 6010D	mg/kg	2,040			E		362			E		1,200			E		1,340			E		3,140			E		5,500			E		1,020			E		2,290			E	
Chromium	SW-846 6010D	mg/kg	2.5	J,D3		E		1.1			E		<2.5	U,D3		E		2.7	J,D3		E		4			E		2.9	J,D3		E		1.2			E		5.6			E	
Cobalt	SW-846 6010D	mg/kg	4.3		J	S	SD	0.6			E		1.3	J,D3		E		5.9			E		10.1			E		12.4			E		2.3			E		6.7			E	
Copper	SW-846 6010D	mg/kg	99.3	M6	J	S	S%	74.9			E		104			E		190			E		178			E		101			E		18.9			E		107			E	
Iron	SW-846 6010D	mg/kg	33,500	M6		E		34,500			E		15,200			E		20,500			E		23,200			E		30,800			E		23,600			E		16,600			E	
Lead	SW-846 6010D	mg/kg	2,350	M6,R1	J	S	D%	6,840			E		1,110			E		519			E		478			E		358			E		304			E		112			E	
Magnesium	SW-846 6010D	mg/kg	1,320		J	S	SD	380			E		1,030			E		650			E		3,240			E		2,720			E		427			E		4,470			E	
Manganese	SW-846 6010D	mg/kg	14,100	M6,R1	J	S	D%	159			E		63,000			E		13,900			E		20,100			E		34,000			E		4,930			E		4,120			E	
Mercury	EPA 7471B	mg/kg	0.18		J-	S	CS	0.25		J-	S	CS	0.073		J-	S	CS	0.054		J-	S	CS	0.21		J-	S	CS	0.18		J-	S	CS	0.056		J-	S	CS	0.051			E	
Molybdenum	SW-846 6010D	mg/kg	3.3			E		3.6			E		3.6	J,D3	U	E	CCB	2.6			E		6.8			E		6		U	E	CCB	5.6		J-	E		1.4			E	
Nickel	SW-846 6010D	mg/kg	2.4			E		0.52	J		E		1.3	J,D3		E		3.2			E		5.3			E		8			E		1.2			E		5.2			E	
Potassium	SW-846 6010D	mg/kg	1,180		J	S	SD	2,460			E		796			E		1,370			E		2,590			E		2,010			E		2,180			E		3,170			E	
Selenium	SW-846 6010D	mg/kg	<3.6	U,D3		E		<0.35	U		E		<8.1	U,D3		E		<3.4	U,D3		E		<1.6	U,D3		E		<3.5	U,D3		E		0.87	J		E		<0.35	U		E	
Silver	SW-846 6010D	mg/kg	46.5	M1	J	S	D%, S%	62.5			E		30.9			E		16.9			E		88.8			E		32.8			E		5.7			E		6.8			E	
Sodium	SW-846 6010D	mg/kg	24.8	J		E		80.9			E		<49.6	U,D3		E		36.8	J		E		51.7	J,D3		E		<53.4	U,D3		E		113			E		56.7			E	
Thallium	SW-846 6010D	mg/kg	<2.6	U,D3		E		<0.26	U		E		<6	U,D3		E		<2.5	U,D3		E		<1.2	U,D3		E		<2.6	U,D3		E		<0.26	U		E		<0.26	U		E	
Vanadium	SW-846 6010D	mg/kg	17.3		J	S	SD	15			E		3.7	J,D3		E		12.2			E		38.8			E		22.7			E		9.9			E		31.3			E	
Zinc	SW-846 6010D	mg/kg	2,340	M6		E		5,260			E		9,530			E		641			E		803			E		703			E		166			E		197			E	
Percent Moisture	ASTM D2974	%	9.9	N2		E		6.9	N2		E		6.7	N2		E		5.7	N2		E		7.4	N2		E		8.3	N2		E		9.1	N2		E		7.3	N2		E	

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Data Validation Reason Codes (Reason Code)

CCB = Qualified due to detections in the Continuing Calibration Blank.

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10498601					10498601					10498601					10498601					10498601					10498601					10498601				
Field Sample ID			WS19-0003-SO5041-N-102319					WS19-0003-SO5043-N-102319					WS19-0003-SO5052-N-102419					WS19-0005-SO5090-N-102519					WS19-0006-SO5093-N-102519					WS19-0040-SO5055-N-102419					WS19-0040-SO5062-N-102419					WS19-0040-SO5064-N-102519				
Lab Sample ID			10498601006					10498601007					10498601010					10498601019					10498601020					10498601011					10498601012					10498601013				
Sample Date			10/23/19					10/23/19					10/24/19					10/25/19					10/25/19					10/24/19					10/24/19					10/25/19				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	6,900			E		6,840			E		4,490	M6		E		7,000			E		10,500			E		7,040			E		4,830			E		3,520			E	
Antimony	SW-846 6010D	mg/kg	0.42	J		E		7.4			E		2.1	M1	J	S	S%	2.9			E		8.5			E		<1.9	U,D3		E		2.2			E		36.2			E	
Arsenic	SW-846 6010D	mg/kg	109			E		123			E		300	M6		E		252			E		115			E		136			E		108			E		220			E	
Barium	SW-846 6010D	mg/kg	113			E		147			E		182	M6	J	S	S%	72.4			E		81.6			E		44.8			E		34			E		36.2			E	
Beryllium	SW-846 6010D	mg/kg	0.26			E		0.38	J,D3		E		0.027	J,M1	J	S	S%	0.19	J		E		0.31			E		<0.068	U,D3		E		0.062	J		E		0.099	J		E	
Cadmium	SW-846 6010D	mg/kg	3.6			E		3.7			E		1.3	M1	J	S	S%, SD	0.44			E		2.6			E		10			E		3.3			E		9.7			E	
Calcium	SW-846 6010D	mg/kg	19,300			E		2,940			E		1,720			E		1,960			E		2,960			E		6,090			E		3,200			E		678			E	
Chromium	SW-846 6010D	mg/kg	6.7			E		4			E		2.8	J,D3		E		2.9	J,D3		E		4.3	J,D3		E		2.9	J,D3		E		2.7	J,D3		E		2.3	J,D3		E	
Cobalt	SW-846 6010D	mg/kg	4.6			E		10.4			E		9.6	M1	J	S	S%, SD	5.7			E		10.5			E		12			E		7.5			E		4.8			E	
Copper	SW-846 6010D	mg/kg	44.1			E		233			E		183	M6	J	S	S%	84.4			E		113			E		98			E		61.9			E		317			E	
Iron	SW-846 6010D	mg/kg	18,700			E		26,000			E		25,700	M6		E		31,100			E		28,400			E		28,500			E		21,900			E		28,900			E	
Lead	SW-846 6010D	mg/kg	596			E		686			E		259	M6		E		169			E		863			E		2,120			E		716			E		3,560			E	
Magnesium	SW-846 6010D	mg/kg	5,170			E		2,040			E		1,110		J	S	SD	1,620			E		2,820			E		2,890			E		1,880			E		689			E	
Manganese	SW-846 6010D	mg/kg	16,500			E		27,300			E		42,600	M6		E		6,030			E		17,900			E		51,900			E		21,400			E		29,200			E	
Mercury	EPA 7471B	mg/kg	0.14			E		0.14			E		0.31			E		0.18			E		0.1			E		0.36			E		0.1			E		0.17			E	
Molybdenum	SW-846 6010D	mg/kg	2.5			E		6			E		10.2	M1	J	S	S%, SD	3.2			E		6.9			E		2.1	J,D3	U	E	CCB	1.7			E		15.8			E	
Nickel	SW-846 6010D	mg/kg	4.5			E		5.6			E		4.6	M1	J	S	S%, SD	3.3			E		4.2			E		6.2			E		4.5			E		1.8			E	
Potassium	SW-846 6010D	mg/kg	2,010			E		1,800			E		1,560			E		2,660			E		2,330			E		1,910			E		1,450			E		1,580			E	
Selenium	SW-846 6010D	mg/kg	<3.4	U,D3		E		<1.7	U,D3		E		<3.6	U,D3		E		<3.2	U,D3		E		<3.4	U,D3		E		<3.4	U,D3		E		<3.5	U,D3		E		<3.2	U,D3		E	
Silver	SW-846 6010D	mg/kg	2.6	J,D3		E		92.1			E		9.9	M6,R1	J	S	D%, S%	9.2			E		33.8			E		44.3			E		57.2			E		186			E	
Sodium	SW-846 6010D	mg/kg	72.8			E		<53.2	U,D3		E		88.9		J	S	SD	60.5			E		42	J		E		<51.1	U,D3		E		25.7	J		E		59.8			E	
Thallium	SW-846 6010D	mg/kg	<2.5	U,D3		E		<1.3	U,D3		E		3	J,D3		E		<2.4	U,D3		E		<2.5	U,D3		E		<2.5	U,D3		E		<2.6	U,D3		E		<2.4	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	14.3			E		87.1			E		36.6	M1	J	S	S%, SD	47.7			E		38.9			E		17.8			E		15.6			E		12			E	
Zinc	SW-846 6010D	mg/kg	928			E		982			E		587	M6		E		182			E		742			E		3,970			E		1,200			E		922			E	
Percent Moisture	ASTM D2974	%	7	N2		E		7.9	N2		E		7.7	N2		E		5.7	N2		E		8.1	N2		E		6.8	N2		E		7.7	N2		E		6.4	N2		E	

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	Work Order		10498601					10498601					10498601					10498601					10498601					10498601					10498601					10498601				
	Field Sample ID		WS19-0040-SO5073-N-102519					WS19-0040-SO5075-N-102519					WS19-0040-SO5076-N-102519					WS19-0003-SO5036-N-102319					WS19-0003-SO5048-N-102419					WS19-0043-SO5081-N-102519					WS19-0043-SO5083-N-102519					WS19-1045-SO5008-N-102319				
	Lab Sample ID		10498601014					10498601015					10498601016					10498601004					10498601008					10498601017					10498601018					10498601001				
	Sample Date		10/25/19					10/25/19					10/25/19					10/23/19					10/24/19					10/25/19					10/25/19					10/23/19				
	Sample Type		Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	6,070			E		4,250			E		6,220			E		7,810			E		5,260			E		5,340			E		5,600			E		8,470			E	
Antimony	SW-846 6010D	mg/kg	53.6			E		1.3			E		6.9			E		1.2			E		8.1			E		1.6			E		2.7	J,D3		E		<2.4	U,D3		E	
Arsenic	SW-846 6010D	mg/kg	333			E		241			E		266			E		131			E		118			E		114			E		156			E		25.8			E	
Barium	SW-846 6010D	mg/kg	56.3			E		20.8			E		41.7			E		70.5			E		258		J	S	FD	40.3			E		68.4			E		321			E	
Beryllium	SW-846 6010D	mg/kg	<0.014	U		E		0.22	J		E		0.23	J,D3		E		0.28			E		0.21	J,D3		E		0.12	J		E		0.24	J,D3		E		4.8			E	
Cadmium	SW-846 6010D	mg/kg	6.4			E		0.7			E		6.6			E		1.6			E		3.5		J	S	FD	2.8			E		2.5			E		0.28	J,D3		E	
Calcium	SW-846 6010D	mg/kg	1,650			E		1,710			E		1,750			E		3,550			E		2,410			E		1,190			E		7,610			E		2,890			E	
Chromium	SW-846 6010D	mg/kg	3.1	J,D3		E		1.4	J,D3		E		3.3	J,D3		E		5.4			E		2.4	J,D3		E		3.2	J,D3		E		2.3	J,D3		E		6.3			E	
Cobalt	SW-846 6010D	mg/kg	6.6			E		6.8			E		11.2			E		7.3			E		10.3			E		4.5			E		14.3			E		3	J,D3		E	
Copper	SW-846 6010D	mg/kg	334			E		54.8			E		290			E		146			E		178			E		82.5			E		95			E		74.5			E	
Iron	SW-846 6010D	mg/kg	61,400			E		29,800			E		27,000			E		26,800			E		24,300			E		16,600			E		33,400			E		19,300			E	
Lead	SW-846 6010D	mg/kg	11,900			E		171			E		1,320			E		256			E		395			E		633			E		339			E		59.6			E	
Magnesium	SW-846 6010D	mg/kg	1,640			E		828			E		1,390			E		2,470			E		1,750			E		1,420			E		2,900			E		670			E	
Manganese	SW-846 6010D	mg/kg	7,070			E		6,490			E		27,700			E		35,500			E		26,700			E		22,900			E		43,700			E		329			E	
Mercury	EPA 7471B	mg/kg	0.13			E		0.053			E		0.094			E		0.094			E		0.15			E		0.068			E		0.4			E		0.045			E	
Molybdenum	SW-846 6010D	mg/kg	9.4			E		4.8			E		2.6	J,D3	U	E	CCB	2.5			E		7.9			E		2.1			E		2.4	J,D3	U	E	CCB	3.3	J,D3	U	E	CCB
Nickel	SW-846 6010D	mg/kg	2.6			E		2.5			E		6.9			E		5.4			E		4.7	J,D3		E		3			E		8.6			E		7			E	
Potassium	SW-846 6010D	mg/kg	4,210			E		1,590			E		1,560			E		1,970			E		1,720			E		1,600			E		1,600			E		793	J,D3		E	
Selenium	SW-846 6010D	mg/kg	<3.5	U,D3		E		<3.3	U,D3		E		<3.4	U,D3		E		<3.3	U,D3		E		<1.7	U,D3		E		<3.3	U,D3		E		<3.4	U,D3		E		<2.1	U,D3		E	
Silver	SW-846 6010D	mg/kg	83.8			E		7.5			E		57.4			E		21.1			E		61.1			E		18.2			E		45.8			E		5.3			E	
Sodium	SW-846 6010D	mg/kg	197			E		23.9	J		E		<51.4	U,D3		E		40.8	J		E		<51.3	U,D3		E		19.7	J		E		<52.5	U,D3		E		327			E	
Thallium	SW-846 6010D	mg/kg	<2.5	U,D3		E		<2.4	U,D3		E		<2.5	U,D3		E		<2.4	U,D3		E		<1.2	U,D3		E		<2.4	U,D3		E		<2.5	U,D3		E		<1.6	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	19.4			E		17.1			E		16.7			E		18.2			E		27.5			E		11.8			E		22			E		50.2			E	
Zinc	SW-846 6010D	mg/kg	1,490			E		337			E		1,620			E		364			E		771		J	S	FD	722			E		840			E		66.3			E	
Percent Moisture	ASTM D2974	%	7	N2		E		7.3	N2		E		8.3	N2		E		7.4	N2		E		6.3	N2		E		7.4	N2		E		5.6	N2		E		24.4	N2		E	

Pace Laboratory Flags (Lab Flag)

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CCB = Qualified due to detections in the Continuing Calibration Blank.

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to Serial Dilution recovery problems.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10498601					10498601					10499840					10499840					10499840					10499840					10499840					10499840				
Field Sample ID			WS19-1045-SO5028-N-102319					WS19-1045-SO5030-N-102319					WS19-0010-SO5175-N-110719					WS19-0010-SO5187-N-110819					WS19-0015-SO5181-N-110719					WS19-0015-SO5204-N-110819					WS19-0019-SO5193-N-110819					WS19-0288-SO5217-N-111519				
Lab Sample ID			10498601002					10498601003					10499840001					10499840003					10499840008					10499840004					10499840009					10499840006				
Sample Date			10/23/19					10/23/19					11/07/19					11/08/19					11/07/19					11/08/19					11/08/19					11/15/19				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	6,930			E		16,900			E		3,470			E		1,820			E		3,350			E		2,920	M1	J	S	S%	7,330			E		654			E	
Antimony	SW-846 6010D	mg/kg	2.9			E		1.7			E		0.64	J		E		1.5			E		3.3			E		1.9	M1	J	S	S%	6.8			E		3.4			E	
Arsenic	SW-846 6010D	mg/kg	264			E		42.8			E		98.2		J	S	FD	195			E		115			E		178	M1	J	S	S%	73.4			E		115			E	
Barium	SW-846 6010D	mg/kg	136			E		215			E		14.1			E		28			E		77			E		53			E		94.6			E		1.2			E	
Beryllium	SW-846 6010D	mg/kg	0.071	J		E		0.22	J		E		0.2	J		E		0.076	J		E		0.12	J		E		0.12	J		E		0.21	J		E		0.028	J		E	
Cadmium	SW-846 6010D	mg/kg	1.1			E		1.4			E		5.7		J	S	FD	3.5			E		7.9			E		7.8			E		0.88			E		1			E	
Calcium	SW-846 6010D	mg/kg	1,360			E		16,400			E		5,610			E		245			E		1,370			E		313			E		5,410			E		164			E	
Chromium	SW-846 6010D	mg/kg	5.2			E		18.9			E		<2.6	U,D3		E		1.1			E		3.7			E		1.1			E		4.3			E		<0.1	U		E	
Cobalt	SW-846 6010D	mg/kg	6.1			E		6.8			E		6.2			E		1.5			E		1.9			E		1.9			E		8.4			E		0.068	J		E	
Copper	SW-846 6010D	mg/kg	181			E		317			E		42			E		45.5			E		445			E		45.5	M1	J	S	S%	24.6			E		33.6			E	
Iron	SW-846 6010D	mg/kg	28,200			E		21,500			E		23,500		J	S	FD	24,600			E		14,900			E		25,600	P6		E		27,100			E		6,650			E	
Lead	SW-846 6010D	mg/kg	428			E		122			E		1,490		J	S	FD	2,480			E		1,740			E		6,870	P6		E		1,120			E		2,990			E	
Magnesium	SW-846 6010D	mg/kg	2,770			E		7,240			E		3,090			E		375			E		794			E		384			E		3,790			E		38.1			E	
Manganese	SW-846 6010D	mg/kg	4,670			E		904			E		84,000		J	S	FD	2,850			E		5,610			E		3,180	P6		E		9,780			E		302			E	
Mercury	EPA 7471B	mg/kg	0.34			E		0.85			E		0.28			E		0.17			E		0.17			E		0.17			E		0.22			E		0.33			E	
Molybdenum	SW-846 6010D	mg/kg	5.4			E		0.9		U	E	CCB	3.5			E		3			E		5.1			E		2.2			E		1.3			E		6.2			E	
Nickel	SW-846 6010D	mg/kg	4			E		10.8			E		5			E		0.92	J		E		2			E		1.1			E		6			E		0.19	J		E	
Potassium	SW-846 6010D	mg/kg	2,960			E		4,410			E		1,070			E		2,030			E		900			E		1,400			E		2,150			E		822			E	
Selenium	SW-846 6010D	mg/kg	<0.33	U		E		<0.36	U		E		<8.7	U,D3		E		<0.33	U		E		<0.35	U		E		<0.33	U		E		<1.7	U,D3		E		1	J		E	
Silver	SW-846 6010D	mg/kg	46.9			E		2.2			E		18.3		J	S	FD	46.1			E		39.2			E		22.4	M1	J	S	S%	15.3			E		93.3	M1,R1	J	S	D%, S%
Sodium	SW-846 6010D	mg/kg	81.6			E		134			E		22.5	J		E		154			E		36	J		E		22.9	J		E		53.6			E		73.1			E	
Thallium	SW-846 6010D	mg/kg	0.29	J		E		0.44	J		E		<6.4	U,D3		E		0.31	J		E		<0.26	U		E		0.25	J		E		<1.2	U,D3		E		<0.25	U		E	
Vanadium	SW-846 6010D	mg/kg	29.6			E		39.5			E		8.7			E		8.8			E		11.7			E		9.6			E		24			E		0.72	J		E	
Zinc	SW-846 6010D	mg/kg	383			E		221			E		1,960		J	S	FD	1,030			E		2,140			E		4,810	P6		E		273			E		569			E	
Percent Moisture	ASTM D2974	%	6.6	N2		E		14.1	N2		E		6.3	N2		E		8.2	N2		E		7.4	N2		E		6.6	N2		E		8	N2		E		8.7	N2		E	

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S% = Qualified due to percent recovery of the matrix spike outside of control limits.

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10499840					10499840					10499840					10499840					10499840					10499860					10499860				
Field Sample ID			WS19-0288-SO5231-N-111519					WS19-0290-SO5017-N-111319					WS19-0290-SO5205-N-111319					WS19-0290-SO5207-N-111319					WS19-0288-SO5222-N-111519					WS19-0012-SO5190-N-110819					WS19-0288-SO5020-N-111519				
Lab Sample ID			10499840007					10499840010					10499840005					10499840011					10499840012					10499860001					10499860004				
Sample Date			11/15/19					11/13/19					11/13/19					11/13/19					11/15/19					11/08/19					11/15/19				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	962			E		1,910			E		4,680			E		1,520			E		783			E		12,900			E		9,240			E	
Antimony	SW-846 6010D	mg/kg	2.5			E		4			E		2.9			E		5.7			E		9			E		<0.36	U		E		1.2			E	
Arsenic	SW-846 6010D	mg/kg	148			E		293			E		249			E		140			E		237			E		7.1			E		99.9			E	
Barium	SW-846 6010D	mg/kg	35.6			E		32.7			E		68.1			E		11.6			E		25.1			E		200			E		114			E	
Beryllium	SW-846 6010D	mg/kg	0.12	J		E		0.083	J		E		0.13	J		E		0.13	J		E		0.12	J		E		0.41			E		0.23			E	
Cadmium	SW-846 6010D	mg/kg	0.35			E		6.6			E		11.4			E		13.8			E		9.4			E		0.52			E		1.5			E	
Calcium	SW-846 6010D	mg/kg	2,420			E		797			E		1,140			E		594	J		E		839			E		4,190			E		1,190			E	
Chromium	SW-846 6010D	mg/kg	<0.52	U,D3		E		1.2	J,D3		E		4.2			E		<2.7	U,D3		E		<2.5	U,D3		E		11.8			E		5.8			E	
Cobalt	SW-846 6010D	mg/kg	1.1			E		1.8			E		2			E		0.83			E		0.75			E		4.4			E		3.1			E	
Copper	SW-846 6010D	mg/kg	11.4			E		44.3			E		60.2			E		79.2			E		83.5			E		47.6			E		123			E	
Iron	SW-846 6010D	mg/kg	4,870			E		8,580			E		13,200			E		9,110			E		16,300			E		17,800			E		7,700			E	
Lead	SW-846 6010D	mg/kg	57.7			E		1,410			E		1,890			E		3,650			E		2,970			E		78.1			E		84.5			E	
Magnesium	SW-846 6010D	mg/kg	128			E		289			E		1,060			E		517			E		306			E		4,050			E		1,160			E	
Manganese	SW-846 6010D	mg/kg	10,500			E		21,600			E		13,200			E		42,000			E		65,200			E		481			E		1,830		J	S	FD
Mercury	EPA 7471B	mg/kg	0.018	J		E		0.19			E		0.23			E		0.47			E		0.079			E		0.16			E		0.14			E	
Molybdenum	SW-846 6010D	mg/kg	4.7			E		5.5			E		3.9			E		4.1			E		16.2			E		1.2			E		1.8			E	
Nickel	SW-846 6010D	mg/kg	0.62	J		E		0.86	J		E		2			E		0.86	J		E		1.1			E		7.2			E		4			E	
Potassium	SW-846 6010D	mg/kg	987			E		1,080			E		1,280			E		698			E		1,490			E		3,130			E		1,880			E	
Selenium	SW-846 6010D	mg/kg	<1.7	U,D3		E		<1.8	U,D3		E		<1.8	U,D3		E		<8.7	U,D3		E		<8.2	U,D3		E		<0.32	U		E		<0.3	U		E	
Silver	SW-846 6010D	mg/kg	7			E		41.1			E		43.1			E		111			E		53.5			E		3.6			E		2.3			E	
Sodium	SW-846 6010D	mg/kg	21	J		E		28.7	J		E		51	J		E		14.2	J		E		90.5			E		99.7			E		41.6	J		E	
Thallium	SW-846 6010D	mg/kg	<1.2	U,D3		E		<1.3	U,D3		E		<1.3	U,D3		E		<6.4	U,D3		E		<6	U,D3		E		<0.23	U		E		0.29	J		E	
Vanadium	SW-846 6010D	mg/kg	5.4			E		6.4			E		14.7			E		3			E		3			E		31			E		12.4			E	
Zinc	SW-846 6010D	mg/kg	198			E		1,780			E		3,570			E		5,720			E		3,730			E		177			E		142			E	
Percent Moisture	ASTM D2974	%	6.3	N2		E		9	N2		E		11.1	N2		E		7.5	N2		E		5.2	N2		E		2.8	N2		E		1.3	N2		E	

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M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CCB = Qualified due to detections in the Continuing Calibration Blank.

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to Serial Dilution recovery problems.

Table 1b. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - SPLP

Work Order			10498600					10498600					10498600					10498600					10499840					10499840					10499840					10499840				
Field Sample ID			WS19-0006-SO5092-N-102519					WS19-0006-SO5123-N-110419					WS19-0043-SO5047-N-102419					WS19-1045-SO5027-N-102319					WS19-0015-SO5181-N-110719					WS19-0019-SO5193-N-110819					WS19-0290-SO5017-N-111319					WS19-0290-SO5207-N-111319				
Lab Sample ID			10498600008					10498600010					10498600007					10498600006					10499840008					10499840009					10499840010					10499840011				
Sample Date			10/25/19					11/04/19					10/24/19					10/23/19					11/07/19					11/08/19					11/13/19					11/13/19				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	0.1	J		E		5.5			E		<0.021	U		E		0.067	J		E		5.7		J	S	SD	4.2			E		5.3			E		0.4			E	
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U		E		<0.007	U		E		<0.007	U		E		<0.007	U		E		<0.007	U		E		<0.007	U		E		<0.007	U		E		<0.007	U		E	
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U		E		0.012	J		E		<0.0038	U		E		<0.0038	U		E		0.029			E		0.0095	J		E		0.074			E		<0.0038	U		E	
Barium, SPLP	SW-846 6010D	mg/L	0.017	J		E		0.015	J		E		0.0034	J		E		0.0033	J		E		0.089	J		E		0.014	J		E		0.011	J		E		0.0025	J,B		E	
Beryllium, SPLP	SW-846 6010D	mg/L	0.00052	J		E		0.00014	J		E		0.00013	J		E		0.00017	J		E		0.0002	J		E		0.00017	J		E		0.00015	J		E		<0.00012	U		E	
Cadmium, SPLP	SW-846 6010D	mg/L	0.0044			E		0.00046	J		E		0.00073	J		E		0.00064	J		E		0.021			E		<0.00028	U		E		0.00065	J		E		0.0013	J		E	
Calcium, SPLP	SW-846 6010D	mg/L	147			E		1.4			E		17.3			E		4.2			E		6.3			E		17.2			E		1.4			E		1.2			E	
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U		E		0.00087	J		E		<0.00066	U		E		<0.00066	U		E		0.0016	J		E		0.001	J		E		0.00086	J		E		<0.00066	U		E	
Cobalt, SPLP	SW-846 6010D	mg/L	0.0011	J		E		0.00084	J		E		0.00076	J		E		0.00058	J		E		0.0013	J		E		0.00084	J		E		0.0006	J		E		<0.0005	U		E	
Copper, SPLP	SW-846 6010D	mg/L	0.016			E		0.015			E		0.0033	J		E		0.0023	J		E		0.17			E		0.0051	J		E		0.0074	J		E		<0.0012	U		E	
Iron, SPLP	SW-846 6010D	mg/L	0.098			E		2.6			E		0.048	J		E		0.036	J		E		3.8			E		2.3			E		2.3			E		0.14			E	
Lead, SPLP	SW-846 6010D	mg/L	0.0048	J	J	S	FD	0.062		J	S	FD	<0.002	U		E		<0.002	U		E		1.1			E		0.032			E		0.23			E		0.034			E	
Magnesium, SPLP	SW-846 6010D	mg/L	3.5			E		0.64			E		1.6			E		0.28	J		E		0.93			E		2.4			E		0.57			E		0.55			E	
Manganese, SPLP	SW-846 6010D	mg/L	26.1			E		1.8			E		6.7			E		1.6			E		2.8			E		0.95			E		1.8			E		4.8			E	
Mercury, SPLP	SW-846 7470A	µg/L	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS	<0.093	U	UJ	S	CS
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0038	U		E		<0.0038	U	U	E	CCB	<0.0038	U		E		<0.0038	U		E		<0.0038	U		E		<0.0038	U		E		<0.0038	U		E		<0.0038	U		E	
Nickel, SPLP	SW-846 6010D	mg/L	0.0072	J		E		<0.0011	U		E		0.0023	J		E		<0.0011	U		E		0.0012	J		E		<0.0011	U		E		<0.0011	U		E		<0.0011	U		E	
Potassium, SPLP	SW-846 6010D	mg/L	4.3			E		2.7			E		2.9			E		3			E		3.8			E		3.2			E		2.2	J		E		0.84	J		E	
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E	
Silver, SPLP	SW-846 6010D	mg/L	0.00056	J		E		0.006	J		E		<0.0004	U		E		<0.0004	U		E		0.0099	J		E		0.0016	J		E		0.0027	J		E		0.00088	J		E	
Sodium, SPLP	SW-846 6010D	mg/L	0.83	J		E		1.1	B	U	E	MB	0.61	J		E		0.44	J		E		2			E		1.4	B		E		1.7	B		E		1.3	B		E	
Thallium, SPLP	SW-846 6010D	mg/L	0.0062	J		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E	
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U		E		0.0068	J		E		<0.00043	U		E		<0.00043	U		E		0.0049	J		E		0.0055	J		E		0.0044	J		E		<0.00043	U		E	
Zinc, SPLP	SW-846 6010D	mg/L	1.8			E		0.067	B		E		0.56			E		0.13			E		4.1			E		0.025			E		0.25			E		0.067			E	

Pace Laboratory Flags (Lab Flag)

B = Analyte was detected in the associated method blank.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CCB = Qualified due to detections in the Continuing Calibration Blank.

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

SD = Qualified due to Serial Dilution recovery problems.

Table 1b. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - SPLP

		Work Order	10499840				
		Field Sample ID	WS19-0288-SO5222-N-111519				
		Lab Sample ID	10499840012				
		Sample Date	11/15/19				
		Sample Type	Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	3.1			E	
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U		E	
Arsenic, SPLP	SW-846 6010D	mg/L	0.017	J		E	
Barium, SPLP	SW-846 6010D	mg/L	0.0057	J,B		E	
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00012	U		E	
Cadmium, SPLP	SW-846 6010D	mg/L	0.00041	J		E	
Calcium, SPLP	SW-846 6010D	mg/L	1.5			E	
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U		E	
Cobalt, SPLP	SW-846 6010D	mg/L	<0.0005	U		E	
Copper, SPLP	SW-846 6010D	mg/L	0.0043	J		E	
Iron, SPLP	SW-846 6010D	mg/L	0.95			E	
Lead, SPLP	SW-846 6010D	mg/L	0.14			E	
Magnesium, SPLP	SW-846 6010D	mg/L	0.47	J		E	
Manganese, SPLP	SW-846 6010D	mg/L	1.5			E	
Mercury, SPLP	SW-846 7470A	µg/L	<0.093	U	UJ	S	CS
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0048	J	U	E	CCB
Nickel, SPLP	SW-846 6010D	mg/L	<0.0011	U		E	
Potassium, SPLP	SW-846 6010D	mg/L	1.8	J		E	
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U		E	
Silver, SPLP	SW-846 6010D	mg/L	0.0028	J		E	
Sodium, SPLP	SW-846 6010D	mg/L	0.85	J,B		E	
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U		E	
Vanadium, SPLP	SW-846 6010D	mg/L	0.00091	J		E	
Zinc, SPLP	SW-846 6010D	mg/L	0.18			E	

Pace Laboratory Flags (Lab Flag)

B = Analyte was detected in the associated method blank.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CCB = Qualified due to detections in the Continuing Calibration Blank.

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

SD = Qualified due to Serial Dilution recovery problems.

Table 1c. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - ABA

		Work Order	10498502					10499860					10499860				
		Field Sample ID	WS19-0006-SO5092-N-102519					WS19-0019-SO5193-N-110819					WS19-0290-SO5017-N-111319				
		Lab Sample ID	10498502003					10499860002					10499860003				
		Sample Date	10/25/19					11/08/19					11/13/19				
		Sample Type	Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Acid Potential	Modified Sobek 3.2	tons/1000	19.2	AL	J-	S	ICV	40.6	AL	J	S	D%	18.2	AL		E	
Acid/Base Potential	Modified Sobek 3.2	tons/1000	3.6	AL	J-	S	ICV	-1.23464	U,AL	J	S	D%	3.8	AL		E	
Neutralization Potential	Modified Sobek 3.2	tons/1000	22.8	AL		E		39.4	AL		E		22	AL		E	
Sulfur, HCl Extractable	Modified Sobek 3.2	%w/w	0.192	N2,AL	J-	S	ICV	0.167	N2,AL,D6	J	S	D%	0.193	N2,AL		E	
Sulfur, HNO3 Extractable	Modified Sobek 3.2	%w/w	0.465	N2,AL	J-	S	ICV	1.17	N2,AL		E		0.437	N2,AL		E	
Sulfur, Hot Water Extractable	Modified Sobek 3.2	%w/w	0.737	N2,AL	J-	S	ICV	0.208	N2,AL,D6	J	S	D%	0.25	N2,AL		E	
Sulfur, Residual	Modified Sobek 3.2	%w/w	<0.05	U,N2,AL	UJ	S	ICV	<0.05	U,N2,AL		E		<0.05	U,N2,AL		E	
Total Sulfur	Modified Sobek 3.2	%w/w	1.4	N2,AL	J-	S	ICV	1.53	N2,AL		E		0.879	N2,AL		E	

Pace Laboratory Flags (Lab Flag)

AL = The lab does not hold A2LA accreditation for this parameter.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

D% = Qualified due to laboratory duplicate results outside control limits.

ICV = Qualified due to Initial Calibration Verification recovery problems.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Enforcement, Screening and Rejected Codes, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10498600					10498600								
		Field Sample ID	WS19-0006-SO5092-D-102519					WS19-0006-SO5092-N-102519								
		Lab Sample ID	10498600009					10498600008								
		Sample Date	10/25/2019					10/25/2019								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	CRQL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	14,000				5	12,800				5	20	RPD<35%		9%
Antimony	SW-846 6010D	mg/kg	2.2				1	1.4				1	6	+/-2xCRQL	0.8	
Arsenic	SW-846 6010D	mg/kg	83.5				1	64.9				1	1	RPD<35%		25%
Barium	SW-846 6010D	mg/kg	121				1	103				1	20	RPD<35%		16%
Beryllium	SW-846 6010D	mg/kg	0.2	J			1	0.22	J			1	0.5	+/-2xCRQL	0.02	
Cadmium	SW-846 6010D	mg/kg	1.1				1	1.2				1	0.5	+/-2xCRQL	0.1	
Calcium	SW-846 6010D	mg/kg	9,650				5	8,470				5	500	+/-2xCRQL	1180	
Chromium	SW-846 6010D	mg/kg	5.7				5	5				5	1	+/-2xCRQL	0.7	
Cobalt	SW-846 6010D	mg/kg	9.1				1	8.3				1	5	+/-2xCRQL	0.8	
Copper	SW-846 6010D	mg/kg	65				5	51.8				5	2.5	+/-2xCRQL	13.2	
Iron	SW-846 6010D	mg/kg	26,100				5	23,300				5	10	RPD<35%		11%
Lead	SW-846 6010D	mg/kg	386		J	FD	5	239		J	FD	5	1	RPD<35%		**47%**
Magnesium	SW-846 6010D	mg/kg	5,020				1	4,620				1	500	RPD<35%		8%
Manganese	SW-846 6010D	mg/kg	14,400				50	12,300				50	1.5	RPD<35%		16%
Mercury	EPA 7471B	mg/kg	0.23		J-	CS	1	0.19		J-	CS	1	0.1	+/-2xCRQL	0.04	
Molybdenum	SW-846 6010D	mg/kg	2.7				1	2.9				1	5	+/-2xCRQL	0.2	
Nickel	SW-846 6010D	mg/kg	5.4				1	4.8				1	4	+/-2xCRQL	0.6	
Potassium	SW-846 6010D	mg/kg	3,420				1	2,980				1	500	RPD<35%		14%
Selenium	SW-846 6010D	mg/kg	<1.7	U,D3			5	<1.7	U,D3			5	3.5	ND		
Silver	SW-846 6010D	mg/kg	23.6				5	14.9				5	1	+/-2xCRQL	8.7	
Sodium	SW-846 6010D	mg/kg	74				1	62.6				1	500	+/-2xCRQL	11.4	
Thallium	SW-846 6010D	mg/kg	<1.3	U,D3			5	<1.3	U,D3			5	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	38.9				1	36.4				1	5	RPD<35%		7%
Zinc	SW-846 6010D	mg/kg	507				1	467				1	6	RPD<35%		8%
Aluminum, SPLP	SW-846 6010D	mg/L	0.11	J			1	0.1	J			1	0.2	+/-2xCRQL	0.01	
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U			1	<0.007	U			1	0.002	ND		
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U			1	<0.0038	U			1	0.01	ND		
Barium, SPLP	SW-846 6010D	mg/L	0.017	J			1	0.017	J			1	0.01	+/-2xCRQL	0	
Beryllium, SPLP	SW-846 6010D	mg/L	0.0005	J			1	0.00052	J			1	0.001	+/-2xCRQL	0.00002	
Cadmium, SPLP	SW-846 6010D	mg/L	0.0034				1	0.0044				1	0.001	+/-2xCRQL	0.001	
Calcium, SPLP	SW-846 6010D	mg/L	115				1	147				1	5	RPD<35%		24%
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U			1	<0.00066	U			1	0.01	ND		
Cobalt, SPLP	SW-846 6010D	mg/L	0.0013	J			1	0.0011	J			1	0.05	+/-2xCRQL	0.0002	
Copper, SPLP	SW-846 6010D	mg/L	0.016				1	0.016				1	0.002	RPD<35%		0%
Iron, SPLP	SW-846 6010D	mg/L	0.044	J			1	0.098				1	0.1	+/-2xCRQL	0.054	
Lead, SPLP	SW-846 6010D	mg/L	0.0028	J	J	FD	1	0.0048	J	J	FD	1	0.001	+/-2xCRQL	**0.002**	
Magnesium, SPLP	SW-846 6010D	mg/L	3.3				1	3.5				1	5	+/-2xCRQL	0.2	
Manganese, SPLP	SW-846 6010D	mg/L	23.9				5	26.1				5	0.001	RPD<35%		9%
Mercury, SPLP	SW-846 7470A	µg/L	<0.093	U	UJ	CS	1	<0.093	U	UJ	CS	1	0.0002	ND		
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0038	U			1	<0.0038	U			1	0.005	ND		
Nickel, SPLP	SW-846 6010D	mg/L	0.0072	J			1	0.0072	J			1	0.04	+/-2xCRQL	0	
Potassium, SPLP	SW-846 6010D	mg/L	4.1				1	4.3				1	5	+/-2xCRQL	0.2	
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U			1	<0.0058	U			1	0.005	ND		
Silver, SPLP	SW-846 6010D	mg/L	0.00052	J			1	0.00056	J			1	0.001	+/-2xCRQL	0.00004	
Sodium, SPLP	SW-846 6010D	mg/L	0.94	J			1	0.83	J			1	5	+/-2xCRQL	0.11	
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U			1	0.0062	J			1	0.025	+/-2xCRQL	0.0195	
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U			1	<0.00043	U			1	0.05	ND		
Zinc, SPLP	SW-846 6010D	mg/L	1.6				1	1.8				1	0.002	RPD<35%		12%
Percent Moisture	ASTM D2974	%	9.2	N2			1	9.1	N2			1	0.1	RPD<35%		1%

Notes:

The CRQL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

Pace Laboratory Flags (Lab Flag)

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

FD = Qualified due to field duplicate results outside of control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Enforcement, Screening and Rejected Codes, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10498601					10498601								
		Field Sample ID	WS19-0003-SO5048-D-102419					WS19-0003-SO5048-N-102419								
		Lab Sample ID	10498601009					10498601008								
		Sample Date	10/24/2019					10/24/2019								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	CRQL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	5,410				10	5,260				5	20	RPD<35%		3%
Antimony	SW-846 6010D	mg/kg	3.8				1	8.1				5	6	+/-2xCRQL	4.3	
Arsenic	SW-846 6010D	mg/kg	106				1	118				5	1	RPD<35%		11%
Barium	SW-846 6010D	mg/kg	150		J	FD	1	258		J	FD	5	20	RPD<35%		**53%**
Beryllium	SW-846 6010D	mg/kg	0.17	J			1	0.21	J,D3			5	0.5	+/-2xCRQL	0.04	
Cadmium	SW-846 6010D	mg/kg	1.7		J	FD	1	3.5		J	FD	5	0.5	+/-2xCRQL	**1.8**	
Calcium	SW-846 6010D	mg/kg	2,700				10	2,410				5	500	+/-2xCRQL	290	
Chromium	SW-846 6010D	mg/kg	3.9	J,D3			10	2.4	J,D3			5	1	+/-2xCRQL	1.5	
Cobalt	SW-846 6010D	mg/kg	7.9				1	10.3				5	5	+/-2xCRQL	2.4	
Copper	SW-846 6010D	mg/kg	140				10	178				5	2.5	RPD<35%		24%
Iron	SW-846 6010D	mg/kg	26,400				10	24,300				5	10	RPD<35%		8%
Lead	SW-846 6010D	mg/kg	396				10	395				5	1	RPD<35%		0%
Magnesium	SW-846 6010D	mg/kg	1,370				1	1,750				5	500	+/-2xCRQL	380	
Manganese	SW-846 6010D	mg/kg	22,000				100	26,700				50	1.5	RPD<35%		19%
Mercury	EPA 7471B	mg/kg	0.12				1	0.15				1	0.1	+/-2xCRQL	0.03	
Molybdenum	SW-846 6010D	mg/kg	3.6				1	7.9				5	5	+/-2xCRQL	4.3	
Nickel	SW-846 6010D	mg/kg	3.6				1	4.7	J,D3			5	4	+/-2xCRQL	1.1	
Potassium	SW-846 6010D	mg/kg	1,370				1	1,720				5	500	+/-2xCRQL	350	
Selenium	SW-846 6010D	mg/kg	<3.4	U,D3			10	<1.7	U,D3			5	3.5	ND		
Silver	SW-846 6010D	mg/kg	64.7				10	61.1				1	1	RPD<35%		6%
Sodium	SW-846 6010D	mg/kg	22.1	J			1	<51.3	U,D3			5	500	+/-2xCRQL	29.2	
Thallium	SW-846 6010D	mg/kg	<2.5	U,D3			10	<1.2	U,D3			5	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	22.5				1	27.5				5	5	+/-2xCRQL	5	
Zinc	SW-846 6010D	mg/kg	453		J	FD	1	771		J	FD	5	6	RPD<35%		**52%**
Percent Moisture	ASTM D2974	%	6.9	N2			1	6.3	N2			1	0.1	RPD<35%		9%

Notes:

The CRQL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

Pace Laboratory Flags (Lab Flag)

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

FD = Qualified due to field duplicate results outside of control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Enforcement, Screening and Rejected Codes, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10499840					10499840								
		Field Sample ID	WS19-0010-SO5175-D-110719					WS19-0010-SO5175-N-110719								
		Lab Sample ID	10499840002					10499840001								
		Sample Date	11/7/2019					11/7/2019								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	CRQL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	4,480				10	3,470				25	20	RPD<35%		25%
Antimony	SW-846 6010D	mg/kg	0.77	J			1	0.64	J			1	6	+/-2xCRQL	0.13	
Arsenic	SW-846 6010D	mg/kg	206		J	FD	1	98.2		J	FD	1	1	RPD<35%		**71%**
Barium	SW-846 6010D	mg/kg	32.5				1	14.1				1	20	+/-2xCRQL	18.4	
Beryllium	SW-846 6010D	mg/kg	0.19	J			1	0.2	J			1	0.5	+/-2xCRQL	0.01	
Cadmium	SW-846 6010D	mg/kg	17		J	FD	1	5.7		J	FD	1	0.5	RPD<35%		**100%**
Calcium	SW-846 6010D	mg/kg	7,670				10	5,610				25	500	+/-2xCRQL	2060	
Chromium	SW-846 6010D	mg/kg	1.1	J,D3			10	<2.6	U,D3			25	1	+/-2xCRQL	1.5	
Cobalt	SW-846 6010D	mg/kg	8.2				1	6.2				1	5	+/-2xCRQL	2	
Copper	SW-846 6010D	mg/kg	75.5				10	42				25	2.5	+/-2xCRQL	33.5	
Iron	SW-846 6010D	mg/kg	35,100		J	FD	10	23,500		J	FD	10	10	RPD<35%		**40%**
Lead	SW-846 6010D	mg/kg	2,650		J	FD	10	1,490		J	FD	25	1	RPD<35%		**56%**
Magnesium	SW-846 6010D	mg/kg	3,880				1	3,090				1	500	RPD<35%		23%
Manganese	SW-846 6010D	mg/kg	34,100		J	FD	100	84,000		J	FD	100	1.5	RPD<35%		**85%**
Mercury	EPA 7471B	mg/kg	0.25				1	0.28				1	0.1	+/-2xCRQL	0.03	
Molybdenum	SW-846 6010D	mg/kg	4.3				1	3.5				1	5	+/-2xCRQL	0.8	
Nickel	SW-846 6010D	mg/kg	6				1	5				1	4	+/-2xCRQL	1	
Potassium	SW-846 6010D	mg/kg	1,560				1	1,070				1	500	+/-2xCRQL	490	
Selenium	SW-846 6010D	mg/kg	<3.4	U,D3			10	<8.7	U,D3			25	3.5	ND		
Silver	SW-846 6010D	mg/kg	42.4		J	FD	10	18.3		J	FD	25	1	+/-2xCRQL	**24.1**	
Sodium	SW-846 6010D	mg/kg	24.8	J			1	22.5	J			1	500	+/-2xCRQL	2.3	
Thallium	SW-846 6010D	mg/kg	<2.5	U,D3			10	<6.4	U,D3			25	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	12.1				1	8.7				1	5	+/-2xCRQL	3.4	
Zinc	SW-846 6010D	mg/kg	6,940		J	FD	10	1,960		J	FD	1	6	RPD<35%		**112%**
Percent Moisture	ASTM D2974	%	6.3	N2			1	6.3	N2			1	0.1	RPD<35%		0%

Notes:

The CRQL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

Pace Laboratory Flags (Lab Flag)

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

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Data Validation Reason Codes (Reason Code)

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

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Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Enforcement, Screening and Rejected Codes, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10499860					10499860								
		Field Sample ID	WS19-0288-SO5020-D-111519					WS19-0288-SO5020-N-111519								
		Lab Sample ID	10499860005					10499860004								
		Sample Date	11/15/2019					11/15/2019								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	CRQL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	9,100				1	9,240				1	20	RPD<35%		2%
Antimony	SW-846 6010D	mg/kg	1.3				1	1.2				1	6	+/-2xCRQL	0.1	
Arsenic	SW-846 6010D	mg/kg	96.9				1	99.9				1	1	RPD<35%		3%
Barium	SW-846 6010D	mg/kg	105				1	114				1	20	RPD<35%		8%
Beryllium	SW-846 6010D	mg/kg	0.2	J			1	0.23				1	0.5	+/-2xCRQL	0.03	
Cadmium	SW-846 6010D	mg/kg	1.4				1	1.5				1	0.5	+/-2xCRQL	0.1	
Calcium	SW-846 6010D	mg/kg	1,040				1	1,190				1	500	+/-2xCRQL	150	
Chromium	SW-846 6010D	mg/kg	5.8				1	5.8				1	1	RPD<35%		0%
Cobalt	SW-846 6010D	mg/kg	3				1	3.1				1	5	+/-2xCRQL	0.1	
Copper	SW-846 6010D	mg/kg	115				1	123				1	2.5	RPD<35%		7%
Iron	SW-846 6010D	mg/kg	7,710				1	7,700				1	10	RPD<35%		0%
Lead	SW-846 6010D	mg/kg	66.2				1	84.5				1	1	RPD<35%		24%
Magnesium	SW-846 6010D	mg/kg	1,140				1	1,160				1	500	+/-2xCRQL	20	
Manganese	SW-846 6010D	mg/kg	1,240		J	FD	5	1,830		J	FD	5	1.5	RPD<35%		**38%**
Mercury	EPA 7471B	mg/kg	0.13				1	0.14				1	0.1	+/-2xCRQL	0.01	
Molybdenum	SW-846 6010D	mg/kg	2.1				1	1.8				1	5	+/-2xCRQL	0.3	
Nickel	SW-846 6010D	mg/kg	3.8				1	4				1	4	+/-2xCRQL	0.2	
Potassium	SW-846 6010D	mg/kg	1,840				1	1,880				1	500	+/-2xCRQL	40	
Selenium	SW-846 6010D	mg/kg	<0.31	U			1	<0.3	U			1	3.5	ND		
Silver	SW-846 6010D	mg/kg	1.8				1	2.3				1	1	+/-2xCRQL	0.5	
Sodium	SW-846 6010D	mg/kg	41	J			1	41.6	J			1	500	+/-2xCRQL	0.6	
Thallium	SW-846 6010D	mg/kg	<0.23	U			1	0.29	J			1	2.5	+/-2xCRQL	0.06	
Vanadium	SW-846 6010D	mg/kg	12.4				1	12.4				1	5	+/-2xCRQL	0	
Zinc	SW-846 6010D	mg/kg	126				1	142				1	6	RPD<35%		12%
Percent Moisture	ASTM D2974	%	1.2	N2			1	1.3	N2			1	0.1	RPD<35%		8%

Notes:

The CRQL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

Pace Laboratory Flags (Lab Flag)

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

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Data Validation Reason Codes (Reason Code)

CS = Qualified due to Contract Required Detection Limit Check Sample recovery problems.

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Table 3. Sample Identification

Field ID	Sample Type	Station	Lab ID	Sample Date	ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	Modified Sobek 3.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP
WS19-0006-SO5092-N-102519	Natural	0006	10498502003	10/25/2019					X		
WS19-0019-SO5193-N-110819	Natural	0019	10499860002	11/8/2019					X		
WS19-0290-SO5017-N-111319	Natural	0290	10499860003	11/13/2019					X		
WS19-0006-SO5092-D-102519	Field Duplicate	0006	10498600009	10/25/2019	X	X	X			X	X
WS19-0006-SO5092-N-102519	Natural	0006	10498600008	10/25/2019	X	X	X			X	X
WS19-0006-SO5123-N-110419	Natural	0006	10498600010	11/4/2019	X	X	X			X	X
WS19-0015-SO5181-N-110719	Natural	0015	10499840008	11/7/2019	X	X	X			X	X
WS19-0019-SO5193-N-110819	Natural	0019	10499840009	11/8/2019	X	X	X			X	X
WS19-0043-SO5047-N-102419	Natural	0043	10498600007	10/24/2019	X	X	X			X	X
WS19-0290-SO5017-N-111319	Natural	0290	10499840010	11/13/2019	X	X	X			X	X
WS19-0290-SO5207-N-111319	Natural	0290	10499840011	11/13/2019	X	X	X			X	X
WS19-0288-SO5222-N-111519	Natural	0288	10499840012	11/15/2019	X	X	X			X	X
WS19-1045-SO5027-N-102319	Natural	1045	10498600006	10/23/2019	X	X	X			X	X
WS19-0003-SO5039-N-102319	Natural	0003	10498502001	10/23/2019	X	X	X	X			
WS19-0003-SO5095-N-102819	Natural	0003	10498502004	10/28/2019	X	X	X	X			
WS19-0006-SO5124-N-110419	Natural	0006	10498502006	11/4/2019	X	X	X	X			
WS19-0006-SO5129-N-110419	Natural	0006	10498502007	11/4/2019	X	X	X	X			
WS19-0012-SO5190-N-110819	Natural	0012	10499860001	11/8/2019	X	X	X	X			
WS19-0040-SO5063-N-102519	Natural	0040	10498502002	10/25/2019	X	X	X	X			
WS19-0041-SO5113-N-103119	Natural	0041	10498502005	10/31/2019	X	X	X	X			
WS19-0288-SO5020-D-111519	Field Duplicate	0288	10499860005	11/15/2019	X	X	X	X			
WS19-0288-SO5020-N-111519	Natural	0288	10499860004	11/15/2019	X	X	X	X			
WS19-0003-SO5038-N-102319	Natural	0003	10498601005	10/23/2019	X	X	X				
WS19-0003-SO5041-N-102319	Natural	0003	10498601006	10/23/2019	X	X	X				
WS19-0003-SO5043-N-102319	Natural	0003	10498601007	10/23/2019	X	X	X				
WS19-0003-SO5052-N-102419	Natural	0003	10498601010	10/24/2019	X	X	X				
WS19-0005-SO5090-N-102519	Natural	0005	10498601019	10/25/2019	X	X	X				
WS19-0006-SO5093-N-102519	Natural	0006	10498601020	10/25/2019	X	X	X				
WS19-1131-SO5168-N-110519	Natural	1131	10498600005	11/5/2019	X	X	X				
WS19-0010-SO5175-D-110719	Field Duplicate	0010	10499840002	11/7/2019	X	X	X				
WS19-0010-SO5175-N-110719	Natural	0010	10499840001	11/7/2019	X	X	X				
WS19-0010-SO5187-N-110819	Natural	0010	10499840003	11/8/2019	X	X	X				
WS19-0015-SO5204-N-110819	Natural	0015	10499840004	11/8/2019	X	X	X				
WS19-0037-SO5142-N-110519	Natural	0037	10498600003	11/5/2019	X	X	X				
WS19-0037-SO5155-N-110519	Natural	0037	10498600004	11/5/2019	X	X	X				
WS19-0040-SO5055-N-102419	Natural	0040	10498601011	10/24/2019	X	X	X				
WS19-0040-SO5062-N-102419	Natural	0040	10498601012	10/24/2019	X	X	X				
WS19-0040-SO5064-N-102519	Natural	0040	10498601013	10/25/2019	X	X	X				
WS19-0040-SO5073-N-102519	Natural	0040	10498601014	10/25/2019	X	X	X				
WS19-0040-SO5075-N-102519	Natural	0040	10498601015	10/25/2019	X	X	X				
WS19-0040-SO5076-N-102519	Natural	0040	10498601016	10/25/2019	X	X	X				
WS19-0040-SO5105-N-103119	Natural	0040	10498600002	10/31/2019	X	X	X				
WS19-0003-SO5036-N-102319	Natural	0003	10498601004	10/23/2019	X	X	X				
WS19-0003-SO5048-D-102419	Field Duplicate	0003	10498601009	10/24/2019	X	X	X				
WS19-0003-SO5048-N-102419	Natural	0003	10498601008	10/24/2019	X	X	X				
WS19-0043-SO5081-N-102519	Natural	0043	10498601017	10/25/2019	X	X	X				
WS19-0043-SO5083-N-102519	Natural	0043	10498601018	10/25/2019	X	X	X				
WS19-0043-SO5094-N-102819	Natural	0043	10498600001	10/28/2019	X	X	X				
WS19-0288-SO5217-N-111519	Natural	0288	10499840006	11/15/2019	X	X	X				
WS19-0288-SO5231-N-111519	Natural	0288	10499840007	11/15/2019	X	X	X				
WS19-0290-SO5205-N-111319	Natural	0290	10499840005	11/13/2019	X	X	X				
WS19-1045-SO5008-N-102319	Natural	1045	10498601001	10/23/2019	X	X	X				
WS19-1045-SO5028-N-102319	Natural	1045	10498601002	10/23/2019	X	X	X				
WS19-1045-SO5030-N-102319	Natural	1045	10498601003	10/23/2019	X	X	X				

Method	**Analytes**
ASTM D2974	Percent Moisture
SW-846 6010D	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
EPA 7471B	Mercury
IRTC 6.2.2	Multi-Incremental Sampling
Modified Sobek 3.2 (ABA)	Acid Potential; Acid/Base Potential; Neutralization Potential; Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual; Total Sulfur
SW-846 6010D, SPLP	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
SW-846 7470A, SPLP	Mercury

Attachment A
Data Validation Checklists

Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10498502
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 10/23/2019, 10/25/2019, 10/28/2019, 10/31/2019, 11/4/2019
Analysis Date(s): 11/8/2019, 11/14/2019, 11/15/2019, 11/18/2019, 11/19/2019, 11/20/2019
Data Validator: L. Moon
Validation Date(s): 3/10/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	10/23/2019, 10/25/2019, 10/28/2019, 10/31/2019, 11/4/2019	644271	11/18/2019, 11/20/2019	Y	N/A
Hg			EPA 245.1	28 days		644281	11/18/2019	Y	N/A

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y	N X
Were any data flagged because of preservation problems?	Y	N X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 3.9°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments:

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The following table lists the CCBs bracketing sample analyses that had detections greater than 2 times the instrument detection limit (IDL). The affected analyses had raw results greater than 5 times the blank detections; therefore, no qualifications are warranted.

	CCB detections > 2xMDL									
	11/18/2019 13:24		11/18/2019 13:50		11/18/2019 14:14		11/18/2019 14:34		11/18/2019 14:46	
Analyte	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag
Manganese	0.55	J	3	J	1.6	J	0.52	J	0.66	J
Molybdenum	2.8	J	N/A		2.8	J	2.3	J	N/A	

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: The ICS Solution A and/or ICS Solution AB had detections of Antimony, Barium, Beryllium, Cobalt, Lead, Manganese, Molybdenum, Nickel, Sodium, Thallium, Vanadium, and Zinc greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. For analytes with percent recoveries, they were within control limits for both interference check samples (Solution A and Solution AB).

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments:

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: WS19-0003-SO5039-N-102319 was used to generate the LDS for batches 644271 and 644281.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: WS19-0003-SO5039-N-102319 was used to generate the LMS and LMS duplicate (LMSD) samples for batches 644271 and 644281. The following table list the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample Type	%R	PDS %R	DV Flag	Batch
Antimony	MS	30%	67%	J-	644271
	MSD	29%	67%		
Arsenic	MS	55%	91.7%	J	644271
	MSD	62%	91.7%		
Barium	MS	59%	91.1%	J	644271
Beryllium	MS	74%	73.6%	J-	644271
Potassium	MS	65%	83.8%	J	644271
Mercury	MSD	73%	N/A	J-	644281

Per the NFG "*For a Matrix Spike that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples are considered sufficiently similar to the parent sample to require qualification.

Comments: The LMS and/or LMDS %R for Aluminum, Calcium, Iron, Lead, Magnesium, Manganese, and Zinc were outside the control limit. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria."* (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: WS19-0003-SO5039-N-102319 was used to generate the SD sample. The following table list the analytes that had SD results outside the control limits. The parent sample is qualified as indicated.

Analyte	Sample Type	%D	DV Flag	Batch
Beryllium	SD	59.6%	J	644271
Potassium	SD	11.8%	J	644271
Vanadium	SD	19.5%	J	644271

Per the NFG "*For a serial dilution that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples are considered sufficiently similar to the parent sample to require qualification.

The Beryllium result for these samples were previously qualified "J-" for MS %R below the control limits. The final qualification is "J".

Comments: The SD %D for Chromium, Molybdenum, and Sodium were outside the control limit. However, the original sample concentration of these analytes was less than 50 times the MDL, respectively, and/or the concentration in the SD sample was less than the CRQL, respectively. Therefore, no qualifications are warranted.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken:

Comments: Internal standards used for WO 10498502 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 87.4% to 107.9%

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: No field duplicates were submitted on this WO.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On WO 10498502, the following qualifications were made:

- One (1) Antimony result was qualified "J-" due to matrix spike and post-digestion spike results below the control limits.
- One (1) Arsenic result was qualified "J" due to matrix spike results below the control limits.
- One (1) Barium result was qualified "J" due to matrix spike results below the control limits.
- One (1) Beryllium result was qualified "J" due to matrix spike and serial dilution results outside the control limit.
- One (1) Mercury result was qualified "J-" due to matrix spike and post-digestion spike results below the control limits.
- One (1) Potassium result was qualified "J" due to matrix spike and serial dilution results outside the control limit.
- One (1) Vanadium result was qualified "J" due to serial dilution results outside the control limit.

Comments:

13. Authorization of Data Validation

Data Validator **Name:**	Laura Moon	**Reviewed by:** Julie Flammang
Signature:	Laura Moon	Julie Flammang
Date:	3/10/2020	6/5/2020

Data Validation Checklist for General Chemistry Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10498502
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil
Analyses: Acid Potential; Acid/Base Potential; Neutralization Potential; Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual
Sample Date(s): 10/25/2019
Analysis Date(s): 11/14/2019, 11/15/2019, 11/14/2019
Data Validator: L. Moon
Validation Date(s): 3/18/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Acid Potential; Acid/Base Potential	Pace	Soil	Modified Sobek 3.2	None	10/25/2019	645942	11/19/2019	N/A	N/A
Neutralization Potential						645149	11/15/2019		
Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual						644074	11/14/2019		

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 3.9°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was Instrument successfully calibrated at the correct frequency?	Y [X]	N [ ]
Was Instrument calibrated with appropriate standards and blanks?	Y [X]	N [ ]
Was Initial Calibration Verification sample analyzed?	Y [X]	N [ ]
Was ICV and Continuing Calibration Verifications (ICV) results within the control window?	Y [ ]	N [X]
Were any data flagged because of calibration problems?	Y [X]	N [ ]

Describe Any Actions Taken: The ICV %R for sulfur (86%) was outside the control window. Therefore, WS19-0006-SO5092-N-102519 has been qualified "J-" for Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Acid Potential; and Acid/Base Potential, and "UJ" for Sulfur, Residual.

Comments:

3. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y [X]	N [ ]
Were MBs within the control window?	Y [X]	N [ ]
Were any data flagged because of blank problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

4. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
What was the source of the LCS?	Unknown	
Were LCS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LCS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required
Comments:

5. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N			
Were LDS results within the control window?	Y	X	N			
Were any data flagged because of LDS problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: WS19-0006-SO5092-N-102519 was used to create the LDS for the Modified Sobek 3.2 analyses on this WO.

6. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y		N		N/A	X
Were LMS results within the control window?	Y		N		N/A	X
Were any data flagged because of LMS problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Matrix Spike samples are not performed for the Modified Sobek 3.2 method.

7. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

8. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: No field duplicate pair was included on this WO.

9. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: On WO 10498502, the following qualifications were made:

One (1) Acid Potential result was qualified "J-" due to an ICV result outside the control window.
One (1) Acid/Base Potential result was qualified "J-" due to an ICV result outside the control window.
One (1) Sulfur, HCl Extractable result was qualified "J-" due to an ICV result outside the control window.
One (1) Sulfur, HNO3 Extractable result was qualified "J-" due to an ICV result outside the control window.
One (1) Sulfur, Hot Water Extractable result was qualified "J-" due to an ICV result outside the control window.
One (1) Sulfur, Residual result was qualified "UJ" due to an ICV result outside the control window.
One (1) Total Sulfur result was qualified "J-" due to an ICV result outside the control window.

Comments:

10. Authorization of Data Validation

Data Validator

Name:	Laura Moon	**Reviewed by:** Julie Flammang
Signature:		
Date:	3/18/2020	3/24/2020

Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10498600
Laboratory: Pace Analytical

Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil, SPLP
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury

Sample Date(s): 10/23/2019, 10/24/2019, 10/25/2019, 10/28/2019, 10/31/2019, 11/4/2019, 11/5/2019
Analysis Date(s): 11/18/2019, 11/19/2019, 11/20/2019, 11/22/2019

Data Validator: L. Moon
Validation Date(s): 3/18/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	10/23/2019 10/24/2019 10/25/2019 10/28/2019 10/31/2019 11/4/2019 11/5/2019	643994 645886	11/19/2019 11/20/2019	Y	N/A
Hg			EPA 7471B	28 days		644017	11/18/2019	Y	N/A
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		645033 646449	11/18/2019 11/22/2019	Y	N/A
Hg			EPA 7470A	28 days		645032	11/18/2019	Y	N/A

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y		N	X
Were any data flagged because of preservation problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.6°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y	X	N			

Describe Any Actions Taken: The closing Contract Required Detection Limit check sample analyzed for mercury on 11/18/2019 was outside of the project control limits (75%) of 80-120%. All total mercury (EPA Method 7417B) results on this work order are qualified "J-", to indicate a potential low bias and the SPLP mercury results (EPA Method 7470 A) are qualified "UJ", as all results were reported as non-detect. The samples qualified are listed in the table below:

Sample Number	EPA Method
WS19-0043-SO5094-N-102819	7417B
WS19-0040-SO5105-N-103119	7417B
WS19-0037-SO5142-N-110519	7417B
WS19-0037-SO5155-N-110519	7417B
WS19-1131-SO5168-N-110519	7417B
WS19-1045-SO5027-N-102319	7417B, 7470 A
WS19-0043-SO5047-N-102419	7417B, 7470 A
WS19-0006-SO5092-N-102519	7417B, 7470 A
WS19-0006-SO5092-D-102519	7417B, 7470 A
WS19-0006-SO5123-N-110419	7417B, 7470 A

Comments:

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y		N	X
Were any data flagged because of blank problems?	Y	X	N	

Describe Any Actions Taken: The Molybdenum results for WS19-0037-SO5155-N-110519 and WS19-0043-SO5094-N-102819 and the SPLP Molybdenum result for WS19-0006-SO5123-N-110419 were qualified "U" because CCB detections that were greater than 2 times the instrument detection limit (IDL) bracketed the sample results and the raw sample results were less than 5 times the blank detections, respectively.
The SPLP method blanks for batch 646449 associated with WS19-0006-SO5123-N-110419 had detections of sodium (0.26 mg/L) greater than 2 times the method detection limit (MDL). The SPLP sodium result for this sample is qualified "U".

Comments: The following table lists the CCBs bracketing sample analyses that had detections greater than 2 times the IDL. The affected analyses, except as noted above, had raw results greater than 5 times the blank detections; therefore, no qualifications are warranted.

	CCB detections > 2xIDL (ug/L)					
Analysis Date/Time	**Iron**		**Manganese**		**Molybdenum**	
11/22/2019 12:23					4	J
11/19/2019 12:01			0.74	J	4.4	J
11/19/2019 12:18	13.3	J	2.3	J	4.5	J
11/19/2019 13:14			1.5	J	3.9	J
11/19/2019 13:34			1.2	J	3.3	J
11/19/2019 13:58			0.65	J	3.9	J
11/19/2019 14:19					4.2	J
11/18/2019 13:50			3	J		
11/18/2019 14:14			1.6	J		

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: The ICS Solution A and/or ICS Solution AB had detections of Antimony, Barium, Beryllium, Cobalt, Lead, Manganese, Molybdenum, Nickel, Potassium, Sodium, Thallium, Vanadium, and Zinc greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments:

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had an RPD for the LDS outside the control limits. The parent sample is qualified as indicated.

Analyte	Sample	RPD	DV Flag	Batch	Parent Sample
Barium	3467958MSD	35%	J	643994	WS19-1131-SO5168-N-110519
Lead	3467958MSD	83%	J	643994	WS19-1131-SO5168-N-110519
Manganese	3467958MSD	54%	J	643994	WS19-1131-SO5168-N-110519
Silver	3467958MSD	57%	J	643994	WS19-1131-SO5168-N-110519

Per the NFG "*For a duplicate sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar*." (EPA, 2017). No other samples on this work order are considered sufficiently similar based on location.

Comments: The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
643994	3467957MS	3467958MSD	WS19-1131-SO5168-N-110519	EPA 6010D
645033	3472392MS	3472393MSD	WS19-1045-SO5027-N-102319	EPA 6010D, SPLP
645886	3476274MS	3476275MSD	WS19-1131-SO5168-N-110519	EPA 6010D
646449	3479040MS	3479041MSD	WS19-0006-SO5123-N-110419	EPA 6010D, SPLP
644017	3468042MS	3468043MSD	WS19-1131-SO5168-N-110519	EPA 7471B
645032	3472384MS	3472385MSD	WS19-1045-SO5027-N-102319	EPA 7470A, SPLP

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Antimony	MS	37%	74.3%	J-	643994	WS19-1131-SO5168-N-110519
	MSD	37%				
Copper	MSD	64%	96.9%	J	643994	WS19-1131-SO5168-N-110519
Silver	MS	150%	93.8%	J	645886	WS19-1131-SO5168-N-110519

Per the NFG "*For a Matrix Spike that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples on this work order are considered sufficiently similar to this sample based on location.

Comments: See table in section 6 for LMS/LMSD parent samples on this WO.

The LMS and/or LMDS %R for Aluminum, Arsenic, Iron, Lead, Manganese, Silver, and Zinc for batch 643994 were outside the control limit. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had SD results outside the control limits. The parent sample is qualified as indicated.

Analyte	Sample Type	%D	DV Flag	Batch	Parent Sample
Barium	SD	19.3%	J	643994	WS19-1131-SO5168-N-110519
Cobalt	SD	32.7%	J	643994	WS19-1131-SO5168-N-110519
Magnesium	SD	16.4%	J	643994	WS19-1131-SO5168-N-110519
Potassium	SD	13.3%	J	643994	WS19-1131-SO5168-N-110519
Vanadium	SD	15.9%	J	643994	WS19-1131-SO5168-N-110519

Per the NFG "*For a serial dilution that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples on this work order were considered sufficiently similar based on location to require qualification.

Comments: The following table list the SD parent samples for each batch on this WO.

Batch	Lab ID	Parent Sample ID	Method
643994	3474462SD	WS19-1131-SO5168-N-110519	EPA 6010D
645033	3473196SD	WS19-1045-SO5027-N-102319	EPA 6010D, SPLP
645886	3477284SD	WS19-1131-SO5168-N-110519	EPA 6010D
646449	3480032SD	WS19-0006-SO5123-N-110419	EPA 6010D, SPLP

For batch 645033, the SD %D for Aluminum, Beryllium, Cadmium, Cobalt and Iron were outside the control limit. For batch 643994, the SD %D for Beryllium and Nickel were outside the control limit. For batch 646449, the SD %D for Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper and Silver were outside the control limit. However, the original sample concentration of these analytes was less than 50 times the MDL, respectively. Therefore, no qualifications are warranted.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for WO 10498600 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 86.4% to 113.5%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate pair on this WO was WS19-0006-SO5092-D-102519 and WS19-0006-SO5092-N-102519. The following table list the analytes with results outside the control limits. The field duplicate pair has been qualified as indicated.

Analyte	Matrix	Control Limit	RPD	Difference	DV Flag
Lead	Soil	RPD<35%	47%	N/A	J
Lead	SPLP	±2xCRQL	N/A	0.002 mg/L	J

No other samples were considered sufficiently similar to warrant qualifications.

Comments:

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: In WO 10498600, the following qualifications were made:

One (1) Antimony result is qualified "J-" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Barium result is qualified "J" due to laboratory duplicate and serial dilution results outside the control limits.
One (1) Cobalt result is qualified "J" due to serial dilution results outside the control limits.
One (1) Copper result is qualified "J" due to low percent recovery of the matrix spike.
One (1) Lead result is qualified "J" due to laboratory duplicate results outside control limits.
Two (2) Lead results are qualified "J" due to field duplicate results outside of control limits.
One (1) Magnesium result is qualified "J" due to Serial Dilution results outside the control limits.
One (1) Manganese result is qualified "J" due to laboratory duplicate results outside control limits.
Ten (10) Mercury results are qualified "J-" due to Contract Required Detection Limit Check Sample recovery problems.
Two (2) Molybdenum results are qualified "U" due to detections in the Continuing Calibration Blank.
One (1) Potassium result is qualified "J" due to serial dilution results outside the control limits.
One (1) Silver result is qualified "J" due to laboratory duplicate results and percent recovery of the matrix spike outside of control limits.
One (1) Vanadium result is qualified "J" due to serial dilution results outside the control limits.
Two (2) Lead, SPLP results are qualified "J" due to field duplicate results outside the control limits.
One (1) Molybdenum, SPLP, result is qualified "U" due to detections in the Continuing Calibration Blank.
Five (5) Mercury, SPLP, results are qualified "UJ" due to Contract Required Detection Limit Check Sample recovery problems.
One (1) Sodium, SPLP, result is qualified "U" due to detections in the method blanks.

Comments:

13. Authorization of Data Validation

Data Validator
Name: L. Moon **Reviewed by:** Julie Flammang

Signature: Laura Moon Julie Flammang

Date: 3/18/2020 6/5/2020

Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10498601
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc
Sample Date(s): 10/23/2019, 10/24/2019, and 10/25/2019
Analysis Date(s): 11/19/2019 and 11/20/2019
Data Validator: J. Janosko
Validation Date(s): 3/19/2020 and 3/20/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, and Zn	Pace	Soil	SW-846 6010D	6 months	10/23/2019, 10/24/2019, and 10/25/2019	643995, 645886, 645505, and 645474	11/19/2019 and 11/20/2019	Y	N
Hg			EPA 7471B	28 days		644018	11/19/2019	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time?	Y	N X
Were any data flagged because of preservation problems?	Y	N X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.6°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None Required

Comments:

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the CCBs bracketing sample analyses that had detections greater than 2 times the IDL:

Bracketing CCBs greater than 2 times the IDL (ug/L)						
Analysis Date/Time	Beryllium		Manganese		Molybdenum	
	CCB Result	Lab Flag	CCB Result	Lab Flag	CCB Result	Lab Flag
11/19/2019 9:25					3.7	J
11/19/2019 9:50			4.2	J	3.4	J
11/19/2019 10:11			2.6	J	1.6	J
11/19/2019 10:44			1.5	J	3.9	J
11/19/2019 11:04			2.1	J	4.1	J
11/19/2019 11:25	0.25	J	1.5	J	4.1	J
11/19/2019 11:46					4.1	J
11/19/2019 12:01			0.74	J	4.4	J

Molybdenum in the following samples were qualified "U", due to positive bracketing CCB detections greater than 2x the IDL and raw sample concentrations <5 times the blank value:

WS19-1045-SO5008-N-102319,
WS19-1045-SO5030-N-102319,
WS19-0040-SO5055-N-102419,
WS19-0040-SO5076-N-102519, and
WS19-0043-SO5083-N-102519

The remaining molybdenum sample results and all manganese and beryllium sample results warrant no qualification due to raw sample concentrations >5 times the respective bracketing CCB values.

Comments: For the analytical run on 11/19/2019, additional detections in 1 or more CCBs of barium, iron, lead, selenium, silver and vanadium require no qualifications as the detections were less than 2 times the IDL as discussed in the CFRSSI QAPP (ARCO, 1992). Detections in CCBs for chromium, lead and thallium were also reported for the analytical run on 11/20/2019. These detections were also less than 2 times the IDL and require no qualifications.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: The ICS Solution A and/or ICS Solution AB had detections of Antimony, Arsenic, Barium, Beryllium, Cobalt, Lead, Manganese, Nickel, Thallium, and Vanadium greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for both interference check samples (Solution A and Solution AB) were within control criteria.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments:

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: The LDS sample (parent sample ID WS19-0003-SO5052-N-102419) result for silver (118.3%) was above the acceptable precision range for soils samples. The silver result for this sample is qualified "J". Per the NFG, *"For a duplicate sample that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar*" (EPA, 2017). No other samples are considered sufficiently similar to warrant qualifications.

Comments:

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: Matrix spike (MS) and/or matrix spike duplicate (MSD) percent recoveries were outside recovery criteria for analytes listed in the table below; post digestion spike (PDS) samples were performed for all analytes listed and were within recovery criteria.

Analyte	Sample Type	% R	PDS % R	DV Flag	Batch	Parent Sample
Antimony	MS	39%	76%	J	643995	WS19-0003-SO5052-N
	MSD	38%	76%			
Barium	MS	-173%	96%	J	643995	WS19-0003-SO5052-N
	MSD	-174%	96%			
Beryllium	MS	70%	76%	J	643995	WS19-0003-SO5052-N
	MSD	73%	76%			
Cadmium	MS	69%	77%	J	643995	WS19-0003-SO5052-N
	MSD	73%	77%			
Cobalt	MS	65%	78%	J	643995	WS19-0003-SO5052-N
	MSD	69%	78%			
Copper	MS	-69%	97%	J	643995	WS19-0003-SO5052-N
	MSD	-24%	97%			
Molybdenum	MS	69%	81%	J	643995	WS19-0003-SO5052-N
	MSD	72%	81%			
Nickel	MS	69%	77%	J	643995	WS19-0003-SO5052-N
	MSD	73%	77%			
Silver	MS	464%	96%	J	643995	WS19-0003-SO5052-N
Vanadium	MS	57%	81%	J	643995	WS19-0003-SO5052-N
	MSD	70%	81%			

Consequently, the antimony, barium, beryllium, cadmium, cobalt, copper, molybdenum, nickel, silver and vanadium results for WS19-0003-SO5052-N are all qualified as indicated in the table. Per the NFG, *"For a Matrix Spike that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar*" (EPA, 2017). No other samples were considered sufficiently similar enough to warrant qualification.

Comments: The MS and/or MSD %R for Aluminum, Arsenic, Iron, Lead, Manganese, and Zinc for batch 643995 were also outside recovery criteria. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria*." (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: The following table lists analytes that had SD results outside the control limits. The parent sample is qualified as indicated.

Analyte	Sample Type	%D	DV Flag (Detect/Non-detect)	Parent Sample
Cadmium	SD	21.4%	J	WS19-0003-SO5052-N-102419
Cobalt	SD	25.1%	J	WS19-0003-SO5052-N-102419
Magnesium	SD	14.7%	J	WS19-0003-SO5052-N-102419
Molybdenum	SD	19.4%	J	WS19-0003-SO5052-N-102419
Nickel	SD	23.4%	J	WS19-0003-SO5052-N-102419
Sodium	SD	12.3%	J	WS19-0003-SO5052-N-102419
Vanadium	SD	16.7%	J	WS19-0003-SO5052-N-102419

Per the NFG "*For a serial dilution that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples are considered sufficiently similar to the parent sample to warrant qulaifications.

Comments: The SD %D for Silver was outside the control limit; however, the original sample concentration was less than 50 times the MDL, respectively. Therefore, no qualifications are warranted.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The internal standard used for WO 10498601 was Y, run on 11/19/2019 and 11/20/2019. In the analytical run the Calibration 0 %RI equaled 100% for both dates. The remaining %RI ranged from 88.0% to 114.7% on 11/19/2019 and from 87.4% to 104.9% on 11/20/2019.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: WS19-0003-SO5048-N-102419 and WS19-0003-SO5048-D-102419 are the field duplicate pair on this workorder. The RPD for Barium (53%) and Zinc (52%) were outside acceptable precision criteria for soil samples. In addition, the duplicate result for Cadmium was less than 5 times the CRQL and the difference between the original and duplicate result is greater than 2 times the CRQL. Consequently, the barium, cadmium, and zinc results for the natural and duplicate samples are qualified "J". As discussed above, no other samples are considered sufficiently similar to warrant qualifications.

Comments: The remaining FD RPDs were within acceptable precision criteria.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: In WO 10498601, the following qualifications were made:

One (1) Antimony result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries.
One (1) Barium result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries.
Two (2) Barium results are qualified "J" due to poor field precision.
One (1) Beryllium result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries.
One (1) Cadmium result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries and poor serial dilution precision.
Two (2) Cadmium results are qualified "J" due to poor field precision.
One (1) Cobalt result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries and poor serial dilution precision.
One (1) Copper result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries.
One (1) Magnesium result is qualified "J" due to poor serial dilution precision.
One (1) Molybdenum result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries, and poor serial dilution precision.
Five (5) Molybdenum results are qualified "U" due to detections in the bracketing CCBs.
One (1) Nickel result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries and poor serial dilution precision.
One (1) Silver result is qualified "J" due to high matrix spike recoveries and poor matrix spike precision.
One (1) Sodium result is qualified "J" due to poor serial dilution precision.
One (1) Vanadium result is qualified "J" due to low matrix spike and matrix spike duplicate recoveries and poor serial dilution precision.
Two (2) Zinc results are qualified "J" due to poor field precision.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Jacqueline Janosko

Reviewed by: Julie Flammang

Signature: 

Date: 3/20/2020

3/26/2020

Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10499840
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil, SPLP
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 11/7/2019, 11/8/2019, 11/13/2019 & 11/15/2019
Analysis Date(s): 12/2/2019, 12/3/2019 & 12/4/2019
Data Validator: S. Green
Validation Date(s): 3/24/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	11/7/2019 11/8/2019 11/13/2019 11/15/2019	646282 647831	12/3/2019 12/4/2019	Y	N/A
Hg			EPA 7471B	28 days		646300	12/2/2019	Y	N/A
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		647704	12/3/2019	Y	N/A
Hg			EPA 7470A	28 days		647706	12/3/2019	Y	N/A

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y		N	X
Were any data flagged because of preservation problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.6°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y	X	N			

Describe Any Actions Taken: The opening and closing Contract Required Detection Limit (CRDL) check samples analyzed for SPLP mercury on 12/3/2019 were outside of the project control limits (75% and 77.5%) of 80-120%. All SPLP mercury results (EPA Method 7470 A) are qualified "UJ", as all results were reported as non-detect. The samples qualified are listed in the table below:

Sample Number	EPA Method
WS19-0015-SO5181-N-110719	7470 A
WS19-0019-SO5193-N-110819	7470 A
WS19-0290-SO5017-N-111319	7470 A
WS19-0290-SO5207-N-111319	7470 A
WS19-0288-SO5222-N-111519	7470 A

Comments:

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y	X	N	

Describe Any Actions Taken: The Molybdenum, SPLP result for WS19-0288-SO5222-N-111519 is qualified "U" because of bracketing CCB detections that were greater than 2 times the IDL and the raw sample result is less than 5 times the blank detections.

Comments: The following table lists the CCBs bracketing sample analyses that had detections greater than 2 times the IDL. The affected analyses, except as noted above, had raw results greater than 5 times the blank detections; therefore, no qualifications are warranted.

	CCB detections > 2xIDL (ug/L)					
Analysis Date/Time	**Iron**		**Manganese**		**Molybdenum**	
12/3/2019 9:43					3.4	J
12/3/2019 10:13	11.6	J	2.7	J	3.5	J
12/3/2019 10:37			2.9	J		
12/3/2019 11:26			.97	J	3.3	J
12/3/2019 11:55			0.49	J		
12/3/2019 12:18			0.7	J	3.6	J
12/3/2019 12:41					3.5	J

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: The ICS Solution A and/or ICS Solution AB had detections of arsenic, barium, beryllium, cobalt, manganese, molybdenum, thallium and vanadium greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. For analytes with percent recoveries, they were within control limits for both interference check samples (Solution A and Solution AB).

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments:

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had an RPD for the LDS outside the control limits. The parent sample is qualified as indicated.

Analyte	Sample	RPD	DV Flag	Batch	Parent Sample
Silver	3485467MSD	66%	J	647831	WS19-0288-SO5217-N-111519

Per the NFG "*For a duplicate sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar*." (EPA, 2017). No other samples on this work order are considered sufficiently similar to this sample to warrant qualification.

Comments: The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
646282	3478324MS	3478325MSD	WS19-0015-SO5204-N-110819	EPA 6010D
647704	3484972MS	3484973MSD	WS19-0015-SO5181-N-110719	EPA 6010D, SPLP
647831	3485466MS	3485467MSD	WS19-0288-SO5217-N-111519	EPA 6010D
646300	3478405MS	3478406MSD	WS19-0015-SO5204-N-110819	EPA 7471B
647706	3484976MS	3484977MSD	WS19-0015-SO5181-N-110719	EPA 7470A, SPLP

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Aluminum	MS	247%	99.6%	J	646282	WS19-0015-SO5204-N-110819
	MSD	245%				
Antimony	MS	45%	86.2%	J	646282	WS19-0015-SO5204-N-110819
	MSD	47%				
Arsenic	MS	-59%	93.4%	J	646282	WS19-0015-SO5204-N-110819
	MSD	-22%				
Copper	MS	74%	96.5%	J	646282	WS19-0015-SO5204-N-110819
Silver	MS	65%	91.1%	J	646282	WS19-0015-SO5204-N-110819
Silver	MS	210%	94.2%	J	647831	WS19-0288-SO5217-N-111519

Per the NFG "*For a Matrix Spike that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples on this work order are considered sufficiently similar to this sample to warrant qualification.

Comments: See table in section 6 for LMS/LMSD parent samples on this WO.

The LMS and/or LMDS %R for Iron, Lead, Manganese, and Zinc for batch 646282 were outside the control limit. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had SD results outside the control limits. The parent sample is qualified as indicated.

Analyte	Sample Type	%D	DV Flag	Batch	Parent Sample
Aluminum, SPLP	SD	14.3%	J	647704	WS19-0015-SO5181-N-110719

Per the NFG "*For a serial dilution that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). No other samples on this work order were considered sufficiently similar based on location to require qualification.

Comments: The following table list the SD parent samples for each batch on this WO.

Batch	Lab ID	Parent Sample ID	Method
647831	3486255SD	WS19-0288-SO5217-N-111519	EPA 6010D
646282	3483295SD	WS19-0015-SO5204-N-110819	EPA 6010D
647704	3485553SD	WS19-0015-SO5181-N-110719	EPA 6010D, SPLP

For batch 646282, the SD %D for Beryllium (103.3%), Cobalt (31%) and Molybdenum (11.3%) were outside the control limit. For batch 647704, the SD %D for Arsenic (29.9%), Beryllium (25%), Chromium (55.1%), Cobalt (30.8%), and Nickel (170.2%) were outside the control limit. The original sample concentrations of these analytes were less than 50 times the MDL, no additional qualifications are warranted.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for WO 10499840 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 84.9% to 118.2%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate pair on this WO was WS19-0010-SO5175-N-110719 and WS19-0010-SO5175-D-110719. The following table list the analytes with results outside the control limits. The field duplicate pair has been qualified as indicated.

Analyte	Matrix	Control Limit	RPD	Difference	DV Flag
Arsenic	Soil	RPD<35%	71%	N/A	J
Cadmium	Soil	RPD<35%	100%	N/A	J
Iron	Soil	RPD<35%	40%	N/A	J
Lead	Soil	RPD<35%	56%	N/A	J
Manganese	Soil	RPD<35%	85%	N/A	J
Silver	Soil	±2xCRQL	N/A	24.1 mg/kg	J
Zinc	Soil	RPD<35%	112%	N/A	J

As discussed above, no other samples on this work order are considered sufficiently similar to this sample to warrant qualifications.

Comments:

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: In WO 10499840, the following qualifications were made:

One (1) Aluminum SPLP result is qualified "J" due to a Serial Dilution outside the control limits.
Five (5) Mercury, SPLP, results are qualified "UJ" due to Contract Required Detection Limit Check Sample recovery problems.
One (1) Molybdenum, SPLP result is qualified "U" due to detections in the Continuing Calibration Blank.
One (1) Aluminum result is qualified "J" due to high percent recovery of the matrix spike.
One (1) Antimony result is qualified "J" due to low percent recovery of the matrix spike.
One (1) Arsenic result is qualified "J" due to low percent recovery of the matrix spike.
Two (2) Arsenic results are qualified "J" due to field duplicate results outside of control limits.
One (1) Copper result is qualified "J" due to low percent recovery of the matrix spike.
Two (2) Cadmium results are qualified "J" due to field duplicate results outside of control limits.
Two (2) Iron results are qualified "J" due to field duplicate results outside of control limits.
Two (2) Lead results are qualified "J" due to field duplicate results outside of control limits.
Two (2) Manganese results are qualified "J" due to field duplicate results outside of control limits.
Two (2) Silver results are qualified "J" due to field duplicate results outside of control limits.
One (1) Silver result is qualified "J" due to low percent recovery of the matrix spike.
One (1) Silver result is qualified "J" due to high percent recovery of the matrix spike and poor laboratory precision.
Two (2) Zinc results are qualified "J" due to field duplicate results outside of control limits.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Shelby Green **Reviewed by:** Julie Flammang

Signature: Shelby Green Julie Flammang

Date: 3/24/2020 3/26/2020

Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10499860
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 11/8/2019, 11/15/2019
Analysis Date(s): 12/2/2019 12/3/2019
Data Validator: S. Green
Validation Date(s): 3/18/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	11/8/2019, 11/15/2019	646282	12/3/2019	Y	N/A
Hg			EPA 245.1	28 days		646300	12/2/2019	Y	N/A

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y		N	X
Were any data flagged because of preservation problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 4.2°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments:

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The following table lists the CCBs bracketing sample analyses that had detections greater than 2 times the IDL. The affected analyses had raw results greater than 5 times the blank detections; therefore, no qualifications are warranted.

	CCB detections > 2x IDL							
Analyte	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag	Result (ug/L)	Lab Flag
Iron	11.6	J	N/A		N/A		N/A	
Manganese	2.7	J	2.9	J	0.97	J	0.49	J
Molybdenum	3.5	J	N/A		3.3	J	N/A	

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: The ICS Solution A and/or ICS Solution AB had detections of Antimony, Barium, Beryllium, Cobalt, Manganese, Nickel, Sodium, Thallium, and Vanadium greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. For analytes with percent recoveries, they were within control limits for both interference check samples (Solution A and Solution AB).

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments:

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: A sample from a different WO was used to generate the LDS for batches 646282 and 646300. All LDS results were within control limits.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: A sample from a different work order was used to generate the LMS and LMS Duplicate (LMSD) sample pair for batches 646282 (metals) and 646300 (mercury). The %R for aluminum (247% and 245%), antimony (44% and 47%), arsenic (-60% and -23%), copper (74%), iron (-369% and -379%), lead (-5800% and -4790%), manganese (792% and -546%), silver (65%), and zinc (-2100% and -2470%) were outside control limits. The remaining %R were within control limits. Per the NFG "*For a Matrix Spike that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). With the information provided, the similarity to the samples on this work order could not be determined, no qualifications were made.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: A sample from a different work order was used for the SD. The SD %D for beryllium (103.3%), cobalt (31%), and molybdenum (11.3%) were outside control limits. Per the NFG "*For a serial dilution that does not meet the technical criteria, apply the action to all samples of the same matrix, if the samples are considered sufficiently similar*" (EPA, 2017). With the information provided, the similarity to the samples on this work order could not be determined, no qualifications were made.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N			
Were the percent relative recoveries (%RI) within the control window?	Y	X	N			
Were any data flagged because of internal standard problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: Internal standards used for WO 10499860 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 85.2% to 115.9%

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate pair submitted on this WO includes samples WS19-0288-SO5020-N-111519 and WS19-0288-SO5020-D-111519. The RPD for manganese (38%) was outside the control limit. Therefore, the field duplicate pair has been qualified "J" for manganese.

Comments: The field duplicate results were within control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: Two (2) manganese results are qualified J due to poor field duplicate precision.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Shelby Green

Reviewed by: Julie Flammang

Signature: Shelby Green

Julie Flammang

Date: 3/18/2020

3/22/2020

Data Validation Checklist for General Chemistry Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10499860
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2019
Sample Matrix: Soil
Analyses: Acid Potential; Acid/Base Potential; Neutralization Potential; Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual
Sample Date(s): 11/8/2019, 11/13/2019
Analysis Date(s): 12/3/2019, 12/9/2019 & 12/10/2019
Data Validator: S. Green
Validation Date(s): 3/18/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Acid Potential; Acid/Base Potential	Pace	Soil	Modified Sobek 3.2	None	11/8/2019 11/13/2019	648999	12/10/2019	N/A	N/A
Neutralization Potential						647765	12/3/2019		
Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual						646197	12/9/2019		

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 4.2°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was Instrument successfully calibrated at the correct frequency?	Y [X]	N [ ]
Was Instrument calibrated with appropriate standards and blanks?	Y [X]	N [ ]
Was Initial Calibration Verification sample analyzed?	Y [X]	N [ ]
Was ICV and Continuing Calibration Verifications (ICV) results within the control window?	Y [X]	N [ ]
Were any data flagged because of calibration problems?	Y [ ]	N [X]

Describe Any Actions Taken:

Comments:

3. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y [X]	N [ ]
Were MBs within the control window?	Y [X]	N [ ]
Were any data flagged because of blank problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

4. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
What was the source of the LCS?	Unknown	
Were LCS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LCS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required
Comments:

5. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: The LDS RPD for Sulfur, HCL Extractable (87%) and Sulfur, Hot Water Extractable (44%) were outside the control window. Therefore, sample WS19-0019-SO5193-N-110819 is qualified "J" for Sulfur, HCL Extractable and Sulfur, Hot Water Extractable. These results for Acid Potential; and Acid/Base Potential are also qualified "J" as the sulfur results were used in the calculations to determine the reported results. Per the NFG "*For a duplicate sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar*." (EPA, 2017). No other samples on this work order are considered sufficiently similar to this sample to warrant qualification.

Comments: WS19-0019-SO5193-N-110819 was used to create the LDS for the Modified Sobek 3.2 analyses on this WO. The remaining LDS results were within the control window.

6. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y		N		N/A	X
Were LMS results within the control window?	Y		N		N/A	X
Were any data flagged because of LMS problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Matrix Spike samples are not performed for the Modified Sobek 3.2 method.

7. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

8. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: No field duplicate pair was included on this WO.

9. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: On WO 10499860, the following qualifications were made:

- One (1) Sulfur, HCL Extractable results is qualified "J" due to poor laboratory precision.
- One (1) Sulfate, Hot Water Extractable result is qualified "J" due to poor laboratory precision.
- One (1) Acid Potential result is qualified "J" due to poor laboratory precision.
- One (1) Acid/Base Potential result is qualified "J" due to poor laboratory precision.

Comments:

10. Authorization of Data Validation

Data Validator		
Name:	Shelby Green	**Reviewed by:** Julie Flammang
Signature:	Shelby Green	Julie Flammang
Date:	3/18/2020	3/22/2020

Attachment B
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: West Side Soils Operable Unit (WSSOU), Multiple Mining Claims
Project: WSSOU Remedial Investigation Sampling 2019
Client: Atlantic Richfield
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable ____
2. Level A ____
3. Level B X

I. **Level A**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Sampling date	Yes	
2. Sampling team or leader	Yes	
3. Physical description of sampling location	Yes	
4. Sample depth (soils)	Yes	
5. Sample collection technique	Yes	
6. Field preparation technique	Yes	
7. Sample preservation technique	N/A	
8. Sample shipping records	Yes	

II**. Level B**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Field instrumentation methods and standardization complete	Yes	
2. Sample container preparation	Yes	
3. Collection of field replicates (1/20 minimum)	Yes	
4. Proper and decontaminated sampling equipment	Yes	
6. Field custody documentation	Yes	
7. Shipping custody documentation	Yes	
8. Traceable sample designation number	Yes	
9. Field notebook(s), custody records in secure repository	Yes	
10. Completed field forms	Yes	

Attachment C
Data Validation Quality Control Criteria

Data Validation QC Criteria

EPA 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	180 Days	Hold Time > 180 Days	Professional Judgement J-	Professional Judgement UJ or R	H	NFG (EPA, 2017)
Preservation	Every sampling	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ or R	Pres	WSSOU RI QAPP, (CDM Smith, 2019)
			samples received > 6ºC	Professional Judgement J-	Professional Judgement UJ or R		
Calibration	Daily	Mid-level standard and a blank -OR- Three-point curve and a blank with lowest non-zero standard at or below RL with correlation coefficient ≥0.998	Calibration validity tested by ICV and LLICV	See ICV and LLICV	See ICV and LLICV	N/A	BP LaMP, NFG (EPA, 2017)
			If 3-point curve used: correlation coefficient < 0.998	J	UJ	CC	
Linear Range	Linear Range standard(s) analyzed for each calibration run	Linear Range standard %D ± 10%	Linear Range standard %D > 10%	Use highest passing standard as LDR	N/A	CL	Method EPA 6010D, BP LaMP
		Sample raw results ≤ 90% LDR	Sample raw result > 90% LDR	J	N/A		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 90-110%	%R < 75%	Professional Judgement J- or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			%R 75-89%	J-	UJ		
			%R 90-110%	No Qualification	No Qualification		
			%R 111-125%	J+	No Qualification		
			%R > 125%	Professional Judgement J+ or R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	MB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Low Limit Initial Calibration Verification (LLICV)/CRDL Check Sample	After the ICV and ICB	%R 70-130%	%R < 70%	J-	UJ	CS	BP LaMP
			%R 70-130%	No Qualification	No Qualification		
			%R > 130%	J+	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Interference Check Samples (ICS)	At the beginning of each analytical sequence	%R 80-120% -OR- ± 2x the CRQL (whichever is greater) for analytes and interferents present in ICSA and ICSAB Sample results < MDL for analytes not present in ICSA	ICS not analyzed or not analyzed in proper sequence	Professional Judgement R if not analyzed	Professional Judgement R if not analyzed	ICS	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			ICSAB %R<50%	J-*	R*		
			%R 50-79% -OR- < -2x CRQL (whichever is greater)	J-*	UJ*		
			%R 80-120% -OR- within ± 2x CRQL (whichever is greater)	No Qualification	No Qualification		
			%R >120% -OR- > 2x CRQL (whichever is greater)	J+*	No Qualification		
			%R >150%	Professional Judgement	Professional Judgement		
			Sample results for analytes not present in ICSA ≥ MDL	J+*	No Qualification		
			Negative sample results for analytes not present in the ICS solution A with an absolute value ≥ MDL	J- *	UJ*		
			Note: Associated samples will be qualified if interferents are within 10% or are higher than interferent concentration in the ICS -AND- for detections of analytes not present, if sample results are < 10 times the ICS detection.				
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2x CRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2017)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is > CRQL (water) or > 2x CRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is ≤ CRQL (water) or ≤ 2x CRQL (soil)	No Qualification	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria	Matrix Spike %R < 30% Post-digestion spike %R < 75%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Matrix Spike %R < 30% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R 30-74% Post-digestion Spike %R < 75%	J-*	UJ*		
			Matrix Spike %R 30-74% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R > 125% Post-digestion spike %R > 125%	J+*	No Qualification		
			Matrix Spike %R > 125% Post-digestion spike %R ≤ 125%	J*	No Qualification		
			Matrix Spike %R < 30% No post-digestion spike performed	J-*	R*		
			Matrix Spike %R 30-74% No post-digestion spike performed	J-*	UJ*		
			Matrix Spike %R 75-125% No post-digestion spike is required	No Qualification	No Qualification		
			Matrix Spike %R > 125% No post-digestion spike performed	J+*	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		
Post-digestion Spike (PDS)	When matrix spike %R does not meet acceptance criteria	%R 75-125%	See Matrix Spike	See Matrix Spike	See Matrix Spike	N/A	BP LaMP, NFG (EPA, 2017)
Serial Dilution (SD)	Each analytical batch of samples.	%D ≤ 10% if sample concentration is sufficiently high	Sample >50x MDL and SD ≥CRQL and %D > 10%	J*	UJ*	SD	NFG (EPA, 2017)
			Sample >50x MDL and SD ≥CRQL and %D ≥ 100%	Professional Judgement	Professional Judgement		
			Sample > 5x CRQL and SD <CRQL	No Qualification	No Qualification		
			Interferences present	Professional Judgement	Professional Judgement		
Internal Standards	Optional If used, every analysis	%R 60-125%	%R 60-125%	No Qualification	No Qualification	CS	BP LaMP
			%R < 60% or > 125% and original sample reanalyzed at 2-fold dilution	J	UJ		
			%R < 60% or > 125% and original sample not reanalyzed at 2-fold dilution	Professional Judgement J or R	Professional Judgement UJ or R		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 7470A and EPA 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	28 Days	Hold Time > 28 Days	Professional Judgement J-	Professional Judgement UJ/R	H	NFG (EPA, 2017)
Preservation	Every sample	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ/R	Pres	NFG (EPA, 2017)
			samples received > 6ºC but ≤ 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
			samples received > 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
Calibration	Daily	A blank and at least five calibration standards shall be used to establish the calibration curve. At least one of the calibration standards shall be at or below CRQL but above the MDL. Correlation coefficient ≥0.995 %D ± 30% for all non-zero standards.	Calibration not performed	R	R	Cal	NFG (EPA, 2017)
			Calibration incomplete	Professional Judgement J or R	Professional Judgement UJ or R		
			%D outside ±30%	J	UJ		
			correlation coefficient < 0.998	J	UJ	CC	
Liner Range	Every sample	The sample instrument level of mercury must be within the calibration range.	Raw result > calibration range	J	N/A	CL	BP LaMP
Low Limit Initial Calibration Verification (LLICV)/CRDL Check Sample	After the ICV and ICB	%R 80-120%	%R < 80%	J-	UJ	CS	BP LaMP
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 80-120%	%R < 70%	Professional Judgement J or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			%R 70-79%	J	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R 120-130%	J+	No Qualification		
			%R > 130%	Professional Judgement J+ or R	No Qualification		
			%R > 165%	R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 7470A and EPA 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2x CRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2017)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is > CRQL (water) or > 2x CRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is ≤ CRQL (water) or ≤ 2x CRQL (soil)	No Qualification	No Qualification		
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria	Matrix Spike %R < 30%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Matrix Spike %R 30-74%	J-*	UJ*		
			Matrix Spike %R 75-125%	No Qualification	No Qualification		
			Matrix Spike %R > 125%	J+*	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

Data Validation QC Criteria

Modified Sobek 3.2 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time / Preservation	N/A						WSSOU RI QAPP (CDM Smith, 2019)
Neutralization Potential							
Calibration	Prior to sample analysis	Correlation coefficient ≥ 0.995	correlation coefficient < 0.995	J	UJ	CC	ENV-SOP-BILL-0012 (Pace, 2019)
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - following each calibration CCV - 1 per 10 sample analyses and follow last sample analysis	%R 98-102%	%R < 98%	J-	UJ	ICV CCV	ENV-SOP-BILL-0012 (Pace, 2019)
			%R >102%	J+	No Qualification		
Method Blank (MB)	MB - Each analytical batch of samples for every 20 (or fewer) samples received.	Blank result ≤ 2x MDL	Blank result > 2x MDL.	Results < 5x the blank detection - U	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992)
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2x CRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is > CRQL (water) or > 2x CRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is ≤ CRQL (water) or ≤ 2x CRQL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	Varies as SRM changes Use lower control limit (LCL) and upper control limit (UCL) presented in laboratory report.	%R <LCL%	J-	UJ	L%	ENV-SOP-BILL-0012 (Pace, 2019)
			%R >UCL%	J+	N/A		

* Qualifications apply only to sample used to generate QC sample(s).

Modified Sobek 3.2 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Total and Extractable Sulfur							
Calibration	Prior to sample analysis	Correlation coefficient ≥ 0.99	correlation coefficient < 0.99	J	UJ	CC	ENV-SOP-BILL-0012 (Pace, 2019)
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - following each calibration CCV - 1 per 10 sample analyses and follow last sample analysis	%R 90-110%	%R < 90%	J-	UJ	ICV CCV	ENV-SOP-BILL-0012 (Pace, 2019)
			%R >110%	J+	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992) NFG (EPA, 2017)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992) NFG (EPA, 2017)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x the CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result < 5x the CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2xCRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x the CRQL and difference between the sample and duplicate > CRQL (water) or > 2xCRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x the CRQL and difference between the sample and duplicate ≤ CRQL (water) or ≤ 2xCRQL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 90-110%	%R <90%	J-	UJ	L%	ENV-SOP-BILL-0012 (Pace, 2019)
			%R >110%	J+	N/A		

Notes:
Acid Potential is calculated from Sulfur, HCl Extractable; Sulfur, HNO3; and Sulfur, Residual and will therefore receive the same qualifications as these analytes.
Acid/Base Potential is calculated from Acid Potential and Neutralization Potential and will therefore receive the same qualifications as these analytes.

* Qualifications apply only to sample used to generate QC sample(s).

Data Validation QC Criteria

Field Quality Control Samples							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Field Blank/ Equipment Rinsate Blank	Not required						WSSOU RI QAPP (CDM Smith, 2019)
Field Duplicate	One per 20 samples	1. If both original sample and duplicate sample results are ≥ 5x CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2x CRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	FD	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2017)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is > CRQL (water) or > 2x CRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is ≤ CRQL (water) or ≤ 2x CRQL (soil)	No Qualification	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

Appendix B-2

2020 Remedial Investigation Sampling Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Final

2020 Remedial Investigation Sampling Laboratory Data Validation Report

Atlantic Richfield Company

July 2022

Specific Comments for 2020 DVR

1. *Section 1.0 – First Paragraph, Page 1: Please update the EPA NFG reference to includethe full title: National Functional Guidelines for Inorganic Superfund Methods Data Review (2017). As a side note, the EPA has updated their laboratory statement of workalong with the National Functional Guidelines (2020).*

Atlantic Richfield Response:
Recommended edit has been incorporated.

2. *Section 1.0 – Summary Table, Page 2:*

    a. *Please provide the exact data which is populating this table in order to complete the review. For example, field duplicate results that were qualified are not calculated in the screening count. It looks like IVBA qualified results are not included in the screening count but the IVBA total analyte results are included inthe data count. Also, the field duplicate qualifications where "S" data was generated should be included in the total as well since the field duplicate sample results are included in the total number of data points.*

Atlantic Richfield Response 2a:
This table contains only natural samples and their data points. No field duplicates are included because these QC samples are not assigned an E/S/R designation. Qualifications made to IVBA natural samples are included. This table has been revised to break down the analysis groups performed (metals, SPLP, ABA, and IVBA). Please note that 19 qualifications were removed due to specific comment for SDG 10522826 (see below), and therefore, the E/S/R counts have been revised.

    b. *Please verify the number of screening results. EPA counted 171 versus 170 thatare presented. Please adjust values if required.*

Atlantic Richfield Response 2b:
The counts have been revised due to changes in qualifications (see response to specific comment for SDG 10522826 below). Please note that E/S/R designation is listed in Table 1a, 1b, 1c, and 1d only.

    c. *Why are the field duplicate qualifications not accounted for in the E/S/R table?*

Atlantic Richfield Response 2c:
Field QC samples are not assigned an E/S/R designation. The following text was added to Section 1.0 for clarification:

"Field QC samples (field duplicate and field blank samples) results are used for assessing the data quality of natural samples. Please note that although the field QC samples may receive a qualifier during the data validation process, the enforcement and screening quality summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summary."

3. *Section 3.0, Page 4: Please revise the level A/B assessment checklist to include all SDGs that were reviewed or have a separate sheet for each SDG.*

Atlantic Richfield Response:
The associated SDGs numbers have been added to each Level A/B Assessment Checklist.

4. *Section 4.1, Page 5: Please perform a QC check to verify the number of field duplicate results that were qualified. EPA counted 23 data points.*

Atlantic Richfield Response:
Qualifications to natural samples due to field duplicate (FD) results has been verified to be accurate (20); however, Table 1a was found to have errors with FD qualifications and has been revised.

5. *Section 4.2, Page 6: Please perform a QC check to verify the number of results that were qualified based on accuracy parameters. EPA counted 127 results that were qualified.*

Atlantic Richfield Response:
The count has been revised due to changes in qualifications (see response to specific comment for SDG 10522826 below). The following text has been added for clarification:

> "There were 66 natural data points qualified due to an exceedance of the %R for the LMS and/or LMSD, and 61 natural data points qualified due to an exceedance of the %D for the SD. Of these data points, 20 were qualified due to both an exceedance of the %R for the LMS and/or LMSD and an exceedance of the %D for the SD
>
> This resulted in 107 (3%) of the 3,972 natural data points associated with the natural samples collected that did not meet the accuracy requirements, and 3,865 (97%) of the 3,972 natural data points that did meet the accuracy requirements."

6. *Section 4.6, Page 7 - 8: Some clarification is required regarding terms used in this sectionand how sensitivity analysis is presented.*

    a. *In the first sentence there is discussion that the reporting limit (RL) or the laboratory method detection limits (MDLs) are compared to the CRQLs (contractrequired quantitation limits).*

        i. *The MDL is defined as "the concentration of a target parameter that, whena sample is processed through the complete method, produces a signal with 99 percent probability that it is different from the blank."*

        ii. *The RL (also known as method reporting limit [MRL]) is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particularmatrix problem, the MRL is typically about three to five times higher thanthe MDL.*

iii. *The CRQL is a specific EPA term and is defined as the "minimum level of quantitation acceptable under the contract Statement of Work (SOW) and supported by the analysis of standards."*

iv. *The MRL/RL and CRQL are considered equivalent with EPA CLP laboratories using the CRQL terminology and non-CLP laboratories usingMRL/RL/quantitation limit, etc. The term is determined by the laboratoryperforming the analyses. Therefore, the first sentence should be revised tostate that, "…by comparing the laboratory reporting limit (RL) or the laboratory MDL to specified reporting limits defined in the QAPP."*

v. *On Tables B-4 and B-5 in the QAPP, the reporting limits provided for metals are the values required in the EPA laboratory SOW for samplescollected by EPA (they are technically the CRQL). However, please remove the use of CRQL from the DV report and just use the term "project-specific RLs" to reference for comparison of sensitivity.*

Atlantic Richfield Response 6a:
Recommended edits have been incorporated.

b. Please simplify this section to just report the nondetect results for those analytes that have MDLs or RLs that are above the project-specific RL values on Table B-4 and B-5. The discussion of the usability of the data is applicable, because the nondetect sample results with MDLs above the CRQL values (project-specific RLs) still provide usable data (with appropriate qualifiers required if applicable);however, the evaluation discussing the comparison of sample results against risk-based screening levels (RBSLs) is beyond the scope of this report. Risk evaluations are being conducted in the risk assessments. Please delete any text associated with RBSLs.

Atlantic Richfield Response 6b:

Section has been revised to limit discussion to the assessment of non-detect results. Text related to RBSL has been removed.

c. The table provided in the text appears to be showing these results comparedagainst the project specific RLs. The sample results should show the actual nondetect value though and not just ND.

Atlantic Richfield Response 6c:
Table has been updated to include the actual non-detect value, which is reported as less than the MDL, along with a updated footnote that states: "< = Not detected at method detection limit."

d. *Clarification should also be made on what values the nondetect results are being reported to. Even though it is common practice to report nondetect values to the MRL/RL/CRQL as that is the more defensible and conservative result, it is understood that this project has been reporting nondetect values to the MDL. This should be well documented in all text and tables.*

Atlantic Richfield Response 6d:
The following text has been added.
"Pace reports results below the MDL as non-detect."

Attachment A Data Validation Checklist Comments

1. *Global: Matrix spike (MS) and serial dilution required validation actions should be applied to all samples in the SDG if they are considered similar to the sample used in theMS and serial dilution analyses. Please document in these sections whether all samples are considered similar enough to be qualified if required or if just the parent sample should be. This should be a standard review item for each validation report.*

Atlantic Richfield Response:
Attachment A – Data Validation Checklists have been updated to include whether there were samples considered sufficiently similar.

2. *Global: Please ensure that PACE provides the appropriate MDL results in the water unitsso the ICP serial dilution results can be reviewed correctly. Some of the data packages did not have the MDL values in the appropriate units.*

Atlantic Richfield Response:
The IDLs (Instrument Detection Limit) were used when validating the ICP serial dilution results. The IDL values for ICP are reported in the same units as the serial dilution results, which can be found in the ICP "Method Detection Limits" bookmark in the data packages.

3. *Global: It looks like the language needs to be adjusted for ICP serial dilution reviews forwhen analytes do not require qualification as the initial sample concentration is "less than" 50 times the MDL. Some of data validation reports are saying the initial sample concentration is "greater than" 50 times the MDL when no qualification is required. Please correct all reports and double check all qualifications are correct.*

Atlantic Richfield Response:
Data validation checklists have been checked and update to reflect whether the initial sample concentrations were greater than or less than 50 times the MDL. The initial sample concentrations less than 50 times the MDL, did not require qualifications. No additional qualifications were made.

4. *SDG 10518864: Please double check the cadmium MS/MSD results. It looks like the MSD value is 74% which is outside of the 75-125% criteria. Please update the text andtables as required.*

Atlantic Richfield Response:
The cadmium qualifications for sample 20WS-0285-SO5341-N-051420 were included in Table 1a (Page 2 of 30) with the reason codes "S%" for being qualified due to percent recovery of the matrix spike and "SD" for being qualified due to percent difference of serial dilution outside control limits; however, the discussion of the qualification was inadvertently left out of the data validation checklist.
For SDG: 10518864, batch 677449, the MSD result for cadmium (74%) was outside the criteria. The MSD %R results for cadmium along with the qualification applied to 20WS-0285-SO5341-N-051420 has been added to the table in the Matrix Spike Sample Results section, for the Metals Data Validation checklist. Since the cadmium result for sample 20WS-0285-SO5341-N-051420 was also qualified due to serial dilution result outside the criteria, the final qualification for cadmium was "J".
The following statement was added to the Serial Dilution section: "The Cadmium results had a previous qualification of "J-" due to a matrix spike result outside the control limits; therefore, sample 20WS-0285-SO5341-N-051420 will have a final qualification of "J" for Cadmium."
The Overall Assessment section, for SDG 10518864, in Metals Data Validation checklist included the final qualification for both the matrix spike and Serial Dilution results outside the control limits; therefore, no update was required.

5. *<u>SDG 10518864:</u> It looks like magnesium results need to be qualified for ICP serialdilution criteria as the initial sample result is greater than 50x the MDL.*

Atlantic Richfield Response:
For batch 677449, the magnesium results sample 20WS-0285-SO5341-N-051420 had a %D (21.5%) greater than 10% and the original sample concentration (4170 ug/L) was greater than 50 times the MDL (1300 ug/L); however, the serial dilution concentration (5,060 ug/L) was less than the project-specific RL (10,000 ug/L), so no qualifications are warranted. The project-specific RL value for magnesium came from *Quality Assurance Project Plan (QAPP) for WSSOU RI sampling* (*CDM Smith, 2019a)* specifically Table B-5. Sampling Requirements, Laboratory Analytical Methods, and Reporting Limits for Solid Samples. Therefore, no additional qualifications are required.

6. *<u>SDG 10519814:</u> Please confirm the RPD criteria for laboratory duplicates for neutralization potential. The RPD is 40% which is above the laboratory criteria of 20%.*

Atlantic Richfield Response:
For SDG 10519814, batch 680260, the laboratory duplicate pair for Neutralization Potential had an RPD (40%) outside the control limits. In Attachment A2 – General Chemistry, the data validation checklist for SDG 10519814 mentions sample 20WS-0246-SO5378-N-051820 being qualified due to the laboratory duplicate RPD for Neutralization Potential outside the control limits in section "Duplicate Sample Results" and "Overall Assessment." Table 1c ABA also includes the qualification for the Neutralization Potential result for sample 20WS-0246-SO5378-N-051820 on page 1 of 2.

7. *<u>SDG 10521670:</u> Please confirm the RPD criteria for laboratory duplicates for neutralization potential and sulfur, HCl Extractable (41% and 52% respectively) whichare above the laboratory criteria of 20%.*

Atlantic Richfield Response:
For SDG 10521670, batch 688681, the laboratory duplicate for Neutralization Potential had an RPD (41%) outside the control limits. In Attachment A2 – General Chemistry, the data validation checklist for SDG 10521670 mentions sample 20WS-1113-SO5858-D-060920 being qualified due to the laboratory duplicate RPD for Neutralization Potential outside the control limits in section "Duplicate Sample Results" and "Overall Assessment." Table 1c ABA also includes the qualification for the Neutralization Potential result for sample 20WS-1113-SO5858-D-060920 on page 2 of 2.

Batch 682537, the laboratory duplicate for Sulfur, HCl Extractable had an RPD (52%) outside the control limits. However, the sample used for the laboratory duplicate was a sample not from this work order. No additional qualifications are required.

8. *<u>SDG 10521754:</u> It looks like lead was detected in the method blank on page 37 of the data package. It is less than 2x the IDL and does not require any qualification, but it should be listed in the data validation report.*

Atlantic Richfield Response:
In Attachment A2 –Metals, the data validation checklist for SDG 10521754 has been updated to include the lead detection in the method blank. Recommended text has been added.
"No qualifications are required. The MB also had a detection of Lead (0.15 mg/kg) less than 2 times the MDL (0.22 mg/kg). No qualification is warranted."

9. *<u>SDG 10522826:</u> It is documented in the Data Validation QC Criteria presented in the report, that the CRQL check control limit is 80-120%. This is a pretty narrow range and arange of 70-130% is more widely used. Consideration should be given of expanding thatcriteria.*

Atlantic Richfield Response:
The Data Validation QC Criteria has been updated to use 70-130% for the mercury CRQL check control limit. Data validation checklist 10522826 and the affected tables have been updated to remove the CRQL check sample qualifications (Reason Code = CS) made to the 20 sample in SDG 10522826 (19 natural data points and 1 field duplicate data point).

End of Comments.

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Final

2020 Remedial Investigation Sampling Laboratory Data Validation Report

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July 2022

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LIST OF ATTACHMENTS

Attachment A Data Validation Checklists
Attachment B Level A/B Assessment Checklist
Attachment C Data Validation Quality Control Criteria

REVISION SUMMARY

Revision No.	Author	Version	Description	Date
Rev 0	L. Moon/ S. Smith	Draft Final	Issued for Agency Review	12/17/2020
Rev 1	J. Flammang/ S. Smith	Final	Revised to address Agency comments	7/21/2020
Rev 2	L. Moon	Final	Revised to address Agency Comments	5/18/2022
Rev 2	Josie McElroy	Final	Issued for Agency Review	7/5/2022

1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes analytical results for West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) soil samples collected from May 12, 2020, through July 9, 2020. All data have undergone Stage 4 data validation (DV) as defined in U.S. Environmental Protection Agency (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009). The DV was conducted in accordance with the Final Quality Assurance Project Plan (QAPP) for WSSOU RI sampling (CDM Smith, 2019a) (referred to as WSSOU RI QAPP) and Addendum 1 – In Vitro Bioaccessibility Study (CDM Smith, 2019b) (referred to as WSSOU RI QAPP Addendum 1), the *Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation Plan* (DM/DV) (ARCO, 1992a) and addendum (AERL, 2000), the CFRSSI QAPP (ARCO, 1992b), and EPA *National Functional Guidelines* (NFG) *for Inorganic Superfund Methods Data Review* (EPA, 2017). This report details the evaluation of laboratory-reported data for the purpose of usability.

This document refers to the tables and attachments below.

- Table 1 contains the analytical results with laboratory qualifiers; DV qualifiers; enforcement, screening, and rejected classifications; and DV reason codes.
- Table 1a contains metals in soil results.
- Table 1b contains Synthetic Precipitation Leaching Procedure (SPLP) results.
- Table 1c contains Acid-Base Accounting (ABA) results.
- Table 1d contains the In Vitro Bioaccessibility Assay (IVBA) results.
- Table 2 contains the field Quality Assurance/Quality Control (QA/QC) samples with results, laboratory flags, and DV qualifiers; DV reason codes; and QC criteria calculations.
- Table 3 contains sample identification information including the field sample name, laboratory sample name, sample date, and analytical methods.
- Attachment A contains the DV checklists.
- Attachment B contains the Level A/B Assessment Checklist.
- Attachment C contains the QC criteria used in the DV process.

The full data packages, prepared by Pace Analytical Services Inc. (Pace), provided the information needed to perform Stage 4 DV. All data met the Level A and B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan (ARCO, 1992a), the quality of the data is ranked as enforcement quality, screening quality, or it is rejected. Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A and B criteria (Attachment B) and are not qualified as estimated or rejected after the validation process. Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, remedial investigation/feasibility study, evaluation of alternatives, confirmational purposes, risk assessments, and engineering design. As all data met the Level A and B documentation criteria, all results that were not qualified as estimated or rejected during the DV process were considered

"enforcement" quality data and were assigned an "E" in Table 1a, Table 1b, Table 1c, and Table 1d.

Screening quality data, as defined in the CFRSSI DM/DV Plan (ARCO, 1992a), come from those samples that do not meet the Level B criteria and/or were qualified J, J+, J-, or UJ during the DV process. Potential uses of screening quality data, depending on their quality, include site characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. The EPA Risk Assessment Guidance, Part A, Sec. 5.4.1 (EPA, 1989) states the following with respect to the use of J or UJ qualified results: *"Basically, the guidance here is to use J-qualified concentrations the same way as positive data that do not have the qualifier. If possible, note potential uncertainties associated with the qualifier, so that if data qualified with a J contribute significantly to the risk, the appropriate caveats can be attached."* As all data met the Level A and B documentation criteria, samples that were qualified as estimated during the validation process were considered "screening" quality data and were assigned an "S" in Table 1a, Table 1b, Table 1c, and Table 1d. Data rejected during DV cannot be used for any Superfund activities. No results were rejected during the DV process.

Investigative soil samples were collected between May and July 2020 by Pioneer Technical Services, Inc. (Pioneer) to support developing risk assessments, determining the nature and extent of contamination present, and completing a feasibility study and a record of decision defining remedial action objectives for WSSOU. Samples were collected and data were validated in accordance with the WSSOU RI QAPP and WSSOU RI QAPP Addendum 1.

Soil samples for target analyte list (TAL) metals and SPLP analyses were sent to Pace in Minneapolis, Minnesota. Soil samples for ABA analysis and multi-increment sampling (MIS) sample prep were sent to Pace in Billings, Montana. After MIS sample prep, Pace sent the prepared samples to Minneapolis for TAL metals analysis. Soil samples for IVBA analysis were sent to Pace in Sheridan, Wyoming. Table 3 lists the methods and analytes for each sample.

Field QC samples (field duplicate and field blank samples) results are used for assessing the data quality of natural samples. Please note that although the field QC samples may receive a qualifier during the DV process, the enforcement and screening quality summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summary.

From the 156 natural samples collected in 2020 (not including field blanks or field duplicate samples), 3,972 data points were generated by Pace. A summary is shown below:

Summary of Enforcement and Screening Quality Data Points

Analysis Group	Natural Samples[1]	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
Total Metals	148	3,700	3,568 (96%)	132 (4%)	0 (0%)
SPLP	7	168	165 (98%)	3 (2%)	0 (0%)
ABA	7	56	52 (93%)	4 (7%)	0 (0%)
IVBA	8	48	36 (75%)	12 (25%)	0 (0%)
Total	**156**	**3,972**	**3,821 (96%)**	**151 (4%)**	**0 (0%)**

[1]Total number of samples is not a summation of the number of samples for each analytical group because some samples had results for more than one analysis group as listed in Table 3.

One of the enforcement quality data points was qualified as "U" during the DV process due to a detection in an associated QC blank. Data points qualified only with a U are considered enforcement quality in accordance with the CFRSSI DM/DV Plan (ARCO, 1992a) definitions of enforcement and screening quality data. Table 1a, Table 1b, Table 1c, and Table 1d show the laboratory flags, DV qualifiers, enforcement or screening designators, and the reason code for the qualification for each data point.

2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW OF INORGANIC DATA

The QC criteria used during the DV process are listed in Attachment C. These QC criteria were derived from the WSSOU RI QAPP and WSSOU RI QAPP Addendum 1, CFRSSI QAPP (ARCO, 1992b), the EPA NFG for Inorganic Superfund Methods Data Review (EPA, 2017), the internal BP Laboratory Management Program, analytical methods, and method-specific laboratory Standard Operating Procedures (SOPs).

The DV checklists derived from the CFRSSI DM/DV Addendum (AERL, 2000) were completed for each laboratory report (Attachment A). Below are the deviations made to the checklists provided in the CFRSSI DM/DV Addendum guidance document:

- The Laboratory DV Checklist for Metals Analysis by Inductively Coupled Plasma (ICP) or Graphite Furnace Atomic Absorption Spectrometry (GFAA) was revised slightly to more accurately reflect the information provided in the full data package provided by Pace and the requirements listed in the EPA NFG for Inorganic Superfund Methods Data Review (EPA, 2017). The completed checklists are included in Attachment A.
- The DV Checklist for Field QC was not filled out for each data package. Sections on field blanks and field duplicates were added to each Laboratory DV Checklist worksheet.
- The Laboratory DV Checklist for Metals Analysis by ICP or GFAA was modified for the general chemistry validation. The completed checklists are included in Attachment A. The guidelines for general or wet chemistry laboratory QA and QC listed in Table 11-5 of the CFRSSI QAPP (ARCO, 1992b), along with laboratory QA/QC control limits, were used in

evaluating the general chemistry results. The revised checklist more accurately reflects the information provided by the laboratory for these analyses.

- The DV for methods EPA 6010D and EPA 6010C (ICP-Atomic Emission Spectroscopy [AES]) and EPA 7470A and EPA 7471B (mercury) is included in the metals checklists. The DV for the Modified Sobek 3.2 (ABA) is included in the general chemistry checklists. One Level A/B Assessment was completed for the 2020 sampling event (Attachment B).

2.1 Field Quality Control Samples

Field duplicate samples were collected at a rate greater than 1 in 20 and met the requirements listed in Section B5.1 Field Quality Control Samples of the WSSOU RI QAPP. Field blank samples were not collected per the WSSOU RI QAPP because all sampling equipment was one-use (disposable).

The analytical reporting limits (RL) specified in the WSSOU RI QAPP were used as the project-specific RL to evaluate the field duplicates. The field duplicate QC criteria calculations are listed in Table 2 . Any qualifications required based on the field QC sample results are detailed in the DV checklists (Attachment A) and are listed in Table 1a, Table 1b, Table 1c, Table 1d, and Table 2.

2.2 Laboratory Quality Control Samples

The laboratory method detection limits (MDL) were used for the data review and validation of laboratory preparation blanks (method and leachate blanks) and field blanks; and the laboratory instrument detection limits were used for the data review and validation of the laboratory instrument blanks (initial and continuing calibration blanks) as discussed in the CFRSSI QAPP (ARCO, 1992b). Based on information provided by the analytical laboratory, the chain of custody requirements were met for each of the 10 sample shipments for the 2020 sampling event. All samples were adequately preserved with the exception of a temperature exceedance for the mercury samples associated with sample delivery group (SDG) #10519814, which is detailed in the DV checklist (Attachment A). All samples were analyzed within method-specified holding times.

Laboratory QA/QC samples were analyzed with each sample group with the exception of the arsenic IVBA analyses, which is detailed in the 10521603 (sub-contracted report S200647) DV checklist (Attachment A). As a result, there were 8 natural data points qualified due to the lack of a laboratory control sample (LCS) and a laboratory matrix spike (LMS) sample.

Any qualifications required based on the laboratory QC sample results are detailed in the DV checklists (Attachment A) and are listed in Table 1a, Table 1b, Table 1c, Table 1d, and Table 2.

3.0 LEVEL A/B ASSESSMENT

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality

data. Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet Level A or B criteria are designated as unusable.

One Level A/B checklist for all analytical samples submitted for the 2020 sampling event is included in Attachment B. All sample collection information, including sample collection date, location, identification, and collection method, were recorded in the field logbook. This information was reviewed for Level A/B criteria. As shown in Attachment B, all the samples met both Level A and Level B criteria. No data were designated screening quality or rejected based on the results of Level A/B criteria.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, COMPARABILITY, AND SENSITIVITY DATA SUMMARY

Data generated from WSSOU RI soil sampling between May and July 2020 were examined to ensure that project objectives were met. The data quality objectives for this investigation are listed in Section A7 of the WSSOU RI QAPP. The Stage 4 DV was completed for each laboratory SDG.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. Acceptance or rejection of precision measurements is based on the relative percent difference (RPD) of the laboratory and field duplicates. For example, perfect precision would be a 0% RPD between duplicate samples (both samples have the same analytical result) for results that are greater than 5 times the project-specific RL. For soil samples, the control limit of an RPD less than 35% was used when sample results were greater than 5 times the project-specific RL. If 1 or both of the sample results were less than 5 times the project-specific RL, the control limit used was a difference between sample results less than 2 times the project-specific RL. This precision requirement is from the WSSOU RI QAPP. For these sampling events, precision was assessed based on laboratory prepared and field duplicate sample analysis.

Ten field duplicate samples were collected during the 2020 WSSOU RI sampling. If the duplicate sample results were outside the control limit, the respective data points for the natural and duplicate sample pair were qualified. Please note that the field duplicate sample result qualifications were not included in the enforcement/screening quality statistics.

There were 20 instances where the field duplicate pair results did not meet the control limit. This resulted in the qualification of 20 natural data points due to poor field precision because no other samples were considered sufficiently similar enough based on the variability of soil matrices to require additional qualifications.

Of the 3,972 data points derived from the natural samples collected, 20 data points were qualified due to poor field precision, and 9 samples were qualified due to poor laboratory precision. Since 2 data points were qualified for both poor field duplicate precision and poor laboratory precision, a total of 27 (99%) of the 3,972 data points associated with the natural samples collected met the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. Accuracy is assessed based on the percent recovery (%R) and percent difference (%D) of various laboratory and field QC samples. Perfect %R is 100% and perfect %D is 0% (the analysis result is exactly the known concentration of the QC sample).

For EPA 6010D (ICP-AES) analysis, the %R of initial calibration verification (ICV) samples, low limit initial calibration verification (LLICV) samples (which are Contract Required Detection Limits Check Samples), continuing calibration verification (CCV) samples, LCS, LMS samples, and interference check samples (ICS); the %D for the serial dilution (SD) samples; and the detection of analytes in the ICS are used as indicators of accuracy.

For EPA 7470A and EPA 7471B (mercury) analyses, the %R of ICV samples, LLICV samples, CCV samples, LCS, and LMS samples are used as indicators of accuracy.

For Modified Sobek 3.2 (ABA) analysis, the %R of ICV samples, CCV samples, and LCS are used as indicators of accuracy.

For IVBA, the EPA 6010C (ICP-AES) analyses of the leachate and total recoverable fractions follow the same indicators of accuracy as the EPA 6010D indicators listed above. For the IVBA results, the %R of LCS, LMS, and standard reference material (SRM) samples are used as indicators of accuracy. As discussed in the 10521603 DV checklist (Attachment A), the laboratory did not analyze a LCS, LMS, or SRM sample for IVBA arsenic. However, the laboratory did analyze all the required QC samples for the associated leachate and total recoverable arsenic analyses. As a result, all IVBA arsenic results have been qualified as estimated, J, and are considered usable as screening quality data.

Specific accuracy requirements for the QC samples are listed in Attachment C.

There were 66 natural data points qualified due to an exceedance of the %R for the LMS and/or LMSD, and 61 natural data points qualified due to an exceedance of the %D for the SD. Of these data points, 20 were qualified due to both an exceedance of the %R for the LMS and/or LMSD and an exceedance of the %D for the SD

This resulted in 107 (3%) of the 3,972 natural data points associated with the natural samples collected that did not meet the accuracy requirements, and 3,865 (97%) of the 3,972 natural data points that did meet the accuracy requirements.

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper design of the sampling program. The laboratory results were reviewed, and a Stage 4 DV completed. Holding time criteria were met. Eight of the natural data points were qualified as estimated due to the preservation criteria not being met; however, these data points are considered usable as screening quality data. Chain of custody forms were complete and are included in the data packages. The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report includes soil samples collected by Pioneer and analyzed by Pace.

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and laboratory analytical methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in the SOPs and equipment use. Proper chain of custody and sample handling were observed during sample collection, delivery to the laboratory, and analysis. The analytical laboratories performed the sample analysis using industry standard methods.

Consequently, data from future soil sampling events at WSSOU using comparable sampling and analytical methods may be used in concert with this data set.

4.5 Completeness

Completeness is assessed to determine if enough valid data have been collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 90% or greater as designated in the WSSOU RI QAPP.

In total, 3,972 data points were generated by the sampling events. All natural data points were usable as no sample results were rejected, and all the planned data points were collected. Therefore, the completeness was 100% and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the laboratory RL or the laboratory MDL to specified reporting limits defined in the QAPP. The reporting limits in Table B-5 of the WSSOU RI QAPP were used as the project-specific RLs for soil analyses, and the reporting limits in Table B-4 were used as the project-specific RLs for SPLP analyses because Pace reports results below the MDL as non-detect. The laboratory MDLs were compared to the

project-specific RLs for all non-detect results. The usability of sample results that had detectable levels of analytes is not affected by an MDL that is higher than the project-specific RL.

The laboratory MDLs met the project-specific RLs for SPLP for all non-detect results. All the neutralization potential results were detected. All the IVBA lead leachate and total recoverable lead results were detected.

The list following shows those ABA and SPLP samples for which the acid potential, antimony, and/or selenium results were below the MDL. As shown in the list, the project-specific RL is less than the MDL for these analytes, though the difference is small for antimony and selenium.

Analyte	Pace MDL	Project-Specific RL	units	Field Sample ID	Laboratory ID	Result
Acid Potential	4.3	0.01	tons/1000	20WS-0297-SO5249-N-051220	10519814001	<4.3
				20WS-0298-SO5298-N-051320	10519814002	<4.3
				20WS-0312-SO5544-N-052820	10521670008	<4.3
Antimony, SPLP	0.0070	0.0020	mg/L	20WS-0312-SO5544-N-052820	10520797019	<0.0070
				20WS-0130-SO5728-N-060220	10521754018	<0.0070
				20WS-1113-SO5858-N-060920	10521754019	<0.0070
				20WS-1113-SO5858-D-060920	10521754020	<0.0070
				20WS-0297-SO5249-N-051220	10518864018	<0.0070
				20WS-0246-SO5378-N-051820	10518864020	<0.0070
Selenium, SPLP	0.0058	0.0050	mg/L	20WS-0312-SO5544-N-052820	10520797019	<0.0058
				20WS-0179-SO5670-N-060220	10520797020	<0.0058
				20WS-0130-SO5728-N-060220	10521754018	<0.0058
				20WS-1113-SO5858-N-060920	10521754019	<0.0058
				20WS-1113-SO5858-D-060920	10521754020	<0.0058
				20WS-0297-SO5249-N-051220	10518864018	<0.0058
				20WS-0298-SO5298-N-051320	10518864019	<0.0058
				20WS-0246-SO5378-N-051820	10518864020	<0.0058

"<" = Not detected at method detection limit. mg/L = milligrams per Liter. MDL = method detection limit. RL = Reporting Limit. SPLP = Synthetic Precipitation Leaching Procedure.

These data points are considered usable with the recognition that the detection limits are higher than the project-specific RLs listed in Table B-5 and Table B-4 of the WSSOU RI QAPP.

The three ABA samples that were non-detect for acid potential also have little to no detectable amounts of total sulfur. The Sobek analytical method uses the sulfur content of the sample to determine the acid potential. An EPA technical document on acid mine drainage states that "*components affecting the total capacity to generate acid are characterized by: amount of acid generating (sulfide) minerals present [Note: assumes total reaction of sulfide minerals]*" (EPA, 1994). Therefore, in samples that contain no total sulfur, the acid potential cannot be quantified using the Sobek method. The usability of these data points is not impacted then by the Pace MDL being higher than the project-specific RL.

4.7 Overall Data Summary

During the 2020 sampling event, the 156 natural samples collected by Pioneer and analyzed by Pace generated 3,972 data points. Of these, 151 data points were qualified as J, J- or UJ, and 1 data point was qualified U due to a detection in an associated QC blank. No data points were rejected. Data were also evaluated using the Level A/B Checklist (Attachment B). All samples

met both the Level A and Level B criteria defined in the CFRSSI DM/DV Plan (ARCO, 1992a) and addendum (AERL, 2000).

Based on the qualifications assigned during the DV process, and the results of the Level A/B assessment, 151 natural data points (4%) were classified as screening quality, 3,821 natural data points (96%) were classified as enforcement quality, and no data points were rejected.

5.0 REFERENCES

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TABLES

Table 1. Analytical Results with laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes.

Table 1a. Metals in Soil.
Table 1b. SPLP.
Table 1c. ABA.
Table 1d. IVBA.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations.

Table 3. Sample Identification.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10518864					10518864					10518864					10518864					10518864				
		Field Sample ID	20WS-0246-SO5370-N-051820					20WS-0246-SO5378-N-051820					20WS-0285-SO5313-N-051420					20WS-0285-SO5323-N-051420					20WS-0285-SO5324-N-051420				
		Lab Sample ID	10518864017					10518864020					10518864009					10518864010					10518864011				
		Sample Date	5/18/2020					5/18/2020					5/14/2020					5/14/2020					5/14/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	4,020			E		3,930			E		2,260			E		2,010			E		1,500			E	
Antimony	SW-846 6010D	mg/kg	6.4			E		4			E		6.5			E		4.3			E		10.9			E	
Arsenic	SW-846 6010D	mg/kg	226			E		116			E		316			E		170			E		307			E	
Barium	SW-846 6010D	mg/kg	53.6			E		36.5			E		13			E		75			E		7.5			E	
Beryllium	SW-846 6010D	mg/kg	1.1	J,D3		E		0.25			E		0.24	J,D3		E		0.16	J		E		<0.13	U,D3		E	
Cadmium	SW-846 6010D	mg/kg	2.5			E		2.3			E		66.9			E		4.9			E		217			E	
Calcium	SW-846 6010D	mg/kg	425			E		867			E		581			E		214			E		879	J,D3		E	
Chromium	SW-846 6010D	mg/kg	2	J,D3		E		2.5			E		1.3	J,D3		E		1.4	J,D3		E		<4.9	U,D3		E	
Cobalt	SW-846 6010D	mg/kg	2.5	J,D3		E		3.7			E		1.1	J,D3		E		0.58			E		1.2	J,D3		E	
Copper	SW-846 6010D	mg/kg	98.2			E		72			E		181			E		115			E		202			E	
Iron	SW-846 6010D	mg/kg	18,500			E		16,700			E		24,600			E		7,500			E		38,500			E	
Lead	SW-846 6010D	mg/kg	1,090			E		773			E		9,670			E		1,620			E		17,800			E	
Magnesium	SW-846 6010D	mg/kg	607			E		1,540			E		362			E		153			E		514			E	
Manganese	SW-846 6010D	mg/kg	9,980			E		12,600			E		56,600			E		21,700			E		144,000			E	
Mercury	SW-846 7471B	mg/kg	0.37			E		0.11			E		3.5			E		0.23			E		3.4			E	
Molybdenum	SW-846 6010D	mg/kg	60.4			E		3.3			E		15.9			E		24.4			E		7.6			E	
Nickel	SW-846 6010D	mg/kg	1.6	J,D3		E		2.6			E		0.89	J,D3		E		0.55	J		E		2.3	J,D3		E	
Potassium	SW-846 6010D	mg/kg	1,310			E		1,430			E		800			E		1,260			E		636	J,D3		E	
Selenium	SW-846 6010D	mg/kg	2.4	J,D3		E		<1.6	U,D3		E		5.6			E		2.4	J,D3		E		<16.1	U,D3		E	
Silver	SW-846 6010D	mg/kg	74.1			E		86.2			E		91.7			E		47.5			E		86.2			E	
Sodium	SW-846 6010D	mg/kg	<50.6	U,D3		E		16.4	J		E		<52.2	U,D3		E		65.2			E		<98.3	U,D3		E	
Thallium	SW-846 6010D	mg/kg	<1.2	U,D3		E		<1.2	U,D3		E		<1.3	U,D3		E		<1.2	U,D3		E		<11.8	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	11.6			E		14.7			E		5.6			E		14.8			E		1.2	J,D3		E	
Zinc	SW-846 6010D	mg/kg	765			E		830			E		19,800			E		722			E		59,500			E	
Percent Moisture	ASTM D2974	%	2.1	N2		E		1.5	N2		E		4.2	N2		E		2.6	N2		E		3.1	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

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J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

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Screening/Enforcement Quality (S/E)

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S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10518864					10518864					10518864					10518864					10518864				
Field Sample ID			20WS-0285-SO5327-N-051420					20WS-0285-SO5341-N-051420					20WS-0285-SO5347-N-051820					20WS-0285-SO5355-N-051820					20WS-0288-SO5276-N-051320				
Lab Sample ID			10518864012					10518864014					10518864015					10518864016					10518864006				
Sample Date			5/14/2020					5/14/2020					5/18/2020					5/18/2020					5/13/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,960			E		1,950	M6	J	S	S%	4,990			E		2,320			E		4,080			E	
Antimony	SW-846 6010D	mg/kg	10.2			E		5	M1	J-	S	S%	1.4			E		7			E		5.3			E	
Arsenic	SW-846 6010D	mg/kg	160			E		475	P6,R1	J	S	SD	101			E		239			E		150			E	
Barium	SW-846 6010D	mg/kg	7.5			E		26.6		J	S	SD	74.9			E		42			E		62.3			E	
Beryllium	SW-846 6010D	mg/kg	0.89	J,D3		E		0.63	M1	J-	S	S%	0.4			E		0.71			E		0.058	J		E	
Cadmium	SW-846 6010D	mg/kg	9.7			E		13.3	M1	J	S	S%, SD	1.8			E		10			E		8.1			E	
Calcium	SW-846 6010D	mg/kg	136	J,D3		E		570			E		419			E		326			E		340			E	
Chromium	SW-846 6010D	mg/kg	<0.99	U,D3		E		1.2	J,D3		E		2.7			E		<0.48	U,D3		E		2.9			E	
Cobalt	SW-846 6010D	mg/kg	0.44	J,D3		E		0.72	M1	J-	S	S%	1.6			E		1.1			E		0.84			E	
Copper	SW-846 6010D	mg/kg	163			E		227	M6		E		93.6			E		157			E		179			E	
Iron	SW-846 6010D	mg/kg	24,400			E		25,400	M6,R1		E		6,910			E		15,100			E		6,910			E	
Lead	SW-846 6010D	mg/kg	3,020			E		7,060	M6,R1		E		812			E		2,100			E		10,900			E	
Magnesium	SW-846 6010D	mg/kg	126	J,D3		E		205			E		437			E		242			E		374			E	
Manganese	SW-846 6010D	mg/kg	13,900			E		31,000	M6,R1	J	S	D%	8,050			E		20,800			E		18,300			E	
Mercury	SW-846 7471B	mg/kg	1.3			E		1.8	M1	J-	S	S%	0.25			E		1.5			E		0.1			E	
Molybdenum	SW-846 6010D	mg/kg	130			E		647	M6		E		34.5			E		101			E		10.8			E	
Nickel	SW-846 6010D	mg/kg	<1.7	U,D3		E		0.99	M1	J-	S	S%	1.5			E		0.84	J		E		1.4			E	
Potassium	SW-846 6010D	mg/kg	1,020	J,D3		E		1,540	M1,R1	J	S	D%, S%, SD	1,100			E		1,420			E		851			E	
Selenium	SW-846 6010D	mg/kg	5.1	J,D3		E		<3.2	U,D3		E		<1.6	U,D3		E		12			E		3	J,D3		E	
Silver	SW-846 6010D	mg/kg	77.7		J	S	FD	94.5			E		29.6			E		313	M1	J	S	S%	44.9			E	
Sodium	SW-846 6010D	mg/kg	<99.1	U,D3		E		35.1	J		E		18.6	J		E		58			E		19.9	J		E	
Thallium	SW-846 6010D	mg/kg	<2.4	U,D3		E		<2.4	U,D3		E		<1.2	U,D3		E		<1.2	U,D3		E		<1.2	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	14.6			E		19.9		J	S	SD	9.1			E		6.6			E		6.6			E	
Zinc	SW-846 6010D	mg/kg	1,180			E		2,720	M6,R1		E		496			E		1,380			E		1,400			E	
Percent Moisture	ASTM D2974	%	3	N2		E		3.3	N2		E		5.4	N2		E		3.5	N2		E		4.3	N2		E	

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D4 = Sample was diluted due to the presence of high levels of target analytes.

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R1 = RPD value was outside control limits.

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Pres = Qualified because preservation requirement was not met.

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S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10518864					10518864					10518864					10518864					10518864				
Field Sample ID			20WS-0297-SO5239-N-051220					20WS-0297-SO5244-N-051220					20WS-0297-SO5245-N-051220					20WS-0297-SO5249-N-051220					20WS-0297-SO5254-N-051220				
Lab Sample ID			10518864001					10518864002					10518864003					10518864018					10518864004				
Sample Date			5/12/2020					5/12/2020					5/12/2020					5/12/2020					5/12/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	2,030			E		1,560			E		2,670			E		812			E		736			E	
Antimony	SW-846 6010D	mg/kg	5			E		<1.8	U,D3		E		9.4			E		2.4			E		2.5			E	
Arsenic	SW-846 6010D	mg/kg	324			E		122			E		226			E		95.5			E		46.3			E	
Barium	SW-846 6010D	mg/kg	11.1			E		3			E		3.3			E		7.5			E		4			E	
Beryllium	SW-846 6010D	mg/kg	0.2	J		E		0.22	J,D3		E		0.096	J,D3		E		0.088	J		E		0.053	J		E	
Cadmium	SW-846 6010D	mg/kg	6			E		9.9			E		2.3			E		2			E		11			E	
Calcium	SW-846 6010D	mg/kg	79.1			E		193			E		938			E		191			E		93			E	
Chromium	SW-846 6010D	mg/kg	0.78	J,D3		E		<0.47	U,D3		E		<0.5	U,D3		E		0.13	J		E		<0.098	U		E	
Cobalt	SW-846 6010D	mg/kg	0.44	J		E		0.55	J,D3		E		0.92	J,D3		E		0.26	J		E		0.28	J		E	
Copper	SW-846 6010D	mg/kg	110			E		43.4			E		68.1			E		34.4			E		34.4			E	
Iron	SW-846 6010D	mg/kg	21,300			E		8,230			E		12,100			E		3,750			E		3,930			E	
Lead	SW-846 6010D	mg/kg	5,040			E		1,940			E		3,790			E		1,420			E		3,900			E	
Magnesium	SW-846 6010D	mg/kg	175			E		145			E		279			E		77.9			E		42.9			E	
Manganese	SW-846 6010D	mg/kg	6,300			E		20,100			E		232			E		2,290			E		808			E	
Mercury	SW-846 7471B	mg/kg	0.28			E		0.26			E		0.19			E		0.042			E		0.1			E	
Molybdenum	SW-846 6010D	mg/kg	26.2			E		35.1			E		194			E		26.4			E		13.8			E	
Nickel	SW-846 6010D	mg/kg	0.44	J		E		<0.8	U,D3		E		<0.86	U,D3		E		<0.16	U		E		0.18	J		E	
Potassium	SW-846 6010D	mg/kg	1,420			E		1,270			E		603	J,D3		E		553			E		752			E	
Selenium	SW-846 6010D	mg/kg	1.6	J,D3		E		1.6	J,D3		E		5.4			E		<0.31	U		E		<0.32	U		E	
Silver	SW-846 6010D	mg/kg	45.8			E		51.3			E		56.5			E		12.6			E		11.7			E	
Sodium	SW-846 6010D	mg/kg	43.9	J		E		<46.8	U,D3		E		<50.5	U,D3		E		<9.6	U		E		22.8	J		E	
Thallium	SW-846 6010D	mg/kg	<0.49	U,D3		E		<1.1	U,D3		E		<1.2	U,D3		E		<0.23	U		E		<0.24	U		E	
Vanadium	SW-846 6010D	mg/kg	12.7			E		7			E		2.1	J,D3		E		3.8			E		0.8			E	
Zinc	SW-846 6010D	mg/kg	2,250			E		2,810			E		1,150			E		760			E		4,270			E	
Percent Moisture	ASTM D2974	%	3.3	N2		E		1	N2		E		1.9	N2		E		0.79	N2		E		2	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10518864					10518864					10518864					10518864					10519814				
		Field Sample ID	20WS-0298-SO5296-N-051320					20WS-0298-SO5298-N-051320					20WS-0300-SO5264-N-051220					20WS-0300-SO5285-N-051320					20WS-0246-SO5382-N-051820				
		Lab Sample ID	10518864008					10518864019					10518864005					10518864007					10519814009				
		Sample Date	5/13/2020					5/13/2020					5/12/2020					5/13/2020					5/18/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,430			E		10,600			E		1,080			E		1,270			E		4,790			E	
Antimony	SW-846 6010D	mg/kg	0.95	J		E		2	J,D3		E		4.1	J,D3		E		6.6			E		1.8	J,D3		E	
Arsenic	SW-846 6010D	mg/kg	44.2			E		99.6			E		1,020			E		488			E		193			E	
Barium	SW-846 6010D	mg/kg	77.4			E		70.4			E		2.4			E		3.3			E		45.2			E	
Beryllium	SW-846 6010D	mg/kg	0.11	J		E		0.19	J,D3		E		<0.063	U,D3		E		<0.069	U,D3		E		0.23	J,D3		E	
Cadmium	SW-846 6010D	mg/kg	1.4			E		0.17	J,D3		E		8.2			E		5.6			E		3.2			E	
Calcium	SW-846 6010D	mg/kg	271			E		3,260			E		614			E		287			E		1,220			E	
Chromium	SW-846 6010D	mg/kg	1.3			E		9.7			E		<0.47	U,D3		E		<0.52	U,D3		E		2.4			E	
Cobalt	SW-846 6010D	mg/kg	1.5			E		13.3			E		2	J,D3		E		3.4			E		5.8			E	
Copper	SW-846 6010D	mg/kg	18.4			E		87.9			E		30.9			E		42.2			E		74.1			E	
Iron	SW-846 6010D	mg/kg	4,130			E		29,600			E		11,800			E		13,500			E		20,100			E	
Lead	SW-846 6010D	mg/kg	300			E		29.4			E		3,240			E		347			E		843			E	
Magnesium	SW-846 6010D	mg/kg	280			E		5,780			E		161			E		108	J,D3		E		2,130			E	
Manganese	SW-846 6010D	mg/kg	4,020			E		3,930			E		17,800			E		30,200			E		21,600			E	
Mercury	SW-846 7471B	mg/kg	0.012	J		E		0.19			E		0.19			E		0.087			E		0.24		UJ	S	Pres
Molybdenum	SW-846 6010D	mg/kg	5.6			E		19.4			E		75.9			E		34.1			E		3.7			E	
Nickel	SW-846 6010D	mg/kg	0.99			E		10.1			E		1.1	J,D3		E		1.1	J,D3		E		3.9	J,D3		E	
Potassium	SW-846 6010D	mg/kg	598			E		4,600			E		1,180			E		2,140			E		1,650			E	
Selenium	SW-846 6010D	mg/kg	<0.32	U		E		<1.7	U,D3		E		17.1			E		2.3	J,D3		E		<1.5	U,D3		E	
Silver	SW-846 6010D	mg/kg	6.1			E		12.5			E		44.1			E		41.4			E		43.6			E	
Sodium	SW-846 6010D	mg/kg	15	J		E		<52.4	U,D3		E		<47	U,D3		E		<51.6	U,D3		E		<46.6	U,D3		E	
Thallium	SW-846 6010D	mg/kg	<0.24	U		E		<1.3	U,D3		E		<1.1	U,D3		E		<1.2	U,D3		E		1.5	J,D3		E	
Vanadium	SW-846 6010D	mg/kg	9.6			E		62.7			E		<0.088	U,D3		E		0.86	J,D3		E		15.9			E	
Zinc	SW-846 6010D	mg/kg	314			E		96.6			E		967			E		1,050			E		1,060			E	
Percent Moisture	ASTM D2974	%	2.5	N2		E		6.5	N2		E		0.68	N2		E		6.9	N2		E		0.68	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10519814					10519814					10519814					10519814					10519814				
		Field Sample ID	20WS-0249-SO5406-N-052020					20WS-0285-SO5335-N-051420					20WS-0297-SO5246-N-051220					20WS-0297-SO5256-N-051220					20WS-0297-SO5287-N-051320				
		Lab Sample ID	10519814010					10519814008					10519814004					10519814005					10519814006				
		Sample Date	5/20/2020					5/14/2020					5/12/2020					5/12/2020					5/13/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	10,200			E		4,330			E		1,540	M1	J	S	S%	3,310			E		3,490			E	
Antimony	SW-846 6010D	mg/kg	0.68	J		E		6.4			E		<1.9	U,D3,M1	UJ	S	S%	0.93			E		0.44	J		E	
Arsenic	SW-846 6010D	mg/kg	69.3			E		279			E		129	M1	J	S	S%	44.9			E		41			E	
Barium	SW-846 6010D	mg/kg	124			E		66.2			E		8.3			E		36.3			E		27.2			E	
Beryllium	SW-846 6010D	mg/kg	0.17	J		E		0.25	J,D3		E		0.26	J,D3		E		0.13	J		E		0.087	J		E	
Cadmium	SW-846 6010D	mg/kg	0.97			E		10.8			E		6.2			E		2.4			E		0.22			E	
Calcium	SW-846 6010D	mg/kg	1,330			E		347			E		285			E		237			E		210			E	
Chromium	SW-846 6010D	mg/kg	11.4			E		2.9			E		<0.49	U,D3		E		2			E		2			E	
Cobalt	SW-846 6010D	mg/kg	5.1			E		1.3	J,D3		E		0.65	J,D3		E		1.2			E		0.77			E	
Copper	SW-846 6010D	mg/kg	122			E		283			E		50.4			E		37.6			E		37.4			E	
Iron	SW-846 6010D	mg/kg	12,600			E		15,000			E		7,120	P6		E		4,640			E		3,580			E	
Lead	SW-846 6010D	mg/kg	43.8			E		10,400			E		1,850	M1		E		730			E		56.7			E	
Magnesium	SW-846 6010D	mg/kg	2,400			E		511			E		168			E		415			E		358			E	
Manganese	SW-846 6010D	mg/kg	520			E		18,100			E		8,350	M6		E		1,200			E		227			E	
Mercury	SW-846 7471B	mg/kg	0.057		J-	S	Pres	1.6		J-	S	Pres	0.08		J-	S	Pres	0.051		J-	S	Pres	<0.0075	U	J-	S	Pres
Molybdenum	SW-846 6010D	mg/kg	0.94			E		45.3			E		19.1			E		4			E		1.5			E	
Nickel	SW-846 6010D	mg/kg	5.6			E		2	J,D3		E		<0.84	U,D3		E		1.4			E		1.1			E	
Potassium	SW-846 6010D	mg/kg	2,550			E		983			E		726			E		607			E		403			E	
Selenium	SW-846 6010D	mg/kg	<0.31	U		E		<1.6	U,D3		E		<1.6	U,D3		E		<0.3	U		E		<0.31	U		E	
Silver	SW-846 6010D	mg/kg	0.51			E		58.7			E		26.9		J	S	SD	13.6			E		0.33	J		E	
Sodium	SW-846 6010D	mg/kg	75.9			E		<47.3	U,D3		E		<49.2	U,D3		E		13.7	J		E		13.2	J		E	
Thallium	SW-846 6010D	mg/kg	<0.23	U		E		<1.1	U,D3		E		<1.2	U,D3		E		<0.22	U		E		<0.23	U		E	
Vanadium	SW-846 6010D	mg/kg	27.4			E		22.2			E		4.3			E		7.6			E		5.6			E	
Zinc	SW-846 6010D	mg/kg	91.1			E		1,580			E		2,110	P6,R1		E		724			E		40.9			E	
Percent Moisture	ASTM D2974	%	1.1	N2		E		0.38	N2		E		0.32	N2		E		0.34	N2		E		0.31	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and my be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10519814					10519814					10520797					10520797					10520797				
		Field Sample ID	20WS-0299-SO5304-N-051320					20WS-0315-SO5514-N-052720					20WS-0010-SO5611-N-060120					20WS-0013-SO5439-N-052120					20WS-0013-SO5448-N-052120				
		Lab Sample ID	10519814007					10519814011					10520797014					10520797005					10520797006				
		Sample Date	5/13/2020					5/27/2020					6/1/2020					5/21/2020					5/21/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	9,020			E		8,430			E		4,730			E		5,930			E		4,370	P6		E	
Antimony	SW-846 6010D	mg/kg	<1.8	U,D3		E		0.95	J		E		0.69	J		E		0.52	J		E		14.6	M1	J	S	S%
Arsenic	SW-846 6010D	mg/kg	76.8			E		57.6			E		445			E		75.5			E		294	P6		E	
Barium	SW-846 6010D	mg/kg	97.2			E		108			E		20.3			E		104			E		101			E	
Beryllium	SW-846 6010D	mg/kg	0.29	J,D3		E		0.23	J		E		<0.013	U		E		0.22	J		E		<0.014	U		E	
Cadmium	SW-846 6010D	mg/kg	1.4			E		0.88			E		9.4			E		11.9			E		9.4		J	S	SD
Calcium	SW-846 6010D	mg/kg	1,390			E		1,850			E		7,070			E		10,600			E		1,100			E	
Chromium	SW-846 6010D	mg/kg	5.8			E		4.8			E		2	J,D3		E		3			E		183	M1	J	S	S%
Cobalt	SW-846 6010D	mg/kg	4			E		2.8			E		5.9			E		7.2			E		6.5		J	S	SD
Copper	SW-846 6010D	mg/kg	110			E		116			E		123			E		119			E		237	P6		E	
Iron	SW-846 6010D	mg/kg	12,600			E		6,790			E		54,000			E		25,400			E		44,900	P6	J	S	SD
Lead	SW-846 6010D	mg/kg	102			E		46.3			E		4,400			E		1,870			E		2,480	P6	J	S	SD
Magnesium	SW-846 6010D	mg/kg	2,040			E		1,110			E		1,270			E		4,050			E		1,220	M1	J	S	S%
Manganese	SW-846 6010D	mg/kg	1,140			E		1,610			E		5,950			E		17,100			E		1,730	P6,R1		E	
Mercury	SW-846 7471B	mg/kg	0.14		J-	S	Pres	0.072		J-	S	Pres	0.27			E		0.039			E		0.34			E	
Molybdenum	SW-846 6010D	mg/kg	3.6			E		2.5			E		1.2			E		1.9			E		11.5			E	
Nickel	SW-846 6010D	mg/kg	3.6	J,D3		E		3.7			E		4.1			E		4.9			E		7.4			E	
Potassium	SW-846 6010D	mg/kg	2,250			E		1,510			E		1,580			E		2,170			E		2,300			E	
Selenium	SW-846 6010D	mg/kg	<1.5	U,D3		E		<0.32	U		E		<1.6	U,D3		E		<1.7	U,D3		E		<0.34	U		E	
Silver	SW-846 6010D	mg/kg	2.2	J,D3		E		1.4			E		106			E		12.8			E		467	M1	J	S	S%
Sodium	SW-846 6010D	mg/kg	<47.1	U,D3		E		33	J		E		38.7	J		E		51.6			E		253			E	
Thallium	SW-846 6010D	mg/kg	<1.1	U,D3		E		<0.23	U		E		<1.1	U,D3		E		<1.2	U,D3		E		0.43	J		E	
Vanadium	SW-846 6010D	mg/kg	23.7			E		12.6			E		10.7			E		18.9			E		20.1			E	
Zinc	SW-846 6010D	mg/kg	303			E		83			E		3,830			E		5,140			E		4,070	P6		E	
Percent Moisture	ASTM D2974	%	0.85	N2		E		1.1	N2		E		2.1	N2		E		5.4	N2		E		5.8	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

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R1 = RPD value was outside control limits.

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J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10520797					10520797					10520797					10520797					10520797				
Field Sample ID			20WS-0013-SO5601-N-060120					20WS-0016-SO5434-N-052120					20WS-0179-SO5670-N-060220					20WS-0179-SO5673-N-060220					20WS-0179-SO5680-N-060220				
Lab Sample ID			10520797013					10520797004					10520797020					10520797017					10520797018				
Sample Date			6/1/2020					5/21/2020					6/2/2020					6/2/2020					6/2/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	4,860			E		2,230			E		3,480			E		4,150			E		4,230			E	
Antimony	SW-846 6010D	mg/kg	<0.38	U		E		10.9			E		17.9			E		28.2			E		20.2			E	
Arsenic	SW-846 6010D	mg/kg	130			E		911			E		73.5			E		160			E		52.5			E	
Barium	SW-846 6010D	mg/kg	77.1			E		39.3			E		8.7			E		11.7			E		22.2			E	
Beryllium	SW-846 6010D	mg/kg	0.15	J		E		0.23	J,D3		E		<0.014	U		E		0.023	J		E		<0.014	U		E	
Cadmium	SW-846 6010D	mg/kg	6.5			E		9.7			E		0.45			E		15			E		1.6			E	
Calcium	SW-846 6010D	mg/kg	1,790			E		1,050			E		1,730			E		2,030			E		990			E	
Chromium	SW-846 6010D	mg/kg	3.5			E		<2.5	U,D3		E		2			E		2.2			E		5.9			E	
Cobalt	SW-846 6010D	mg/kg	4.6			E		5.7			E		1.5			E		1.2			E		1.9			E	
Copper	SW-846 6010D	mg/kg	43.9			E		129			E		71.3			E		103			E		45.3			E	
Iron	SW-846 6010D	mg/kg	26,500			E		16,400			E		13,000			E		17,100			E		20,300			E	
Lead	SW-846 6010D	mg/kg	4,050			E		2,560			E		496			E		775			E		190			E	
Magnesium	SW-846 6010D	mg/kg	847			E		290			E		965			E		875			E		1,320			E	
Manganese	SW-846 6010D	mg/kg	14,500			E		69,000			E		152			E		180			E		98.3			E	
Mercury	SW-846 7471B	mg/kg	0.12			E		0.16			E		6.6			E		3.9			E		0.64			E	
Molybdenum	SW-846 6010D	mg/kg	1.6			E		116			E		6.7			E		3.6			E		3.1			E	
Nickel	SW-846 6010D	mg/kg	2.4			E		2.5			E		1.4			E		1.4			E		1.9			E	
Potassium	SW-846 6010D	mg/kg	1,870			E		3,070			E		1,490			E		1,830			E		1,920			E	
Selenium	SW-846 6010D	mg/kg	<1.7	U,D3		E		<8	U,D3		E		1	J		E		0.73	J		E		<0.34	U		E	
Silver	SW-846 6010D	mg/kg	14.5			E		56.3			E		66.3			E		141			E		50			E	
Sodium	SW-846 6010D	mg/kg	63.8			E		130			E		41	J		E		113			E		93.3			E	
Thallium	SW-846 6010D	mg/kg	<1.2	U,D3		E		<5.9	U,D3		E		1.1			E		0.77	J		E		1.2			E	
Vanadium	SW-846 6010D	mg/kg	16.3			E		4.8			E		22.6			E		20.7			E		35			E	
Zinc	SW-846 6010D	mg/kg	1,680			E		1,290			E		207			E		2,850			E		365			E	
Percent Moisture	ASTM D2974	%	2.3	N2		E		1.1	N2		E		6.8	N2		E		6	N2		E		3.2	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10520797					10520797					10520797					10520797					10520797				
		Field Sample ID	20WS-0246-SO5389-N-051920					20WS-0249-SO5409-N-052020					20WS-0256-SO5403-N-051920					20WS-0301-SO5571-N-052920					20WS-0306-SO5625-N-060120				
		Lab Sample ID	10520797001					10520797003					10520797002					10520797012					10520797015				
		Sample Date	5/19/2020					5/20/2020					5/19/2020					5/29/2020					6/1/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	2,790			E		3,080			E		5,400			E		5,640			E		5,830			E	
Antimony	SW-846 6010D	mg/kg	1.7			E		<2	U,D3		E		2.4			E		<0.37	U		E		<0.39	U		E	
Arsenic	SW-846 6010D	mg/kg	118			E		32.5			E		136			E		29			E		110			E	
Barium	SW-846 6010D	mg/kg	24.4			E		32.4			E		138			E		24.4			E		72.7			E	
Beryllium	SW-846 6010D	mg/kg	0.053	J		E		0.3	J,D3		E		0.36			E		0.3			E		0.27			E	
Cadmium	SW-846 6010D	mg/kg	1.3			E		0.38	J,D3		E		0.55			E		2.9			E		13			E	
Calcium	SW-846 6010D	mg/kg	662			E		453			E		1,980			E		18,400			E		7,650			E	
Chromium	SW-846 6010D	mg/kg	2			E		0.71	J,D3		E		3.9			E		2.2	J,D3		E		2.9			E	
Cobalt	SW-846 6010D	mg/kg	3.1			E		0.5	J,D3		E		5.7			E		4.7			E		9			E	
Copper	SW-846 6010D	mg/kg	42			E		72.6			E		64.8			E		16.3			E		80.1			E	
Iron	SW-846 6010D	mg/kg	15,000			E		3,660			E		23,500			E		17,300			E		25,900			E	
Lead	SW-846 6010D	mg/kg	344			E		41.9			E		103			E		610			E		2,240			E	
Magnesium	SW-846 6010D	mg/kg	1,100			E		323			E		1,850			E		5,290			E		2,850			E	
Manganese	SW-846 6010D	mg/kg	10,400			E		260			E		2,620			E		13,700			E		7,870			E	
Mercury	SW-846 7471B	mg/kg	0.094			E		0.042			E		0.027			E		0.18			E		0.1			E	
Molybdenum	SW-846 6010D	mg/kg	1.6			E		1.1	J,D3		E		4			E		1.7			E		2.4			E	
Nickel	SW-846 6010D	mg/kg	2.1			E		<0.88	U,D4		E		4.5			E		3.1			E		5.8			E	
Potassium	SW-846 6010D	mg/kg	1,000			E		382	J		E		2,220			E		1,560			E		1,950			E	
Selenium	SW-846 6010D	mg/kg	<0.69	U,D3		E		<1.7	U,D4		E		<0.35	U		E		<1.6	U,D3		E		<1.7	U,D3		E	
Silver	SW-846 6010D	mg/kg	41.3			E		0.7	J,D3		E		10			E		3.9			E		12			E	
Sodium	SW-846 6010D	mg/kg	12.7	J		E		<51.8	U,D3		E		47	J		E		19.2	J		E		34.9	J		E	
Thallium	SW-846 6010D	mg/kg	1.9	J,D3		E		<1.2	U,D3		E		0.32	J		E		<1.2	U,D3		E		<1.2	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	11.4			E		5.5			E		38.6			E		13.7			E		17.6			E	
Zinc	SW-846 6010D	mg/kg	361			E		59.2			E		134			E		822			E		5,940			E	
Percent Moisture	ASTM D2974	%	5.8	N2		E		4.4	N2		E		10.9	N2		E		3.2	N2		E		5.6	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and my be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10520797					10520797					10520797					10520797					10520797				
Field Sample ID			20WS-0312-SO5544-N-052820					20WS-0315-SO5455-N-052620					20WS-0315-SO5488-N-052720					20WS-0319-SO5520-N-052720					20WS-0319-SO5536-N-052820				
Lab Sample ID			10520797019					10520797007					10520797008					10520797009					10520797011				
Sample Date			5/28/2020					5/26/2020					5/27/2020					5/27/2020					5/28/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,860			E		1,670			E		2,090			E		2,660			E		2,000			E	
Antimony	SW-846 6010D	mg/kg	4.4			E		0.65	J		E		0.49	J		E		9.1			E		6.1			E	
Arsenic	SW-846 6010D	mg/kg	51.6			E		36.8			E		22.1			E		83.7			E		121			E	
Barium	SW-846 6010D	mg/kg	21.7			E		7.6			E		48.1			E		63.3			E		31.6			E	
Beryllium	SW-846 6010D	mg/kg	0.066	J		E		0.15	J		E		0.072	J		E		0.51	J,D3		E		0.3			E	
Cadmium	SW-846 6010D	mg/kg	0.36			E		0.64			E		0.25			E		0.79			E		2.1			E	
Calcium	SW-846 6010D	mg/kg	338			E		483			E		321			E		484			E		394			E	
Chromium	SW-846 6010D	mg/kg	0.57			E		0.45	J		E		1.9			E		1.1	J,D3		E		1.4	J,D3		E	
Cobalt	SW-846 6010D	mg/kg	0.72			E		0.73			E		1			E		0.85	J,D3		E		0.69			E	
Copper	SW-846 6010D	mg/kg	119			E		14.9			E		32.7			E		126			E		143			E	
Iron	SW-846 6010D	mg/kg	4,430			E		3,850			E		3,830			E		5,580			E		3,340			E	
Lead	SW-846 6010D	mg/kg	94.2			E		127			E		33.2			E		333		J	S	FD	163			E	
Magnesium	SW-846 6010D	mg/kg	168			E		274			E		259			E		272			E		199			E	
Manganese	SW-846 6010D	mg/kg	264			E		2,270			E		733			E		15,500			E		7,270			E	
Mercury	SW-846 7471B	mg/kg	0.077			E		0.053			E		<0.0078	U		E		0.44			E		0.059			E	
Molybdenum	SW-846 6010D	mg/kg	21.9			E		3.4			E		1.8			E		26.2			E		6.3			E	
Nickel	SW-846 6010D	mg/kg	0.38	J		E		0.36	J		E		0.96	J		E		<0.85	U,D3		E		0.66	J		E	
Potassium	SW-846 6010D	mg/kg	904			E		733			E		471			E		1,370			E		1,040			E	
Selenium	SW-846 6010D	mg/kg	<0.34	U		E		<0.32	U		E		<0.33	U		E		<1.6	U,D3		E		<1.6	U,D3		E	
Silver	SW-846 6010D	mg/kg	3.7			E		6.1			E		0.45	J		E		79.7		J	S	FD	25.5			E	
Sodium	SW-846 6010D	mg/kg	<10.3	U		E		20.1	J		E		<10	U		E		<49.8	U,D3		E		21.3	J		E	
Thallium	SW-846 6010D	mg/kg	0.31	J		E		0.29	J		E		0.3	J		E		<1.2	U,D3		E		<1.2	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	7.6			E		2.8			E		9.4			E		13.2			E		10.8			E	
Zinc	SW-846 6010D	mg/kg	42.1			E		215			E		37.9			E		212			E		76.3			E	
Percent Moisture	ASTM D2974	%	7.2	N2		E		3.2	N2		E		1.4	N2		E		1.5	N2		E		2	N2		E	

Notes:

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Screening/Enforcement Quality (S/E)

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S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10520797					10521670					10521670					10521670					10521670				
		Field Sample ID	20WS-0350-SO5645-N-060220					20WS-0013-SO5610-N-060120					20WS-0122-SO5693-N-060220					20WS-0138-SO5763-N-060420					20WS-0162-SO5732-N-060320				
		Lab Sample ID	10520797016					10521670002					10521670003					10521670005					10521670004				
		Sample Date	6/2/2020					6/1/2020					6/2/2020					6/4/2020					6/3/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	7,990			E		12,000			E		12,800			E		14,200			E		6,890			E	
Antimony	SW-846 6010D	mg/kg	0.98	J		E		0.55	J		E		1.4			E		<0.37	U		E		2.4			E	
Arsenic	SW-846 6010D	mg/kg	194			E		46.3			E		100			E		48.6			E		34.8			E	
Barium	SW-846 6010D	mg/kg	210			E		208			E		180			E		141			E		40.6			E	
Beryllium	SW-846 6010D	mg/kg	0.045	J		E		0.17	J		E		0.1	J		E		0.13	J		E		0.75			E	
Cadmium	SW-846 6010D	mg/kg	2			E		3.5			E		1.5			E		0.91			E		3.6			E	
Calcium	SW-846 6010D	mg/kg	596			E		7,340			E		2,270			E		2,790			E		25,900			E	
Chromium	SW-846 6010D	mg/kg	9			E		9.1			E		7.9			E		8.4			E		18.6			E	
Cobalt	SW-846 6010D	mg/kg	9.1			E		7.2			E		34			E		11.3			E		3.9			E	
Copper	SW-846 6010D	mg/kg	272			E		57			E		358			E		215			E		320			E	
Iron	SW-846 6010D	mg/kg	26,700			E		25,100			E		23,500			E		22,400			E		18,300			E	
Lead	SW-846 6010D	mg/kg	399			E		748			E		152			E		46.5			E		962			E	
Magnesium	SW-846 6010D	mg/kg	1,150			E		5,140			E		4,500			E		4,770			E		4,980			E	
Manganese	SW-846 6010D	mg/kg	19,600			E		3,890			E		1,470			E		1,150			E		50,800			E	
Mercury	SW-846 7471B	mg/kg	0.19			E		0.056			E		0.34			E		0.11			E		0.57			E	
Molybdenum	SW-846 6010D	mg/kg	36.9			E		1.9			E		3.9			E		2.5			E		3			E	
Nickel	SW-846 6010D	mg/kg	6.7			E		6.4			E		7.4			E		7.2			E		16.5			E	
Potassium	SW-846 6010D	mg/kg	1,480			E		3,280			E		4,290			E		4,520			E		1,870			E	
Selenium	SW-846 6010D	mg/kg	<1.6	U,D3		E		<0.32	U		E		0.4	J		E		<0.33	U		E		<8.1	U,D3		E	
Silver	SW-846 6010D	mg/kg	9.7			E		6.5			E		2.7			E		0.95			E		85.6			E	
Sodium	SW-846 6010D	mg/kg	25.4	J		E		164			E		44.2	J		E		55.1			E		29.8	J		E	
Thallium	SW-846 6010D	mg/kg	1.8	J,D3		E		0.28	J		E		<1.2	U,D3		E		<1.2	U,D3		E		<5.9	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	35.5			E		43.7			E		50.8			E		48.9			E		19.4			E	
Zinc	SW-846 6010D	mg/kg	438			E		1,110			E		169			E		142			E		927			E	
Percent Moisture	ASTM D2974	%	1.2	N2		E		2.1	N2		E		1.7	N2		E		2.1	N2		E		1.6	N2		E	

Notes:

"<" = Not detected at method detection limit.

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J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

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E = Enforcement quality.

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Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

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S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10521670					10521670					10521754					10521754					10521754				
		Field Sample ID	20WS-0313-SO5554-N-052820					20WS-1116-SO5823-N-060920					20WS-0121-SO5801-N-060420					20WS-0122-SO5704-N-060220					20WS-0123-SO5828-N-060420				
		Lab Sample ID	10521670001					10521670007					10521754009					10521754002					10521754012				
		Sample Date	5/28/2020					6/9/2020					6/4/2020					6/2/2020					6/4/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	4,280	P6	J	S	SD	10,900			E		12,700			E		4,390			E		3,940			E	
Antimony	SW-846 6010D	mg/kg	0.68	J,M1	J-	S	S%	<0.36	U		E		2.5			E		23.1			E		2			E	
Arsenic	SW-846 6010D	mg/kg	28.3		J	S	SD	26.3			E		26			E		80.7			E		33.9			E	
Barium	SW-846 6010D	mg/kg	100		J	S	SD	135			E		71.8			E		28.9			E		126			E	
Beryllium	SW-846 6010D	mg/kg	0.15	J		E		0.046	J		E		0.27			E		0.03	J		E		<0.014	U		E	
Cadmium	SW-846 6010D	mg/kg	2.7		J	S	SD	0.69			E		0.47		J	S	FD	5.8			E		<0.03	U		E	
Calcium	SW-846 6010D	mg/kg	1,070	M1	J	S	S%, SD	5,260			E		18,000			E		1,010			E		8,900			E	
Chromium	SW-846 6010D	mg/kg	6.1		J	S	SD	9			E		4.8			E		2.8			E		2			E	
Cobalt	SW-846 6010D	mg/kg	2.7			E		7.1			E		8.3			E		6.9			E		1.7			E	
Copper	SW-846 6010D	mg/kg	40.6			E		111			E		41.8			E		159			E		30.7			E	
Iron	SW-846 6010D	mg/kg	7,790	P6	J	S	SD	20,200			E		22,700			E		32,700			E		26,000			E	
Lead	SW-846 6010D	mg/kg	384	P6	J	S	SD	38.8			E		66.4		J	S	FD	1,260			E		81.8			E	
Magnesium	SW-846 6010D	mg/kg	1,450		J	S	SD	5,010			E		6,160			E		1,330			E		908			E	
Manganese	SW-846 6010D	mg/kg	2,650	P6,R1	J	S	SD	668			E		3,830			E		18,500			E		558			E	
Mercury	SW-846 7471B	mg/kg	0.15			E		0.098			E		0.084			E		1.8			E		0.23			E	
Molybdenum	SW-846 6010D	mg/kg	2			E		0.8			E		1.8			E		12.2			E		2.2			E	
Nickel	SW-846 6010D	mg/kg	3.4			E		6.9			E		6.4			E		3.7			E		1.3			E	
Potassium	SW-846 6010D	mg/kg	1,320		J	S	SD	3,800			E		3,180			E		1,280			E		1,920			E	
Selenium	SW-846 6010D	mg/kg	<0.31	U		E		<0.32	U		E		<0.31	U		E		<1.6	U,D3		E		<0.33	U		E	
Silver	SW-846 6010D	mg/kg	5.1		J	S	SD	0.73			E		10.6			E		202			E		6.8			E	
Sodium	SW-846 6010D	mg/kg	42.4	J		E		74.9			E		34.2	J		E		14.3	J		E		58.5			E	
Thallium	SW-846 6010D	mg/kg	<0.22	U		E		<0.23	U		E		0.87	J		E		<1.2	U,D3		E		2.7			E	
Vanadium	SW-846 6010D	mg/kg	17.1		J	S	SD	40.5			E		33.7			E		14.9			E		16.9			E	
Zinc	SW-846 6010D	mg/kg	773	P6	J	S	SD	179			E		93.3		J	S	FD	1,720			E		64.2			E	
Percent Moisture	ASTM D2974	%	0.74	N2		E		1.3	N2		E		4.1	N2		E		2.2	N2		E		8.3	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10521754					10521754					10521754					10521754					10521754				
		Field Sample ID	20WS-0123-SO5829-N-060420					20WS-0130-SO5728-N-060220					20WS-0138-SO5700-N-060220					20WS-0138-SO5757-N-060320					20WS-0138-SO5787-N-060320				
		Lab Sample ID	10521754013					10521754018					10521754001					10521754007					10521754008				
		Sample Date	6/4/2020					6/2/2020					6/2/2020					6/3/2020					6/3/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	2,940			E		7,800			E		5,150			E		6,680			E		6,820			E	
Antimony	SW-846 6010D	mg/kg	5.5			E		0.41	J		E		126			E		2.9			E		2.9			E	
Arsenic	SW-846 6010D	mg/kg	151			E		56.5			E		92.1			E		57.2			E		85.7			E	
Barium	SW-846 6010D	mg/kg	15			E		99.7			E		17.7			E		48.7			E		34.4			E	
Beryllium	SW-846 6010D	mg/kg	0.69	J,D3		E		0.045	J		E		0.35			E		0.13	J		E		0.13	J		E	
Cadmium	SW-846 6010D	mg/kg	3.7			E		0.68			E		5.7			E		12.9			E		2.2			E	
Calcium	SW-846 6010D	mg/kg	2,410			E		2,540			E		6,980			E		2,320			E		12,400			E	
Chromium	SW-846 6010D	mg/kg	3.1	J,D3		E		6.8			E		5.9	J,D3		E		3.8			E		3.5			E	
Cobalt	SW-846 6010D	mg/kg	10.2			E		24.4			E		5.3			E		7.5			E		7			E	
Copper	SW-846 6010D	mg/kg	67.2			E		159			E		704			E		111			E		88			E	
Iron	SW-846 6010D	mg/kg	48,900			E		29,700			E		20,200			E		22,400			E		24,700			E	
Lead	SW-846 6010D	mg/kg	906			E		212			E		1,400			E		1,620			E		418			E	
Magnesium	SW-846 6010D	mg/kg	748			E		4,080			E		2,080			E		2,460			E		3,890			E	
Manganese	SW-846 6010D	mg/kg	39,800			E		3,140			E		93,000			E		15,800			E		16,900			E	
Mercury	SW-846 7471B	mg/kg	1.4			E		0.1			E		0.14			E		0.16			E		0.16			E	
Molybdenum	SW-846 6010D	mg/kg	2.7	J,D3		E		7.1			E		5			E		8.4			E		4.6			E	
Nickel	SW-846 6010D	mg/kg	8			E		4.9			E		5.1			E		4.6			E		5.2			E	
Potassium	SW-846 6010D	mg/kg	1,040			E		3,480			E		1,590			E		1,670			E		1,580			E	
Selenium	SW-846 6010D	mg/kg	<3.3	U,D3		E		<0.33	U		E		<8.6	U,D3		E		<1.6	U,D3		E		<1.5	U,D3		E	
Silver	SW-846 6010D	mg/kg	30.2			E		4.8			E		53			E		44.7			E		30.9			E	
Sodium	SW-846 6010D	mg/kg	<50	U,D3		E		36.9	J		E		14.7	J		E		18.3	J		E		18	J		E	
Thallium	SW-846 6010D	mg/kg	<2.4	U,D3		E		0.48	J		E		<6.3	U,D3		E		<1.2	U,D3		E		1.6	J,D3		E	
Vanadium	SW-846 6010D	mg/kg	13.7			E		45.6			E		13.1			E		17.8			E		15.7			E	
Zinc	SW-846 6010D	mg/kg	1,830			E		277			E		1,150			E		3,490			E		583			E	
Percent Moisture	ASTM D2974	%	3	N2		E		1.4	N2		E		6.1	N2		E		2	N2		E		2.2	N2		E	

Notes:

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Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10521754					10521754					10521754					10521754					10521754				
		Field Sample ID	20WS-0157-SO5744-N-060320					20WS-0162-SO5706-N-060320					20WS-0162-SO5722-N-060320					20WS-0162-SO5733-N-060320					20WS-0350-SO5840-N-060420				
		Lab Sample ID	10521754006					10521754003					10521754004					10521754005					10521754014				
		Sample Date	6/3/2020					6/3/2020					6/3/2020					6/3/2020					6/4/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	4,450			E		13,100			E		6,480			E		4,810			E		5,630			E	
Antimony	SW-846 6010D	mg/kg	7.5			E		0.77	J		E		2.7			E		1.1			E		8.7			E	
Arsenic	SW-846 6010D	mg/kg	74.6			E		27.4			E		39.7			E		16			E		163			E	
Barium	SW-846 6010D	mg/kg	51.3			E		71.3			E		32.9			E		24.8			E		69			E	
Beryllium	SW-846 6010D	mg/kg	<0.014	U		E		0.34			E		0.7			E		1.8			E		<0.013	U		E	
Cadmium	SW-846 6010D	mg/kg	0.36			E		1.5			E		3.4			E		3.2			E		4.1			E	
Calcium	SW-846 6010D	mg/kg	5,450			E		15,900			E		19,200			E		34,200			E		1,100			E	
Chromium	SW-846 6010D	mg/kg	2.8			E		6.3			E		14.3			E		18.5			E		4.6			E	
Cobalt	SW-846 6010D	mg/kg	0.83			E		8.6			E		4			E		1.8			E		10.8			E	
Copper	SW-846 6010D	mg/kg	69.7			E		83			E		231			E		111			E		344			E	
Iron	SW-846 6010D	mg/kg	22,200			E		24,700			E		16,500			E		7,830			E		38,300			E	
Lead	SW-846 6010D	mg/kg	385			E		235			E		804			E		531			E		12,000			E	
Magnesium	SW-846 6010D	mg/kg	1,220			E		7,060			E		4,370			E		4,310			E		1,890			E	
Manganese	SW-846 6010D	mg/kg	44			E		5,800			E		44,800			E		80,100			E		16,300			E	
Mercury	SW-846 7471B	mg/kg	0.88			E		0.018	J		E		0.14			E		0.054			E		0.19			E	
Molybdenum	SW-846 6010D	mg/kg	86.6			E		1.5			E		3			E		1.8			E		23.7			E	
Nickel	SW-846 6010D	mg/kg	1.2			E		7.1			E		13			E		8.5			E		3.5			E	
Potassium	SW-846 6010D	mg/kg	2,320			E		3,160			E		1,980			E		1,290			E		2,220			E	
Selenium	SW-846 6010D	mg/kg	<0.35	U		E		<0.33	U		E		<3.7	U,D3		E		<9	U,D3		E		<1.6	U,D3		E	
Silver	SW-846 6010D	mg/kg	49.8			E		8.6			E		81.5			E		132			E		125			E	
Sodium	SW-846 6010D	mg/kg	196			E		34.1	J		E		24.4	J		E		16.1	J		E		63.2			E	
Thallium	SW-846 6010D	mg/kg	1.4			E		0.83	J		E		3.8	J,D3		E		7.3	J,D3		E		1.3	J,D3		E	
Vanadium	SW-846 6010D	mg/kg	19.2			E		35.9			E		20.8			E		16.2			E		24.5			E	
Zinc	SW-846 6010D	mg/kg	64.5			E		362			E		771			E		789			E		790			E	
Percent Moisture	ASTM D2974	%	7.6	N2		E		2.6	N2		E		15.5	N2		E		11.4	N2		E		1.5	N2		E	

Notes:

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Pace Laboratory Flags (Lab Flag)

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D4 = Sample was diluted due to the presence of high levels of target analytes.

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S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10521754					10521754					10521754					10521754					10521754				
Field Sample ID			20WS-0350-SO5841-N-060420					20WS-1113-SO5858-N-060920					20WS-1114-SO5854-N-060920					20WS-1115-SO5849-N-060920					20WS-1116-SO5821-N-060920				
Lab Sample ID			10521754015					10521754019					10521754017					10521754016					10521754011				
Sample Date			6/4/2020					6/9/2020					6/9/2020					6/9/2020					6/9/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	4,950			E		1,580			E		3,400	M1	J	S	S%	2,830			E		6,640			E	
Antimony	SW-846 6010D	mg/kg	5.3			E		0.76	J		E		1.6	M1	J	S	S%	1.7			E		7.6			E	
Arsenic	SW-846 6010D	mg/kg	358			E		208		J	S	FD	129	M1,R1	J	S	S%	164			E		105			E	
Barium	SW-846 6010D	mg/kg	101			E		7.1			E		29.9			E		205			E		621			E	
Beryllium	SW-846 6010D	mg/kg	<0.013	U		E		<0.015	U		E		0.016	J		E		0.08	J		E		0.5	J,D3		E	
Cadmium	SW-846 6010D	mg/kg	28.2			E		0.33			E		0.32			E		1.4			E		8.7			E	
Calcium	SW-846 6010D	mg/kg	1,700			E		254			E		7,610	P6		E		682			E		1,240			E	
Chromium	SW-846 6010D	mg/kg	5.1			E		0.89			E		1.5			E		2.8			E		6.8			E	
Cobalt	SW-846 6010D	mg/kg	5.1			E		0.46	J		E		5.7		J	S	SD	3.5			E		5.3			E	
Copper	SW-846 6010D	mg/kg	673			E		17			E		72.4	M1	J	S	S%	134			E		687			E	
Iron	SW-846 6010D	mg/kg	58,900			E		20,800			E		25,000	P6		E		12,900			E		15,000			E	
Lead	SW-846 6010D	mg/kg	26,000			E		925			E		122	M1	J	S	S%, SD	131			E		618			E	
Magnesium	SW-846 6010D	mg/kg	1,560			E		186			E		1,130			E		673			E		2,380			E	
Manganese	SW-846 6010D	mg/kg	17,000			E		200		J	S	FD	724	P6,R1	J	S	D%, SD	1,990			E		29,300			E	
Mercury	SW-846 7471B	mg/kg	3.3			E		0.012	J		E		0.1	M1,R1		E		0.11			E		0.67			E	
Molybdenum	SW-846 6010D	mg/kg	153			E		20.3			E		2.1			E		2.1			E		13.8			E	
Nickel	SW-846 6010D	mg/kg	3.8			E		0.48	J		E		1.9			E		2.4			E		3.9	J,D3		E	
Potassium	SW-846 6010D	mg/kg	2,000			E		1,800			E		1,570			E		846			E		2,640			E	
Selenium	SW-846 6010D	mg/kg	<1.5	U,D3		E		0.58	J		E		<0.35	U		E		<0.36	U		E		<3.3	U,D3		E	
Silver	SW-846 6010D	mg/kg	69			E		4.9			E		9.8			E		2.3			E		14.4	M1,R1	J	S	D%, S%
Sodium	SW-846 6010D	mg/kg	132			E		23.1	J		E		61.9			E		13.3	J		E		85.5	J,D3		E	
Thallium	SW-846 6010D	mg/kg	1.6	J,D3		E		0.38	J		E		0.31	J		E		<0.27	U		E		3.1	J,D3		E	
Vanadium	SW-846 6010D	mg/kg	52.9			E		10			E		14.9			E		40.9			E		52.4			E	
Zinc	SW-846 6010D	mg/kg	6,040			E		177		J	S	FD	88.2	M1,R1	J	S	S%, SD	162			E		985			E	
Percent Moisture	ASTM D2974	%	1.5	N2		E		10	N2		E		10.4	N2		E		11.4	N2		E		8.3	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10522826					10522826					10522826					10522826					10522826				
		Field Sample ID	20WS-0043-SO5896-5.9-6.5-N-061920					20WS-0043-SO5897-7.3-7.7-N-061920					20WS-0043-SO5898-10.8-11.2-N-061920					20WS-0043-SO5899-16.0-16.3-N-061920					20WS-0003-SO5900-1.0-1.5-N-062320				
		Lab Sample ID	10522826012					10522826014					10522826015					10522826016					10522826017				
		Sample Date	6/19/2020					6/19/2020					6/19/2020					6/19/2020					6/23/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	9,870			E		11,400			E		13,000	P6	J	S	SD	9,960			E		8,630			E	
Antimony	SW-846 6010D	mg/kg	0.44	J		E		<0.41	U		E		0.58	J,M1	J-	S	S%	<0.39	U		E		<0.37	U		E	
Arsenic	SW-846 6010D	mg/kg	17.3		J	S	FD	10.6			E		11.9		J	S	SD	3.3			E		5.9			E	
Barium	SW-846 6010D	mg/kg	130			E		143			E		168	M1	J	S	S%, SD	149			E		130			E	
Beryllium	SW-846 6010D	mg/kg	0.12	J		E		0.14	J		E		0.19	J		E		0.075	J		E		0.015	J		E	
Cadmium	SW-846 6010D	mg/kg	0.24			E		0.22			E		0.21			E		0.15	J		E		0.046	J		E	
Calcium	SW-846 6010D	mg/kg	3,140			E		3,100			E		3,530	M1	J	S	S%, SD	3,530			E		11,000			E	
Chromium	SW-846 6010D	mg/kg	9.6			E		9.5			E		11.6		J	S	SD	7.6			E		5.8			E	
Cobalt	SW-846 6010D	mg/kg	5.5			E		7.5			E		6		J	S	SD	9.4			E		8.4			E	
Copper	SW-846 6010D	mg/kg	17			E		37.9			E		37.8			E		6.6			E		44.7			E	
Iron	SW-846 6010D	mg/kg	18,100			E		16,700			E		18,900	P6,R1	J	S	SD	20,100			E		15,700			E	
Lead	SW-846 6010D	mg/kg	35.9			E		23.3			E		27.8		J	S	SD	6.3			E		5.2			E	
Magnesium	SW-846 6010D	mg/kg	3,010			E		2,940			E		3,770	M1	J	S	S%, SD	7,030			E		5,150			E	
Manganese	SW-846 6010D	mg/kg	1,340			E		2,660			E		3,600	P6,R1	J	S	SD	1,170			E		1,310			E	
Mercury	SW-846 7471B	mg/kg	0.018	J		E		0.083			E		0.074			E		0.022			E		0.022			E	
Molybdenum	SW-846 6010D	mg/kg	0.5	J		E		0.66	J		E		0.83			E		0.43	J		E		1			E	
Nickel	SW-846 6010D	mg/kg	6.2			E		5.2			E		6.4			E		6.5			E		5.2			E	
Potassium	SW-846 6010D	mg/kg	2,260			E		2,370			E		2,880	M1	J	S	S%, SD	3,940			E		3,420			E	
Selenium	SW-846 6010D	mg/kg	<0.33	U		E		<0.36	U		E		<0.35	U		E		<0.34	U		E		<0.32	U		E	
Silver	SW-846 6010D	mg/kg	3.7			E		1.2			E		0.59			E		0.079	J		E		<0.036	U		E	
Sodium	SW-846 6010D	mg/kg	75.8			E		68.9			E		66.1			E		57.2			E		59.5			E	
Thallium	SW-846 6010D	mg/kg	0.26	J		E		<0.26	U		E		<0.26	U		E		<1.2	U,D3		E		<1.2	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	36.8			E		31.6			E		34		J	S	SD	51.4			E		35			E	
Zinc	SW-846 6010D	mg/kg	93.5			E		171			E		138	M1	J	S	S%, SD	60.2			E		40.1			E	
Percent Moisture	ASTM D2974	%	8.4	N2		E		10.3	N2		E		12.3	N2		E		8.3	N2		E		4.8	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10522826					10522826					10522826					10522826					10522826				
		Field Sample ID	20WS-0003-SO5901-4.4-4.7-N-062320					20WS-0003-SO5902-8.6-9.0-N-062320					20WS-0003-SO5903-4.6-4.9-N-062320					20WS-0006-SO5892-5.7-6.0-N-061820					20WS-0006-SO5893-10.4-10.7-N-061920				
		Lab Sample ID	10522826018					10522826019					10522826020					10522826008					10522826009				
		Sample Date	6/23/2020					6/23/2020					6/23/2020					6/18/2020					6/19/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	13,300			E		8,880			E		7,360			E		9,930			E		10,600			E	
Antimony	SW-846 6010D	mg/kg	0.82	J		E		<0.4	U		E		<0.36	U		E		2			E		<0.38	U		E	
Arsenic	SW-846 6010D	mg/kg	7.2			E		10			E		6			E		11.7			E		8.2			E	
Barium	SW-846 6010D	mg/kg	149			E		78.1			E		68.3			E		183			E		106			E	
Beryllium	SW-846 6010D	mg/kg	0.17	J		E		0.093	J		E		0.024	J		E		0.068	J		E		0.062	J		E	
Cadmium	SW-846 6010D	mg/kg	0.25			E		0.33			E		<0.029	U		E		0.77			E		0.17			E	
Calcium	SW-846 6010D	mg/kg	2,910			E		2,260			E		2,250			E		3,480			E		2,220			E	
Chromium	SW-846 6010D	mg/kg	12.6			E		5.6			E		5.4			E		7.8			E		6.1			E	
Cobalt	SW-846 6010D	mg/kg	5.9			E		6.3			E		7.6			E		4.5			E		10.3			E	
Copper	SW-846 6010D	mg/kg	19.3			E		6.2			E		13.5			E		101			E		17.6			E	
Iron	SW-846 6010D	mg/kg	17,500			E		15,300			E		14,600			E		14,200			E		20,000			E	
Lead	SW-846 6010D	mg/kg	13.7			E		4.1			E		9			E		86.8			E		29.3			E	
Magnesium	SW-846 6010D	mg/kg	5,500			E		5,150			E		4,550			E		2,130			E		7,180			E	
Manganese	SW-846 6010D	mg/kg	599			E		1,500			E		2,630			E		7,940			E		2,600			E	
Mercury	SW-846 7471B	mg/kg	0.04			E		0.013	J		E		0.023			E		0.022			E		0.01	J		E	
Molybdenum	SW-846 6010D	mg/kg	0.49	J		E		0.49	J		E		0.24	J		E		0.76	J		E		1.4			E	
Nickel	SW-846 6010D	mg/kg	9.1			E		7.7			E		4.1			E		3.8			E		6.3			E	
Potassium	SW-846 6010D	mg/kg	3,170			E		2,350			E		2,570			E		1,780			E		4,800			E	
Selenium	SW-846 6010D	mg/kg	<0.35	U		E		<0.34	U		E		<0.31	U		E		<1.8	U,D3		E		<0.33	U		E	
Silver	SW-846 6010D	mg/kg	0.22	J		E		0.068	J		E		0.32	J		E		6.4			E		0.87			E	
Sodium	SW-846 6010D	mg/kg	174			E		55.2			E		52.4			E		39.5	J		E		67.5			E	
Thallium	SW-846 6010D	mg/kg	0.32	J		E		<0.25	U		E		<1.1	U,D3		E		<1.3	U,D3		E		<1.2	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	33.5			E		35.6			E		33.7			E		31			E		44.1			E	
Zinc	SW-846 6010D	mg/kg	67.1			E		80.4			E		49.5			E		217			E		125			E	
Percent Moisture	ASTM D2974	%	11.5	N2		E		10.2	N2		E		4.6	N2		E		9.4	N2		E		5.6	N2		E	

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Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

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FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10522826					10522826					10522826					10522826					10522826				
		Field Sample ID	20WS-0006-SO5894-11.1-11.4-N-061920					20WS-0006-SO5895-5.4-5.7-N-061920					20WS-0040-SO5885-5.6-6.2-N-061820					20WS-0040-SO5886-5.6-10.0-N-061820					20WS-0040-SO5887-6.0-6.5-N-061820				
		Lab Sample ID	10522826010					10522826011					10522826001					10522826002					10522826003				
		Sample Date	6/19/2020					6/19/2020					6/18/2020					6/18/2020					6/18/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	12,400			E		12,000			E		8,130			E		12,100			E		9,870			E	
Antimony	SW-846 6010D	mg/kg	6			E		0.42	J		E		0.44	J		E		0.73	J		E		<0.4	U		E	
Arsenic	SW-846 6010D	mg/kg	10			E		12.2			E		29.4			E		28.4			E		13			E	
Barium	SW-846 6010D	mg/kg	150			E		124			E		174			E		221			E		216			E	
Beryllium	SW-846 6010D	mg/kg	0.1	J		E		0.065	J		E		0.037	J		E		0.28			E		0.13	J		E	
Cadmium	SW-846 6010D	mg/kg	0.48			E		0.76			E		0.37			E		9			E		0.5			E	
Calcium	SW-846 6010D	mg/kg	3,080			E		2,590			E		1,710			E		4,200			E		1,920			E	
Chromium	SW-846 6010D	mg/kg	7.9			E		9.5			E		6.4			E		11.6			E		7.6			E	
Cobalt	SW-846 6010D	mg/kg	6.8			E		7.3			E		6.1			E		13.7			E		5.5			E	
Copper	SW-846 6010D	mg/kg	47.9			E		30			E		53.4			E		14			E		16.4			E	
Iron	SW-846 6010D	mg/kg	17,100			E		17,000			E		13,800			E		21,000			E		15,100			E	
Lead	SW-846 6010D	mg/kg	632			E		32.6			E		74.4			E		38.2			E		39.3			E	
Magnesium	SW-846 6010D	mg/kg	4,170			E		3,440			E		2,350			E		3,660			E		2,680			E	
Manganese	SW-846 6010D	mg/kg	3,900			E		7,000			E		5,740			E		32,200			E		2,970			E	
Mercury	SW-846 7471B	mg/kg	0.035			E		0.016	J		E		0.047			E		0.017	J		E		0.024			E	
Molybdenum	SW-846 6010D	mg/kg	1.1			E		0.89			E		0.82			E		2.6			E		1			E	
Nickel	SW-846 6010D	mg/kg	6.9			E		5.2			E		4.2			E		6.7			E		5.8			E	
Potassium	SW-846 6010D	mg/kg	2,860			E		2,570			E		2,120			E		2,870			E		2,360			E	
Selenium	SW-846 6010D	mg/kg	<0.35	U		E		<1.7	U,D3		E		<0.36	U		E		<3.5	U,D3		E		<0.35	U		E	
Silver	SW-846 6010D	mg/kg	16.6			E		3.3			E		4.2			E		5.9			E		2.2			E	
Sodium	SW-846 6010D	mg/kg	65.7			E		51	J		E		50.5	J		E		122			E		56.2			E	
Thallium	SW-846 6010D	mg/kg	<0.26	U		E		<1.2	U,D3		E		0.48	J		E		<2.6	U,D3		E		<0.26	U		E	
Vanadium	SW-846 6010D	mg/kg	31.4			E		34.9			E		27.9			E		53.8			E		27.2			E	
Zinc	SW-846 6010D	mg/kg	297			E		301			E		223			E		815			E		134			E	
Percent Moisture	ASTM D2974	%	9.5	N2		E		9.3	N2		E		8.8	N2		E		11.1	N2		E		10.2	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10522826					10522826					10522826					10522826					10523409				
		Field Sample ID	20WS-0040-SO5888-5.6-6.0-N-061820					20WS-0043-SO5889-5.8-6.2-N-061820					20WS-0043-SO5890-6.2-6.4-N-061820					20WS-0043-SO5891-10.3-10.9-N-061820					20WS-0003-SO5904-12.6-13.0-N-062320				
		Lab Sample ID	10522826004					10522826005					10522826006					10522826007					10523409001				
		Sample Date	6/18/2020					6/18/2020					6/18/2020					6/18/2020					6/23/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	14,100			E		10,700			E		10,100			E		13,300			E		10,800			E	
Antimony	SW-846 6010D	mg/kg	0.48	J		E		6			E		0.43	J		E		0.64	J		E		<0.4	U		E	
Arsenic	SW-846 6010D	mg/kg	18			E		39.8			E		4.8			E		9.8			E		5.7			E	
Barium	SW-846 6010D	mg/kg	201			E		123			E		156			E		127			E		123			E	
Beryllium	SW-846 6010D	mg/kg	0.2	J		E		0.2	J,D3		E		0.056	J		E		0.11	J		E		0.096	J		E	
Cadmium	SW-846 6010D	mg/kg	0.92			E		0.74	J,D3		E		0.22			E		0.19			E		0.19			E	
Calcium	SW-846 6010D	mg/kg	2,270			E		2,460			E		1,690			E		3,470			E		2,320			E	
Chromium	SW-846 6010D	mg/kg	10.4			E		6.2			E		7.8			E		8.4			E		8.7			E	
Cobalt	SW-846 6010D	mg/kg	7.1			E		8.4			E		5.5			E		7.8			E		6.1			E	
Copper	SW-846 6010D	mg/kg	28			E		124			E		34.8			E		19.7			E		13.8			E	
Iron	SW-846 6010D	mg/kg	20,500			E		24,900			E		16,700			E		23,900			E		16,000			E	
Lead	SW-846 6010D	mg/kg	35			E		153			E		16.2			E		11.5			E		9.4			E	
Magnesium	SW-846 6010D	mg/kg	3,550			E		3,160			E		3,670			E		5,220			E		4,010			E	
Manganese	SW-846 6010D	mg/kg	3,140			E		9,150			E		3,040			E		5,280			E		921			E	
Mercury	SW-846 7471B	mg/kg	0.019	J		E		0.16			E		0.019	J		E		0.035			E		0.009	J		E	
Molybdenum	SW-846 6010D	mg/kg	0.79	J		E		1.3	J,D3		E		0.64	J		E		0.6	J		E		0.43	J		E	
Nickel	SW-846 6010D	mg/kg	8.3			E		6.7			E		5.2			E		5.6			E		6.4			E	
Potassium	SW-846 6010D	mg/kg	2,960			E		2,480			E		2,860			E		2,540			E		2,590			E	
Selenium	SW-846 6010D	mg/kg	<0.35	U		E		<1.7	U,D3		E		<0.35	U		E		<0.35	U		E		<0.35	U		E	
Silver	SW-846 6010D	mg/kg	1.5			E		44.4			E		1.9			E		1.7			E		0.44	J		E	
Sodium	SW-846 6010D	mg/kg	74.5			E		54.1	J,D3		E		53.1	J		E		57.9			E		60			E	
Thallium	SW-846 6010D	mg/kg	<0.26	U		E		<1.3	U,D3		E		0.28	J		E		0.34	J		E		<0.26	U		E	
Vanadium	SW-846 6010D	mg/kg	36.8			E		40.3			E		34			E		49.3			E		33.4			E	
Zinc	SW-846 6010D	mg/kg	323			E		548			E		169			E		196			E		63.3			E	
Percent Moisture	ASTM D2974	%	12.4	N2		E		12.3	N2		E		12.1	N2		E		9.8	N2		E		7.7	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10523409					10523409					10523409					10523409					10523409				
		Field Sample ID	20WS-0010-SO5905-8.4-8.8-N-062320					20WS-0010-SO5906-13.0-13.5-N-062320					20WS-0010-SO5907-12.2-12.6-N-062320					20WS-0010-SO5908-12.4-12.8-N-062320					20WS-0010-SO5909-8.2-8.5-N-062420				
		Lab Sample ID	10523409002					10523409003					10523409004					10523409005					10523409006				
		Sample Date	6/23/2020					6/23/2020					6/23/2020					6/23/2020					6/24/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	13,100			E		6,300			E		15,700			E		7,610			E		13,200			E	
Antimony	SW-846 6010D	mg/kg	<0.41	U		E		<0.41	U		E		0.62	J		E		<0.37	U		E		<0.41	U		E	
Arsenic	SW-846 6010D	mg/kg	14.1			E		60.7			E		40.6			E		15.6			E		20.6			E	
Barium	SW-846 6010D	mg/kg	184			E		111			E		48.1			E		94.9			E		78.5			E	
Beryllium	SW-846 6010D	mg/kg	0.12	J		E		0.051	J		E		0.099	J		E		0.049	J		E		0.17	J		E	
Cadmium	SW-846 6010D	mg/kg	1.1			E		2.2			E		3			E		1.3			E		0.29			E	
Calcium	SW-846 6010D	mg/kg	5,410			E		1,710			E		6,900			E		2,440			E		4,720			E	
Chromium	SW-846 6010D	mg/kg	10.3			E		4.8			E		17.7			E		7.9			E		3.3			E	
Cobalt	SW-846 6010D	mg/kg	7.6			E		5.2			E		10.1			E		6.8			E		9.9			E	
Copper	SW-846 6010D	mg/kg	30			E		51.7			E		50.9			E		21.7			E		7.3			E	
Iron	SW-846 6010D	mg/kg	17,500			E		15,000			E		23,600			E		20,400			E		22,500			E	
Lead	SW-846 6010D	mg/kg	33.7			E		419			E		374			E		173			E		21.9			E	
Magnesium	SW-846 6010D	mg/kg	5,630			E		2,110			E		7,430			E		3,680			E		5,790			E	
Manganese	SW-846 6010D	mg/kg	9,810			E		11,600			E		10,500			E		4,340			E		4,640			E	
Mercury	SW-846 7471B	mg/kg	0.016	J		E		0.077			E		0.055			E		<0.0085	U		E		<0.0087	U		E	
Molybdenum	SW-846 6010D	mg/kg	0.68	J		E		0.87			E		3.9			E		0.96			E		0.91			E	
Nickel	SW-846 6010D	mg/kg	6.7			E		3			E		5.9			E		4.3			E		7.8			E	
Potassium	SW-846 6010D	mg/kg	2,940			E		1,270			E		1,220			E		1,740			E		2,470			E	
Selenium	SW-846 6010D	mg/kg	<1.8	U,D3		E		<1.8	U,D3		E		<1.7	U,D3		E		<0.32	U		E		<0.36	U		E	
Silver	SW-846 6010D	mg/kg	1.4	J,D3		E		5			E		3.2			E		0.95			E		<0.039	U		E	
Sodium	SW-846 6010D	mg/kg	86.3			E		128			E		77.5			E		53			E		60.3			E	
Thallium	SW-846 6010D	mg/kg	<1.3	U,D3		E		<1.3	U,D3		E		<1.2	U,D3		E		<0.24	U		E		0.52	J		E	
Vanadium	SW-846 6010D	mg/kg	34.3			E		22.4			E		52.4			E		49.3			E		29.6			E	
Zinc	SW-846 6010D	mg/kg	252			E		563			E		788			E		457			E		1,010			E	
Percent Moisture	ASTM D2974	%	10	N2		E		9.6	N2		E		8.1	N2		E		6.2	N2		E		10.8	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and my be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10523409					10523409					10523409					10523409					10523409				
		Field Sample ID	20WS-0010-SO5910-9.2-9.6-N-062420					20WS-0246-SO5921-12.2-12.6-N-062520					20WS-0246-SO5922-8.8-9.2-N-062520					20WS-0285-SO5916-4.4-4.5-N-062520					20WS-0285-SO5917-8.4-8.7-N-062520				
		Lab Sample ID	10523409007					10523409019					10523409020					10523409013					10523409014				
		Sample Date	6/24/2020					6/25/2020					6/25/2020					6/25/2020					6/25/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	12,800			E		17,200			E		7,740			E		4,280			E		8,130			E	
Antimony	SW-846 6010D	mg/kg	<0.39	U		E		<0.41	U		E		<2.2	U,D3		E		<2	U,D3		E		17.5			E	
Arsenic	SW-846 6010D	mg/kg	12.7			E		8.9			E		21.5			E		19.1			E		507			E	
Barium	SW-846 6010D	mg/kg	140			E		124			E		152			E		27.6			E		6,360			E	
Beryllium	SW-846 6010D	mg/kg	0.044	J		E		0.18	J		E		0.22	J,D3		E		0.16	J,D3		E		11.3			E	
Cadmium	SW-846 6010D	mg/kg	1.9			E		0.89			E		2.5			E		2.5			E		96.9			E	
Calcium	SW-846 6010D	mg/kg	4,620			E		1,170			E		1,160			E		833			E		2,170			E	
Chromium	SW-846 6010D	mg/kg	6.1			E		13			E		5.4			E		2.3	J,D3		E		<5.1	U,D3		E	
Cobalt	SW-846 6010D	mg/kg	8.3			E		7.2			E		7.6			E		0.72	J,D3		E		13.9			E	
Copper	SW-846 6010D	mg/kg	98.9			E		47.5			E		40.6			E		22.2			E		264			E	
Iron	SW-846 6010D	mg/kg	21,500			E		22,500			E		8,820			E		4,550			E		23,800			E	
Lead	SW-846 6010D	mg/kg	170			E		9.2			E		175			E		482			E		8,200			E	
Magnesium	SW-846 6010D	mg/kg	5,490			E		5,270			E		1,170			E		455			E		978			E	
Manganese	SW-846 6010D	mg/kg	3,220			E		5,780			E		7,060			E		3,680			E		203,000			E	
Mercury	SW-846 7471B	mg/kg	0.013	J		E		0.017	J		E		0.046			E		0.42			E		0.82			E	
Molybdenum	SW-846 6010D	mg/kg	0.54	J		E		0.55	J		E		3.5	J,D3		E		5.1			E		171			E	
Nickel	SW-846 6010D	mg/kg	4.8			E		7.5			E		2.9	J,D3		E		1.1	J,D3		E		5.7			E	
Potassium	SW-846 6010D	mg/kg	3,310			E		3,320			E		1,540			E		506	J,D3		E		9,350			E	
Selenium	SW-846 6010D	mg/kg	<0.34	U		E		<0.35	U		E		<1.9	U,D3		E		<1.7	U,D3		E		<16.7	U,D3		E	
Silver	SW-846 6010D	mg/kg	3.7			E		0.1	J		E		7.7			E		3.9			E		16.5	J,D3		E	
Sodium	SW-846 6010D	mg/kg	93.8			E		42	J		E		<57.4	U,D3		E		<53.2	U,D3		E		344			E	
Thallium	SW-846 6010D	mg/kg	0.27	J		E		0.5	J		E		<1.4	U,D3		E		<1.3	U,D3		E		54.6			E	
Vanadium	SW-846 6010D	mg/kg	33.9			E		40.5			E		14.7			E		5.6			E		94.5			E	
Zinc	SW-846 6010D	mg/kg	764			E		463			E		571			E		581			E		6,850			E	
Percent Moisture	ASTM D2974	%	11.3	N2		E		14.7	N2		E		13.7	N2		E		8.8	N2		E		9.2	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

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J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10523409					10523409					10523409					10523409					10523409				
		Field Sample ID	20WS-0285-SO5918-0.3-0.9-N-062520					20WS-0285-SO5919-1.2-1.5-N-062520					20WS-0285-SO5920-1.3-1.5-N-062520					20WS-0297-SO5911-12.7-13.0-N-062420					20WS-0297-SO5912-4.5-4.8-N-062420				
		Lab Sample ID	10523409015					10523409017					10523409018					10523409008					10523409009				
		Sample Date	6/25/2020					6/25/2020					6/25/2020					6/24/2020					6/24/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	4,950		J	S	FD	6,190			E		4,350			E		10,200			E		7,820			E	
Antimony	SW-846 6010D	mg/kg	<2	U,D3		E		3.6	J,D3		E		<1.9	U,D3		E		3.8	J,D3		E		0.72	J		E	
Arsenic	SW-846 6010D	mg/kg	38.5			E		113			E		12.4			E		119			E		47.3			E	
Barium	SW-846 6010D	mg/kg	95.6			E		77			E		39.9			E		365			E		151			E	
Beryllium	SW-846 6010D	mg/kg	0.58	J,D3		E		0.31	J,D3		E		0.16	J,D3		E		0.99	J,D3		E		0.05	J		E	
Cadmium	SW-846 6010D	mg/kg	2.8		J	S	FD	12.5			E		2.2			E		8.4			E		3.3			E	
Calcium	SW-846 6010D	mg/kg	887			E		842			E		127	J,D3		E		1,920			E		166			E	
Chromium	SW-846 6010D	mg/kg	2	J,D3		E		3.9			E		1.8	J,D3		E		8.8			E		7.4			E	
Cobalt	SW-846 6010D	mg/kg	4.4			E		1.9	J,D3		E		1.1	J,D3		E		7.1			E		1.7			E	
Copper	SW-846 6010D	mg/kg	45.9			E		117			E		62.1			E		71.5			E		31			E	
Iron	SW-846 6010D	mg/kg	6,280			E		14,900			E		4,200			E		13,800			E		15,300			E	
Lead	SW-846 6010D	mg/kg	537		J	S	FD	2,140			E		358			E		1,300			E		291			E	
Magnesium	SW-846 6010D	mg/kg	541			E		697			E		417			E		2,010			E		1,490			E	
Manganese	SW-846 6010D	mg/kg	6,120		J	S	FD	27,300			E		3,210			E		18,900			E		2,850			E	
Mercury	SW-846 7471B	mg/kg	2.1		J	S	FD	7			E		0.11			E		0.24			E		0.015	J		E	
Molybdenum	SW-846 6010D	mg/kg	15.7			E		65.8			E		2.5	J,D3		E		16.7			E		2			E	
Nickel	SW-846 6010D	mg/kg	1.8	J,D3		E		2.8	J,D3		E		<0.87	U,D3		E		5.6	J,D3		E		3.8			E	
Potassium	SW-846 6010D	mg/kg	740			E		1,150			E		512	J,D3		E		2,560			E		1,830			E	
Selenium	SW-846 6010D	mg/kg	<1.7	U,D3		E		1.8	J,D3		E		<1.7	U,D3		E		<1.9	U,D3		E		<0.36	U		E	
Silver	SW-846 6010D	mg/kg	14.2			E		39.2			E		5.4			E		20.8			E		5			E	
Sodium	SW-846 6010D	mg/kg	<52.5	U,D3		E		<52.5	U,D3		E		<51.1	U,D3		E		<56.6	U,D3		E		132			E	
Thallium	SW-846 6010D	mg/kg	<1.3	U,D3		E		1.7	J,D3		E		<1.2	U,D3		E		<1.4	U,D3		E		0.49	J		E	
Vanadium	SW-846 6010D	mg/kg	8.7			E		9.9			E		4.3			E		31.6			E		17.6			E	
Zinc	SW-846 6010D	mg/kg	1,310			E		2,520			E		905			E		1,180			E		923			E	
Percent Moisture	ASTM D2974	%	5.7	N2		E		10.1	N2		E		10.3	N2		E		13.4	N2		E		11.8	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10523409					10523409					10523409					10523968					10523968				
Field Sample ID			20WS-0297-SO5913-0.2-0.8-N-062420					20WS-0297-SO5914-0.4-0.8-N-062420					20WS-0288-SO5915-4.6-5.0-N-062420					20WS-0013-SO5936-12.3-12.6-N-070120					20WS-0015-SO5927-5.5-6.2-N-062620				
Lab Sample ID			10523409010					10523409011					10523409012					10523968015					10523968005				
Sample Date			6/24/2020					6/24/2020					6/24/2020					7/1/2020					6/26/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	11,000	P6	J	S	SD	6,710			E		4,630			E		9,810			E		12,600	P6	J	S	SD
Antimony	SW-846 6010D	mg/kg	0.44	J,M1	J-	S	S%	<0.4	U		E		<0.4	U		E		<0.39	U		E		<0.43	U,M1	UJ	S	S%
Arsenic	SW-846 6010D	mg/kg	27.6	M1	J	S	S%, SD	21.1			E		5.4			E		49.5			E		12.6			E	
Barium	SW-846 6010D	mg/kg	123	M1	J	S	S%, SD	58			E		6.5			E		145			E		164	M1	J	S	S%, SD
Beryllium	SW-846 6010D	mg/kg	0.15	J,M1	J-	S	S%	0.32			E		0.15	J		E		0.055	J		E		0.17	J		E	
Cadmium	SW-846 6010D	mg/kg	1.8	M1	J	S	S%, SD	7			E		1.8			E		8.2			E		1.3			E	
Calcium	SW-846 6010D	mg/kg	195			E		401			E		621			E		2,120			E		3,520	M1	J	S	S%
Chromium	SW-846 6010D	mg/kg	9.7	M1	J	S	S%, SD	5.6			E		1.8			E		6.3			E		7.5		J	S	SD
Cobalt	SW-846 6010D	mg/kg	4	M1	J	S	S%	2.9			E		0.59			E		10.4			E		6.1		J	S	SD
Copper	SW-846 6010D	mg/kg	63.2	M1	J	S	S%, SD	33.1			E		11.1			E		59.2			E		12.8			E	
Iron	SW-846 6010D	mg/kg	13,900			E		6,480			E		3,300			E		16,000			E		16,000	P6,R1		E	
Lead	SW-846 6010D	mg/kg	143	M1	J	S	S%, SD	689			E		22.6			E		88.4			E		225	M1,R1	J	S	S%, SD
Magnesium	SW-846 6010D	mg/kg	2,020		J	S	SD	1,180			E		457			E		4,220			E		4,450	M1	J	S	S%
Manganese	SW-846 6010D	mg/kg	2,750	P6,R1	J	S	D%	1,750			E		766			E		5,870			E		1,690	P6		E	
Mercury	SW-846 7471B	mg/kg	0.02			E		0.061			E		0.0099	J		E		0.045			E		<0.0087	U		E	
Molybdenum	SW-846 6010D	mg/kg	2.2	M1	J	S	S%	1.8			E		0.25	J		E		0.72	J		E		0.74	J		E	
Nickel	SW-846 6010D	mg/kg	4.8	M1	J	S	S%	3.4			E		1.2			E		4.7			E		5.9			E	
Potassium	SW-846 6010D	mg/kg	1,500		J	S	SD	1,080			E		653			E		3,130			E		3,940	M1	J	S	S%
Selenium	SW-846 6010D	mg/kg	<0.34	U,M1	UJ	S	S%	<0.35	U		E		<0.35	U		E		<0.34	U		E		<0.37	U		E	
Silver	SW-846 6010D	mg/kg	2.7	M1	J	S	S%, SD	7.4			E		0.56			E		0.7			E		1.7			E	
Sodium	SW-846 6010D	mg/kg	33.8	J,M1	J	S	S%	21.9	J		E		12.7	J		E		57.6			E		66.5			E	
Thallium	SW-846 6010D	mg/kg	0.35	J,M1	J-	S	S%	<0.26	U		E		<0.26	U		E		0.42	J		E		0.6	J		E	
Vanadium	SW-846 6010D	mg/kg	22.4		J	S	SD	12.6			E		4.5			E		29.2			E		29.4	M1	J	S	S%
Zinc	SW-846 6010D	mg/kg	330		J	S	SD	1,540			E		896			E		1,180			E		453	P6	J	S	SD
Percent Moisture	ASTM D2974	%	11.3	N2		E		8.2	N2		E		7.7	N2		E		9	N2		E		13.6	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10523968					10523968					10523968					10523968					10523968				
		Field Sample ID	20WS-0015-SO5928-12.5-12.7-N-062620					20WS-0015-SO5929-12.7-13.0-N-062620					20WS-0015-SO5930-8.7-9.0-N-062620					20WS-0015-SO5931-9.2-9.5-N-062620					20WS-0016-SO5932-4.8-5.2-N-070120				
		Lab Sample ID	10523968006					10523968007					10523968008					10523968009					10523968010				
		Sample Date	6/26/2020					6/26/2020					6/26/2020					6/26/2020					7/1/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	11,600			E		10,900			E		11,300			E		10,500			E		16,200			E	
Antimony	SW-846 6010D	mg/kg	<0.4	U		E		<0.38	U		E		<0.41	U		E		<0.38	U		E		<0.43	U		E	
Arsenic	SW-846 6010D	mg/kg	4.3			E		3.7			E		45.2			E		52.7			E		21.7			E	
Barium	SW-846 6010D	mg/kg	137			E		110			E		138			E		131			E		208			E	
Beryllium	SW-846 6010D	mg/kg	0.096	J		E		0.061	J		E		0.023	J		E		0.048	J		E		0.44			E	
Cadmium	SW-846 6010D	mg/kg	0.28			E		0.094	J		E		0.79			E		0.69			E		2.7			E	
Calcium	SW-846 6010D	mg/kg	3,780			E		3,340			E		3,070			E		2,440			E		4,590			E	
Chromium	SW-846 6010D	mg/kg	6.3			E		5.8			E		6			E		5.7			E		14.1			E	
Cobalt	SW-846 6010D	mg/kg	6.3			E		6.7			E		6.6			E		6.3			E		4.7			E	
Copper	SW-846 6010D	mg/kg	7.3			E		4			E		91.3			E		69.9			E		37.8			E	
Iron	SW-846 6010D	mg/kg	15,500			E		15,800			E		16,000			E		13,200			E		13,100			E	
Lead	SW-846 6010D	mg/kg	12.5			E		13			E		141			E		64.6			E		221			E	
Magnesium	SW-846 6010D	mg/kg	5,430			E		5,190			E		5,100			E		4,200			E		6,350			E	
Manganese	SW-846 6010D	mg/kg	669			E		585			E		882			E		1,650			E		3,640			E	
Mercury	SW-846 7471B	mg/kg	<0.0083	U		E		<0.0085	U		E		0.073			E		0.049			E		0.019	J		E	
Molybdenum	SW-846 6010D	mg/kg	0.31	J		E		0.35	J		E		0.53	J		E		0.75	J		E		0.61	J		E	
Nickel	SW-846 6010D	mg/kg	5.4			E		5			E		4.7			E		4.4			E		7.1			E	
Potassium	SW-846 6010D	mg/kg	3,480			E		3,130			E		3,600			E		3,060			E		3,400			E	
Selenium	SW-846 6010D	mg/kg	<0.35	U		E		<0.33	U		E		<0.35	U		E		<0.33	U		E		<0.37	U		E	
Silver	SW-846 6010D	mg/kg	<0.038	U		E		<0.037	U		E		2.9			E		0.57			E		55.1			E	
Sodium	SW-846 6010D	mg/kg	103			E		111			E		96.5			E		75.7			E		80.2			E	
Thallium	SW-846 6010D	mg/kg	0.43	J		E		0.39	J		E		0.31	J		E		0.46	J		E		<0.29	U		E	
Vanadium	SW-846 6010D	mg/kg	33.9			E		36.8			E		35.3			E		27.4			E		23.3			E	
Zinc	SW-846 6010D	mg/kg	88.6			E		47			E		195			E		289			E		1,870			E	
Percent Moisture	ASTM D2974	%	9.2	N2		E		5.8	N2		E		9	N2		E		7.8	N2		E		14	N2		E	

Notes:

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J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

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Screening/Enforcement Quality (S/E)

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S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

Work Order			10523968					10523968					10523968					10523968					10523968				
Field Sample ID			20WS-0016-SO5933-12.7-13.0-N-070120					20WS-0016-SO5934-12.7-13.2-N-070120					20WS-0016-SO5935-4.0-5.0-N-070120					20WS-0246-SO5923-4.8-5.1-N-062520					20WS-0246-SO5924-8.7-9.0-N-062520				
Lab Sample ID			10523968011					10523968012					10523968013					10523968001					10523968002				
Sample Date			7/1/2020					7/1/2020					7/1/2020					6/25/2020					6/25/2020				
Sample Type			Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	9,970			E		11,300			E		14,600			E		9,390			E		9,100			E	
Antimony	SW-846 6010D	mg/kg	0.46	J		E		<0.38	U		E		<0.42	U		E		<0.42	U		E		<0.44	U		E	
Arsenic	SW-846 6010D	mg/kg	97.7			E		11.7			E		33.7			E		28.3			E		55.8			E	
Barium	SW-846 6010D	mg/kg	239			E		198			E		161			E		77.4			E		103			E	
Beryllium	SW-846 6010D	mg/kg	0.025	J		E		0.12	J		E		0.33			E		0.14	J		E		0.42			E	
Cadmium	SW-846 6010D	mg/kg	6			E		2.4			E		2.6			E		1.3			E		0.98			E	
Calcium	SW-846 6010D	mg/kg	1,830			E		2,140			E		2,130			E		1,690			E		734			E	
Chromium	SW-846 6010D	mg/kg	8.5			E		7.6			E		10.8			E		6.9			E		4.6			E	
Cobalt	SW-846 6010D	mg/kg	7			E		6.1			E		8.1			E		11.6			E		5.9			E	
Copper	SW-846 6010D	mg/kg	45.3			E		30.4			E		28.5			E		47.2			E		59.1			E	
Iron	SW-846 6010D	mg/kg	29,900			E		15,900			E		20,500			E		20,100			E		8,170			E	
Lead	SW-846 6010D	mg/kg	1,520			E		135			E		429			E		50.4			E		203			E	
Magnesium	SW-846 6010D	mg/kg	2,360			E		3,840			E		3,820			E		3,350			E		1,140			E	
Manganese	SW-846 6010D	mg/kg	12,900			E		4,450			E		5,140			E		11,200			E		3,580			E	
Mercury	SW-846 7471B	mg/kg	0.02	J		E		0.018	J		E		0.0096	J		E		0.046			E		0.057			E	
Molybdenum	SW-846 6010D	mg/kg	1.6			E		0.41	J		E		0.82	J		E		1.3			E		4.1			E	
Nickel	SW-846 6010D	mg/kg	4.4			E		5.7			E		6.5			E		4.2			E		3.2			E	
Potassium	SW-846 6010D	mg/kg	2,420			E		2,180			E		2,730			E		2,750			E		1,450			E	
Selenium	SW-846 6010D	mg/kg	<0.36	U		E		<0.33	U		E		<0.36	U		E		<0.37	U		E		<0.38	U		E	
Silver	SW-846 6010D	mg/kg	4			E		0.96			E		1.4			E		3.7			E		10.9			E	
Sodium	SW-846 6010D	mg/kg	354			E		154			E		56.6			E		31.6	J		E		66			E	
Thallium	SW-846 6010D	mg/kg	<0.28	U		E		<0.26	U		E		0.33	J		E		<0.29	U		E		<0.3	U		E	
Vanadium	SW-846 6010D	mg/kg	37.3			E		35.1			E		38.2			E		37.1			E		13.2			E	
Zinc	SW-846 6010D	mg/kg	1,600			E		661			E		1,130			E		443			E		353			E	
Percent Moisture	ASTM D2974	%	11.3	N2		E		8.2	N2		E		11.1	N2		E		12	N2		E		16.3	N2		E	

Notes:

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Pace Laboratory Flags (Lab Flag)

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E = Enforcement quality.

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Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10523968					10523968					10523968					10523968					10523968				
		Field Sample ID	20WS-0285-SO5925-1.0-1.4-N-062520					20WS-0288-SO5939-4.0-4.4-N-070220					20WS-0288-SO5940-4.4-4.9-N-070220					20WS-0288-SO5941-4.0-4.5-N-070220					20WS-1150-SO5926-20.5-20.8-N-062520				
		Lab Sample ID	10523968003					10523968018					10523968019					10523968020					10523968004				
		Sample Date	6/25/2020					7/2/2020					7/2/2020					7/2/2020					6/25/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	9,090			E		895			E		12,200			E		2,360			E		8,430			E	
Antimony	SW-846 6010D	mg/kg	0.52	J		E		3.3			E		0.87	J		E		<0.37	U		E		<0.4	U		E	
Arsenic	SW-846 6010D	mg/kg	42.3			E		298			E		25.7			E		22.5			E		36.1			E	
Barium	SW-846 6010D	mg/kg	112			E		7.6			E		166			E		1.1			E		77.6			E	
Beryllium	SW-846 6010D	mg/kg	1			E		0.017	J		E		0.23	J		E		0.056	J		E		0.24	J		E	
Cadmium	SW-846 6010D	mg/kg	1.9			E		1.9			E		3.4			E		0.57			E		4.5			E	
Calcium	SW-846 6010D	mg/kg	394			E		40.6			E		546			E		457			E		1,810			E	
Chromium	SW-846 6010D	mg/kg	5.2			E		0.58			E		9.6			E		0.83			E		6.5			E	
Cobalt	SW-846 6010D	mg/kg	5.3			E		0.076	J		E		2.4			E		0.22	J		E		8			E	
Copper	SW-846 6010D	mg/kg	39.6			E		28.3			E		47.5			E		4.6			E		62.9			E	
Iron	SW-846 6010D	mg/kg	8,930			E		16,300			E		11,000			E		2,650			E		8,490			E	
Lead	SW-846 6010D	mg/kg	349			E		3,250			E		258			E		4.6			E		1,440			E	
Magnesium	SW-846 6010D	mg/kg	1,060			E		82.8			E		2,380			E		262			E		1,440			E	
Manganese	SW-846 6010D	mg/kg	5,200			E		551			E		6,720			E		633			E		11,100			E	
Mercury	SW-846 7471B	mg/kg	0.056			E		0.12			E		0.021	J		E		<0.0081	U		E		0.16			E	
Molybdenum	SW-846 6010D	mg/kg	5			E		3.1			E		1.4			E		1.3			E		0.89			E	
Nickel	SW-846 6010D	mg/kg	3			E		0.21	J		E		4.6			E		0.4	J		E		3.4			E	
Potassium	SW-846 6010D	mg/kg	1,630			E		915			E		1,920			E		566			E		1,400			E	
Selenium	SW-846 6010D	mg/kg	0.34	J		E		<0.33	U		E		<0.35	U		E		<0.32	U		E		<0.35	U		E	
Silver	SW-846 6010D	mg/kg	18.5			E		61.3			E		4.2			E		0.058	J		E		12.4			E	
Sodium	SW-846 6010D	mg/kg	46.4	J		E		32.6	J		E		47.1	J		E		<9.8	U		E		70			E	
Thallium	SW-846 6010D	mg/kg	<0.27	U		E		<0.26	U		E		<0.27	U		E		<0.25	U		E		<0.27	U		E	
Vanadium	SW-846 6010D	mg/kg	14.2			E		0.34	J		E		18.9			E		2.2			E		13			E	
Zinc	SW-846 6010D	mg/kg	462			E		928			E		1,160			E		384			E		1,590			E	
Percent Moisture	ASTM D2974	%	11.9	N2		E		7.9	N2		E		14.6	N2		E		4.5	N2		E		8.9	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10523968					10523968					10524722					10524722					10524722				
		Field Sample ID	20WS-1150-SO5937-12.3-12.7-N-070120					20WS-1150-SO5938-24.4-24.9-N-070120					20WS-0017-SO5956-8.1-8.6-N-070820					20WS-0019-SO5957-5.3-5.7-N-070820					20WS-0017-SO5958-12.4-12.8-N-070820				
		Lab Sample ID	10523968016					10523968017					10524722017					10524722018					10524722019				
		Sample Date	7/1/2020					7/1/2020					7/8/2020					7/8/2020					7/8/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	7,130			E		6,660			E		11,500			E		13,300			E		11,100			E	
Antimony	SW-846 6010D	mg/kg	<1.9	U,D3		E		<0.38	U		E		<2	U,D3		E		<2	U,D3		E		<0.4	U		E	
Arsenic	SW-846 6010D	mg/kg	7.8			E		48.1			E		23.6			E		25.2			E		17			E	
Barium	SW-846 6010D	mg/kg	23.5			E		473			E		109			E		118			E		120			E	
Beryllium	SW-846 6010D	mg/kg	0.23	J,D3		E		0.31			E		0.15	J,D3		E		0.25	J,D3		E		0.14	J		E	
Cadmium	SW-846 6010D	mg/kg	6.7			E		7.5			E		0.27	J,D3		E		2.6			E		0.21			E	
Calcium	SW-846 6010D	mg/kg	703			E		1,370			E		17,200			E		15,300			E		2,910			E	
Chromium	SW-846 6010D	mg/kg	3.2			E		12.9			E		6.2			E		5.3			E		8.2			E	
Cobalt	SW-846 6010D	mg/kg	1.7	J,D3		E		12.5			E		8.3			E		13.3			E		7.2			E	
Copper	SW-846 6010D	mg/kg	44.6			E		31.1			E		23.7			E		9.5			E		11.5			E	
Iron	SW-846 6010D	mg/kg	5,140			E		15,300			E		16,600			E		20,200			E		20,900			E	
Lead	SW-846 6010D	mg/kg	26			E		107			E		23.9			E		18			E		15.3			E	
Magnesium	SW-846 6010D	mg/kg	1,040			E		2,280			E		6,590			E		7,540			E		4,580			E	
Manganese	SW-846 6010D	mg/kg	2,810			E		16,700			E		2,510			E		15,700			E		2,020			E	
Mercury	SW-846 7471B	mg/kg	0.016	J		E		0.012	J		E		0.061			E		0.3			E		0.011	J		E	
Molybdenum	SW-846 6010D	mg/kg	<0.96	U,D3		E		9.3			E		<0.97	U,D3		E		<1	U,D3		E		0.67	J		E	
Nickel	SW-846 6010D	mg/kg	2.6	J,D3		E		7.4			E		5.4			E		9			E		6.3			E	
Potassium	SW-846 6010D	mg/kg	645			E		2,520			E		2,560			E		3,050			E		2,790			E	
Selenium	SW-846 6010D	mg/kg	<1.7	U,D3		E		<0.33	U		E		<1.7	U,D3		E		<1.7	U,D3		E		0.59	J		E	
Silver	SW-846 6010D	mg/kg	<0.18	U,D3		E		5.9			E		<0.19	U,D3		E		0.91	J,D3		E		0.19	J		E	
Sodium	SW-846 6010D	mg/kg	<50.9	U,D3		E		194			E		94.5	J,D3		E		<53.3	U,D3		E		75.3			E	
Thallium	SW-846 6010D	mg/kg	<1.3	U,D3		E		<0.26	U		E		<1.3	U,D3		E		1.9	J,D3		E		<0.27	U		E	
Vanadium	SW-846 6010D	mg/kg	7.3			E		45.4			E		35.9			E		35.8			E		42.2			E	
Zinc	SW-846 6010D	mg/kg	2,130			E		1,650			E		73.3			E		469			E		76.1			E	
Percent Moisture	ASTM D2974	%	9.8	N2		E		7.4	N2		E		6.3	N2		E		11.5	N2		E		7.6	N2		E	

Notes:

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J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

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D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and my be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10524722					10524722					10524722					10524722					10524722				
		Field Sample ID	20WS-0138-SO5948-12.8-13.3-N-070620					20WS-0138-SO5949-13.1-13.6-N-070620					20WS-0138-SO5950-9.5-9.8-N-070620					20WS-0162-SO5943-12.3-12.7-N-070620					20WS-0162-SO5946-16.0-16.4-N-070620				
		Lab Sample ID	10524722008					10524722009					10524722010					10524722005					10524722006				
		Sample Date	7/6/2020					7/6/2020					7/6/2020					7/6/2020					7/6/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	10,400			E		18,600			E		8,610			E		18,900			E		17,400			E	
Antimony	SW-846 6010D	mg/kg	1.2			E		0.6	J		E		1.3			E		<0.42	U		E		<0.4	U		E	
Arsenic	SW-846 6010D	mg/kg	28			E		12.2			E		44			E		31.8			E		11.3			E	
Barium	SW-846 6010D	mg/kg	93.6			E		230			E		170			E		66.3			E		51.2			E	
Beryllium	SW-846 6010D	mg/kg	0.2	J		E		0.085	J		E		<0.019	U		E		0.25	J		E		0.15	J		E	
Cadmium	SW-846 6010D	mg/kg	1.8			E		1.2			E		1.1			E		0.69			E		0.54			E	
Calcium	SW-846 6010D	mg/kg	6,610			E		4,140			E		4,960			E		4,560			E		5,040			E	
Chromium	SW-846 6010D	mg/kg	5.6			E		9.8			E		6.2			E		10.4			E		10			E	
Cobalt	SW-846 6010D	mg/kg	8.5			E		8.7			E		10			E		5.6			E		10.1			E	
Copper	SW-846 6010D	mg/kg	56.4			E		50.9			E		70.2			E		114			E		53.8			E	
Iron	SW-846 6010D	mg/kg	17,300			E		22,000			E		24,300			E		21,000			E		23,100			E	
Lead	SW-846 6010D	mg/kg	203			E		121			E		235			E		26.4			E		36			E	
Magnesium	SW-846 6010D	mg/kg	4,750			E		7,050			E		2,470			E		6,880			E		7,740			E	
Manganese	SW-846 6010D	mg/kg	6,530			E		2,750			E		14,900			E		421			E		691			E	
Mercury	SW-846 7471B	mg/kg	0.12			E		0.36			E		0.47			E		0.029			E		0.025			E	
Molybdenum	SW-846 6010D	mg/kg	3.5			E		2.4			E		2.5			E		0.37	J		E		0.37	J		E	
Nickel	SW-846 6010D	mg/kg	7.1			E		9.1			E		6.1			E		6.4			E		7			E	
Potassium	SW-846 6010D	mg/kg	2,480			E		5,020			E		2,400			E		2,990			E		2,620			E	
Selenium	SW-846 6010D	mg/kg	<0.4	U		E		0.48	J		E		<0.41	U		E		<0.36	U		E		<0.35	U		E	
Silver	SW-846 6010D	mg/kg	17.5			E		13.3			E		9.7			E		0.98			E		3.6			E	
Sodium	SW-846 6010D	mg/kg	46.5	J		E		73.7			E		31.7	J		E		277			E		52.7	J		E	
Thallium	SW-846 6010D	mg/kg	0.71	J		E		0.65	J		E		1.2	J		E		0.45	J		E		<1.4	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	23.9			E		39.9			E		22.1			E		49			E		61.2			E	
Zinc	SW-846 6010D	mg/kg	420			E		265			E		342			E		423			E		147			E	
Percent Moisture	ASTM D2974	%	19.1	N2		E		25.8	N2		E		21.2	N2		E		11.5	N2		E		7.3	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

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R1 = RPD value was outside control limits.

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J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

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Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10524722					10524722					10524722					10524722					10524722				
		Field Sample ID	20WS-0162-SO5947-20.0-20.4-N-070620					20WS-0179-SO5951-4.2-4.5-N-070820					20WS-0179-SO5952-0.2-0.7-N-070820					20WS-0179-SO5953-5.4-5.7-N-070820					20WS-0179-SO5954-4.3-4.9-N-070820				
		Lab Sample ID	10524722007					10524722011					10524722012					10524722013					10524722014				
		Sample Date	7/6/2020					7/8/2020					7/8/2020					7/8/2020					7/8/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	12,700			E		9,130			E		5,720	P6		E		9,780			E		12,400			E	
Antimony	SW-846 6010D	mg/kg	<0.38	U		E		<0.38	U		E		17.5	M1	J	S	S%	0.87	J		E		1.2			E	
Arsenic	SW-846 6010D	mg/kg	8.1			E		147			E		71.4			E		37			E		84.4			E	
Barium	SW-846 6010D	mg/kg	76.7			E		57.7			E		58.1			E		74.8			E		122			E	
Beryllium	SW-846 6010D	mg/kg	0.092	J		E		<0.015	U		E		<0.015	U		E		0.026	J		E		0.055	J		E	
Cadmium	SW-846 6010D	mg/kg	<0.03	U		E		0.4			E		0.41			E		0.13	J		E		0.12	J		E	
Calcium	SW-846 6010D	mg/kg	11,400			E		2,790			E		2,910	M1	J	S	S%	2,520			E		3,230			E	
Chromium	SW-846 6010D	mg/kg	8.6			E		8.8			E		4.6			E		10.6			E		9.8			E	
Cobalt	SW-846 6010D	mg/kg	12.2			E		7.9			E		3.4			E		9			E		6.1			E	
Copper	SW-846 6010D	mg/kg	24.2			E		54.9			E		88.6	M1	J	S	S%	65.1			E		128		J	S	FD
Iron	SW-846 6010D	mg/kg	24,500			E		27,700			E		35,200	P6		E		21,700			E		31,300			E	
Lead	SW-846 6010D	mg/kg	11.4			E		4.6			E		123	M1	J	S	S%	12.2			E		18.7			E	
Magnesium	SW-846 6010D	mg/kg	7,550			E		5,900			E		3,570	M1	J	S	S%	3,970			E		4,200			E	
Manganese	SW-846 6010D	mg/kg	697			E		309			E		152	M1	J	S	S%	607			E		340			E	
Mercury	SW-846 7471B	mg/kg	<0.0082	U		E		0.041			E		0.53	M1,R1	J	S	S%	0.066			E		0.031			E	
Molybdenum	SW-846 6010D	mg/kg	0.72	J		E		<0.19	U		E		4.2			E		0.8			E		0.56	J		E	
Nickel	SW-846 6010D	mg/kg	8.2			E		7.1			E		3.6			E		5.6			E		6.4			E	
Potassium	SW-846 6010D	mg/kg	4,310			E		5,290			E		4,460	P6		E		3,330			E		3,650			E	
Selenium	SW-846 6010D	mg/kg	<0.33	U		E		<0.33	U		E		0.64	J		E		<0.34	U		E		<0.37	U		E	
Silver	SW-846 6010D	mg/kg	0.35	J		E		0.09	J		E		38.3	M1	J	S	S%	2.7			E		1.2			E	
Sodium	SW-846 6010D	mg/kg	160			E		220			E		493			E		117			E		355			E	
Thallium	SW-846 6010D	mg/kg	<1.3	U,D3		E		<1.3	U,D3		E		<1.3	U,D3		E		<1.3	U,D3		E		<1.4	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	53.8			E		54.1			E		43			E		46.3			E		38.8			E	
Zinc	SW-846 6010D	mg/kg	45.1			E		100			E		139	M1	J	S	S%, SD	45.7			E		72.7			E	
Percent Moisture	ASTM D2974	%	5.3	N2		E		5.6	N2		E		11.2	N2		E		9.1	N2		E		14.6	N2		E	

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Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10524722					10524722					10524722					10524722					10524722				
		Field Sample ID	20WS-0179-SO5955-0.7-1.2-N-070820					20WS-0288-SO5942-0.9-1.3-N-070220					20WS-0289-SO5944-12.3-12.6-N-070220					20WS-0289-SO5945-12.8-13.3-N-070220					20WS-0315-SO5959-8.8-9-N-070920				
		Lab Sample ID	10524722016					10524722001					10524722003					10524722004					10524722020				
		Sample Date	7/8/2020					7/2/2020					7/2/2020					7/2/2020					7/9/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	10,500			E		2,920			E		8,090			E		1,060			E		2,390			E	
Antimony	SW-846 6010D	mg/kg	0.78	J		E		<1.9	U,D3		E		<2.2	U,D3		E		1.8			E		3.2			E	
Arsenic	SW-846 6010D	mg/kg	74.1			E		45.2			E		136			E		117			E		25.2			E	
Barium	SW-846 6010D	mg/kg	126			E		9.8			E		49.5			E		1.7			E		36.7			E	
Beryllium	SW-846 6010D	mg/kg	<0.016	U		E		0.3	J,D3		E		<0.085	U,D3		E		<0.015	U		E		1.1			E	
Cadmium	SW-846 6010D	mg/kg	0.14	J		E		1.3			E		0.43	J,D3		E		0.63			E		0.23			E	
Calcium	SW-846 6010D	mg/kg	3,050			E		376			E		1,790			E		831			E		530			E	
Chromium	SW-846 6010D	mg/kg	9.4			E		1.2	J,D3		E		4.4			E		0.71			E		2.6			E	
Cobalt	SW-846 6010D	mg/kg	9.5			E		1	J,D3		E		1.4	J,D3		E		1.4			E		1			E	
Copper	SW-846 6010D	mg/kg	105			E		21.3			E		16.4			E		43.2			E		31.4			E	
Iron	SW-846 6010D	mg/kg	28,300			E		3,240			E		8,340			E		8,170			E		3,290			E	
Lead	SW-846 6010D	mg/kg	10.8			E		15			E		29.1			E		60.8			E		69.4			E	
Magnesium	SW-846 6010D	mg/kg	5,370			E		229			E		1,680			E		103			E		350			E	
Manganese	SW-846 6010D	mg/kg	393			E		1,430			E		2,810			E		5,160			E		10,700			E	
Mercury	SW-846 7471B	mg/kg	0.039			E		<0.0084	U		E		0.019	J		E		0.024			E		0.1			E	
Molybdenum	SW-846 6010D	mg/kg	0.62	J		E		3	J,D3		E		<1.1	U,D3		E		2.4			E		5.9			E	
Nickel	SW-846 6010D	mg/kg	6.7			E		<0.85	U,D3		E		2.4	J,D3		E		0.35	J		E		0.77	J		E	
Potassium	SW-846 6010D	mg/kg	3,700			E		654			E		1,660			E		640			E		896			E	
Selenium	SW-846 6010D	mg/kg	<0.36	U		E		<1.6	U,D3		E		<1.9	U,D3		E		0.34	J		E		0.53	J		E	
Silver	SW-846 6010D	mg/kg	1.6			E		0.87	J,D3		E		3			E		5.4			E		5.2			E	
Sodium	SW-846 6010D	mg/kg	225			E		<49.8	U,D3		E		<57.3	U,D3		E		12.4	J		E		26.2	J		E	
Thallium	SW-846 6010D	mg/kg	<1.4	U,D3		E		<1.3	U,D3		E		<1.5	U,D3		E		0.57	J		E		0.54	J		E	
Vanadium	SW-846 6010D	mg/kg	41.9			E		4			E		17.2			E		0.13	J		E		8.3			E	
Zinc	SW-846 6010D	mg/kg	62			E		582			E		2,500			E		375			E		66.9			E	
Percent Moisture	ASTM D2974	%	10.6	N2		E		4.4	N2		E		15.3	N2		E		5.4	N2		E		8.1	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and my be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1a. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - Metals in Soil

		Work Order	10524722					10524722					10524722				
		Field Sample ID	20WS-0315-SO5960-4.3-4.7-N-070920					20WS-0315-SO5961-4.3-4.6-N-070920					20WS-0315-SO5962-5.3-5.6-N-070920				
		Lab Sample ID	10524722021					10524722022					10524722023				
		Sample Date	7/9/2020					7/9/2020					7/9/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	2,680	M1,R1	J	S	S%	4,940			E		5,900			E	
Antimony	SW-846 6010D	mg/kg	<2	U,D3,M1	UJ	S	S%	10			E		1.5			E	
Arsenic	SW-846 6010D	mg/kg	6.2			E		38			E		65.5			E	
Barium	SW-846 6010D	mg/kg	8.3			E		43.6			E		118			E	
Beryllium	SW-846 6010D	mg/kg	0.31	J,D3		E		0.94	J,D3		E		0.05	J		E	
Cadmium	SW-846 6010D	mg/kg	<0.16	U,D3		E		0.72	J,D3		E		0.13	J		E	
Calcium	SW-846 6010D	mg/kg	8,680	P6,R1		E		646			E		267			E	
Chromium	SW-846 6010D	mg/kg	0.81	J,D3		E		2.7			E		5			E	
Cobalt	SW-846 6010D	mg/kg	0.45	J,D3		E		4.1			E		1.5			E	
Copper	SW-846 6010D	mg/kg	11.3			E		164			E		52.9			E	
Iron	SW-846 6010D	mg/kg	3,320	M1	J	S	S%	5,800			E		13,900			E	
Lead	SW-846 6010D	mg/kg	5.2			E		54.9			E		45.7			E	
Magnesium	SW-846 6010D	mg/kg	576			E		541			E		961			E	
Manganese	SW-846 6010D	mg/kg	54.8	M1	J	S	S%	12,400			E		565			E	
Mercury	SW-846 7471B	mg/kg	0.12			E		0.26			E		0.045			E	
Molybdenum	SW-846 6010D	mg/kg	<0.98	U,D3		E		14.3			E		2.1			E	
Nickel	SW-846 6010D	mg/kg	2	J,D3		E		1.3	J,D3		E		2.6			E	
Potassium	SW-846 6010D	mg/kg	267	J,D3		E		1,270			E		1,560			E	
Selenium	SW-846 6010D	mg/kg	<1.7	U,D3		E		<1.7	U,D3		E		<0.35	U		E	
Silver	SW-846 6010D	mg/kg	0.42	J,D3		E		59.5			E		4.7			E	
Sodium	SW-846 6010D	mg/kg	<52.3	U,D3		E		<52.9	U,D3		E		262			E	
Thallium	SW-846 6010D	mg/kg	<1.3	U,D3		E		1.4	J,D3		E		1.1			E	
Vanadium	SW-846 6010D	mg/kg	4.8			E		15.8			E		13.5			E	
Zinc	SW-846 6010D	mg/kg	23.4			E		107			E		67.7			E	
Percent Moisture	ASTM D2974	%	5.3	N2		E		8.3	N2		E		7.2	N2		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D4 = Sample was diluted due to the presence of high levels of target analytes.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and my be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1b. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - SPLP

		Work Order	10518864					10518864					10518864					10520797					10520797					10521754					10521754				
		Field Sample ID	20WS-0246-SO5378-N-051820					20WS-0297-SO5249-N-051220					20WS-0298-SO5298-N-051320					20WS-0179-SO5670-N-060220					20WS-0312-SO5544-N-052820					20WS-0130-SO5728-N-060220					20WS-1113-SO5858-N-060920				
		Lab Sample ID	10518864020					10518864018					10518864019					10520797020					10520797019					10521754018					10521754019				
		Sample Date	5/18/2020					5/12/2020					5/13/2020					6/2/2020					5/28/2020					6/2/2020					6/9/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	6.6			E		7.7		J	S	SD	19.4			E		0.18	J		E		3.1			E		0.41			E		0.18	J		E	
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U		E		<0.007	U		E		0.064			E		0.012	J		E		<0.007	U		E		<0.007	U		E		<0.007	U		E	
Arsenic, SPLP	SW-846 6010D	mg/L	0.02	J		E		0.063			E		0.16			E		<0.0038	U		E		0.051			E		<0.0038	U		E		<0.0038	U		E	
Barium, SPLP	SW-846 6010D	mg/L	0.017	J		E		0.0085	J		E		0.054	J		E		0.0034	J,B		E		0.014	J		E		0.005	J		E		0.0026	J		E	
Beryllium, SPLP	SW-846 6010D	mg/L	0.00032	J		E		0.0004	J		E		0.00048	J		E		<0.00028	U		E		<0.00028	U		E		<0.00028	U		E		<0.00028	U		E	
Cadmium, SPLP	SW-846 6010D	mg/L	0.00059	J		E		0.0013	J		E		0.00081	J		E		0.00086	J		E		<0.00031	U		E		0.00035	J		E		<0.00031	U		E	
Calcium, SPLP	SW-846 6010D	mg/L	0.88			E		0.5			E		2.5			E		2.9			E		0.19	J,B		E		3.3			E		0.9	B		E	
Chromium, SPLP	SW-846 6010D	mg/L	0.0012	J		E		<0.00066	U		E		0.0074	J		E		<0.00066	U		E		0.00099	J		E		0.00098	J		E		<0.00066	U		E	
Cobalt, SPLP	SW-846 6010D	mg/L	0.00093	J		E		<0.00061	U		E		0.012			E		<0.00061	U		E		<0.00061	U		E		0.0009	J		E		<0.00061	U		E	
Copper, SPLP	SW-846 6010D	mg/L	0.02			E		0.03			E		0.12			E		0.014			E		0.048			E		0.0072	J		E		0.0025	J		E	
Iron, SPLP	SW-846 6010D	mg/L	3.6			E		4.3			E		29.8			E		0.19			E		1.8			E		0.32			E		0.2			E	
Lead, SPLP	SW-846 6010D	mg/L	0.19			E		0.7			E		0.15			E		0.11			E		0.054			E		0.0064	J		E		0.011		J	S	FD
Magnesium, SPLP	SW-846 6010D	mg/L	0.87			E		0.64			E		3.6			E		0.23	J		E		0.27	J		E		0.62			E		0.24	J,B	U	E	MB
Manganese, SPLP	SW-846 6010D	mg/L	3.4			E		0.78			E		4			E		0.11			E		0.091			E		0.98			E		0.11		J	S	FD
Mercury, SPLP	SW-846 7470A	µg/L	<0.075	U		E		<0.075	U		E		<0.075	U		E		<0.075	U		E		<0.075	U		E		<0.075	U		E		<0.075	U		E	
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0017	J		E		0.0056	J		E		0.039			E		0.0031	J		E		0.01	J		E		<0.0015	U		E		<0.0015	U		E	
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U		E		<0.0014	U		E		0.0085	J		E		<0.0014	U		E		<0.0014	U		E		0.0018	J		E		0.0016	J		E	
Potassium, SPLP	SW-846 6010D	mg/L	3.4			E		3.8			E		5.9			E		1.6	J		E		1.5	J		E		2.6			E		1.3	J		E	
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E		<0.0058	U		E	
Silver, SPLP	SW-846 6010D	mg/L	0.007	J		E		0.013			E		0.012			E		0.019			E		0.0016	J		E		<0.00058	U		E		<0.00058	U		E	
Sodium, SPLP	SW-846 6010D	mg/L	2.5			E		0.64	J,B		E		1.1	B		E		1.6			E		1.9			E		1.2	1M		E		0.37	J,1M		E	
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E		<0.0055	U		E	
Vanadium, SPLP	SW-846 6010D	mg/L	0.007	J		E		0.0027	J		E		0.047			E		<0.00043	U		E		0.0046	J		E		0.00084	J		E		<0.00043	U		E	
Zinc, SPLP	SW-846 6010D	mg/L	0.28			E		0.72			E		0.11			E		0.061			E		0.015	J		E		0.052			E		0.055			E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

B = Analyte was detected in the associated method blank.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

MB = Qualified due to preparation blank results.

SD = Qualified due to percent difference of serial dilution outside control limit.

FD = Qualified due to field duplicate results outside of control limits.

Table 1c. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - ABA

		Work Order	10519814					10519814					10519814					10521670				
		Field Sample ID	20WS-0246-SO5378-N-051820					20WS-0297-SO5249-N-051220					20WS-0298-SO5298-N-051320					20WS-0130-SO5728-N-060220				
		Lab Sample ID	10519814003					10519814001					10519814002					10521670010				
		Sample Date	5/18/2020					5/12/2020					5/13/2020					6/2/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Acid Potential	Modified Sobek 3.2	tons/1000	6.1	AL		E		<4.3	U,AL		E		<4.3	U,AL		E		12.8	AL		E	
Acid/Base Potential	Modified Sobek 3.2	tons/1000	-4.65213	AL	J	S	D%	3.6	AL		E		5.1	AL		E		-0.51742	AL		E	
Neutralization Potential	Modified Sobek 3.2	tons/1000	1.44	AL,D8	J	S	D%	3.6	AL		E		5.12	AL		E		12.3	AL		E	
Sulfur, HCl Extractable	Modified Sobek 3.2	%w/w	<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		0.062	N2,AL		E	
Sulfur, HNO3 Extractable	Modified Sobek 3.2	%w/w	0.165	N2,AL		E		<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		0.364	N2,AL		E	
Sulfur, Hot Water Extractable	Modified Sobek 3.2	%w/w	0.104	N2,AL		E		<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		0.175	N2,AL		E	
Sulfur, Residual	Modified Sobek 3.2	%w/w	<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		<0.05	U,N2,AL		E	
Total Sulfur	Modified Sobek 3.2	%w/w	0.309	N2,AL		E		0.0535	N2,AL		E		<0.05	U,N2,AL		E		0.601	N2,AL		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

AL = The lab does not hold A2LA accreditation for this parameter.

D8 = The sample and duplicate results for this parameter are less than 5 times the reporting limit, the RPD may not be statistically valid.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

Table 1c. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - ABA

		Work Order	10521670					10521670					10521670				
		Field Sample ID	20WS-0179-SO5670-N-060220					20WS-0312-SO5544-N-052820					20WS-1113-SO5858-N-060920				
		Lab Sample ID	10521670009					10521670008					10521670011				
		Sample Date	6/2/2020					5/28/2020					6/9/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Acid Potential	Modified Sobek 3.2	tons/1000	5	AL		E		<4.3	U,AL		E		7.3	AL		E	
Acid/Base Potential	Modified Sobek 3.2	tons/1000	-3.18302	AL		E		4	AL		E		-6.54101	AL	J	S	D%, FD
Neutralization Potential	Modified Sobek 3.2	tons/1000	1.78	AL		E		4.02	AL		E		0.75	AL	J	S	D%, FD
Sulfur, HCl Extractable	Modified Sobek 3.2	%w/w	0.0506	N2,AL		E		<0.05	U,N2,AL		E		0.0918	N2,AL		E	
Sulfur, HNO3 Extractable	Modified Sobek 3.2	%w/w	0.121	N2,AL		E		<0.05	U,N2,AL		E		0.164	N2,AL		E	
Sulfur, Hot Water Extractable	Modified Sobek 3.2	%w/w	0.161	N2,AL		E		<0.05	U,N2,AL		E		0.332	N2,AL		E	
Sulfur, Residual	Modified Sobek 3.2	%w/w	<0.05	U,N2,AL		E		<0.05	U,N2,AL		E		<0.05	U,N2,AL		E	
Total Sulfur	Modified Sobek 3.2	%w/w	0.332	N2,AL		E		<0.05	U,N2,AL		E		0.588	N2,AL		E	

Notes:

"<" = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

AL = The lab does not hold A2LA accreditation for this parameter.

D8 = The sample and duplicate results for this parameter are less than 5 times the reporting limit, the RPD may not be statistically valid.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

U = Indicates the compound was analyzed for, but not detected.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

Table 1d. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - IVBA

		Work Order	10521603					10521603					10521603					10521603				
		Field Sample ID	20WS-0003-SO5877-N-061020					20WS-0003-SO5878-N-061020					20WS-0006-SO5879-N-061020					20WS-0015-SO5884-N-061020				
		Lab Sample ID	10521603001 (S2006476-004)					10521603002 (S2006476-005)					10521603003 (S2006476-006)					10521603008 (S2006476-012)				
		Sample Date	6/10/2020					6/10/2020					6/10/2020					6/10/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Arsenic, IVBA	Calculation	%	37.1		J	S	LX, SX	2.96		J	S	LX, SX	4.6		J	S	LX, SX	0.66		J	S	LX, SX
Lead, IVBA	Calculation	%	28			E		6.7			E		6.98			E		11.2		J	S	CL
Arsenic	SW-846 6010C	mg/kg	64.1			E		141			E		130			E		200			E	
Arsenic, Dissolved	SW-846 6010C	mg/L	0.238			E		0.0418	J		E		0.0598	J		E		0.0132	J		E	
Lead	SW-846 6010C	mg/kg	139			E		488			E		474			E		5,500		J	S	CL
Lead, Dissolved	SW-846 6010C	mg/L	0.39			E		0.327			E		0.331			E		6.17			E	

Pace Laboratory Flags (Lab Flag)

J = Analyte detected below quantitation limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CL = Qualified because working range of instrument is exceeded.

LX = Qualified because laboratory control sample and standard reference material samples were not analyzed at required frequency.

SX = Qualified because matrix spike sample was not analyzed at the required frequency.

Table 1d. Analytical Results with Laboratory Qualifiers, Data Validation Qualifiers, Enforcement, Screening, and Rejected Classifications, and Data Validation Reason Codes - IVBA

		Work Order	10521603					10521603					10521603					10521603				
		Field Sample ID	20WS-0040-SO5880-N-061020					20WS-0288-SO5882-N-061020					20WS-0288-SO5883-N-061020					20WS-0288-SO5881-N-061020				
		Lab Sample ID	10521603004 (S2006476-007)					10521603006 (S2006476-009)					10521603007 (S2006476-010)					10521603005 (S2006476-008)				
		Sample Date	6/10/2020					6/10/2020					6/10/2020					6/10/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Arsenic, IVBA	Calculation	%	4.59		J	S	LX, SX	3.11		J	S	LX, SX	35.3		J	S	LX, SX	1.72		J	S	LX, SX
Lead, IVBA	Calculation	%	5.74			E		8.34			E		48.6			E		19		J	S	CL
Arsenic	SW-846 6010C	mg/kg	151			E		249			E		132			E		362			E	
Arsenic, Dissolved	SW-846 6010C	mg/L	0.0693	J		E		0.0775	J		E		0.466			E		0.0622	J		E	
Lead	SW-846 6010C	mg/kg	170			E		175			E		198			E		1,740		J	S	CL
Lead, Dissolved	SW-846 6010C	mg/L	0.0977			E		0.146			E		0.962			E		3.3			E	

Pace Laboratory Flags (Lab Flag)

J = Analyte detected below quantitation limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

CL = Qualified because working range of instrument is exceeded.

LX = Qualified because laboratory control sample and standard reference material samples were not analyzed at required frequency.

SX = Qualified because matrix spike sample was not analyzed at the required frequency.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10518864					10518864								
		Field Sample ID	20WS-0285-SO5327-D-051420					20WS-0285-SO5327-N-051420								
		Lab Sample ID	10518864013					10518864012								
		Sample Date	5/14/2020					5/14/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	1890				10	1960				10	20	RPD<35%		4%
Antimony	SW-846 6010D	mg/kg	10.4				10	10.2				10	6	±2xRL	0.2	
Arsenic	SW-846 6010D	mg/kg	127				10	160				10	1	RPD<35%		23%
Barium	SW-846 6010D	mg/kg	5.3				10	7.5				10	20	±2xRL	2.2	
Beryllium	SW-846 6010D	mg/kg	0.85	J,D3			10	0.89	J,D3			10	0.5	±2xRL	0.04	
Cadmium	SW-846 6010D	mg/kg	7.8				10	9.7				10	0.5	±2xRL	1.9	
Calcium	SW-846 6010D	mg/kg	136	J,D3			10	136	J,D3			10	500	±2xRL	0	
Chromium	SW-846 6010D	mg/kg	1	U,D3			10	0.99	U,D3			10	1	ND		
Cobalt	SW-846 6010D	mg/kg	0.36	J,D3			10	0.44	J,D3			10	5	±2xRL	0.08	
Copper	SW-846 6010D	mg/kg	132				10	163				10	2.5	RPD<35%		21%
Iron	SW-846 6010D	mg/kg	20000				10	24400				10	10	RPD<35%		20%
Lead	SW-846 6010D	mg/kg	2510				10	3020				10	1	RPD<35%		18%
Magnesium	SW-846 6010D	mg/kg	120	J,D3			10	126	J,D3			10	500	±2xRL	6	
Manganese	SW-846 6010D	mg/kg	15100				50	13900				25	1.5	RPD<35%		8%
Mercury	SW-846 7471B	mg/kg	1.1				2	1.3				2	0.1	RPD<35%		17%
Molybdenum	SW-846 6010D	mg/kg	50.2				10	130				10	5	±2xRL	79.8	
Nickel	SW-846 6010D	mg/kg	1.7	U,D3			10	1.7	U,D3			10	4	ND		
Potassium	SW-846 6010D	mg/kg	991	J,D3			10	1020	J,D3			10	500	±2xRL	29	
Selenium	SW-846 6010D	mg/kg	3.3	U,D3			10	5.1	J,D3			10	3.5	±2xRL	1.8	
Silver	SW-846 6010D	mg/kg	18.7		J	FD	10	77.7		J	FD	10	1	±2xRL	**59**	
Sodium	SW-846 6010D	mg/kg	100	U,D3			10	99.1	U,D3			10	500	ND		
Thallium	SW-846 6010D	mg/kg	2.4	U,D3			10	2.4	U,D3			10	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	13				10	14.6				10	5	±2xRL	1.6	
Zinc	SW-846 6010D	mg/kg	1090				10	1180				10	6	RPD<35%		8%
Percent Moisture	ASTM D2974	%	2.9	N2			1	3	N2			1	0.1	RPD<35%		3%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10520797					10520797								
		Field Sample ID	20WS-0319-SO5520-D-052720					20WS-0319-SO5520-N-052720								
		Lab Sample ID	10520797010					10520797009								
		Sample Date	5/27/2020					5/27/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	2500				5	2660				5	20	RPD<35%		6%
Antimony	SW-846 6010D	mg/kg	14.3				5	9.1				5	6	±2xRL	5.2	
Arsenic	SW-846 6010D	mg/kg	86.1				5	83.7				5	1	RPD<35%		3%
Barium	SW-846 6010D	mg/kg	80.5				5	63.3				5	20	±2xRL	17.2	
Beryllium	SW-846 6010D	mg/kg	0.62	J,D3			5	0.51	J,D3			5	0.5	±2xRL	0.11	
Cadmium	SW-846 6010D	mg/kg	0.84				5	0.79				5	0.5	±2xRL	0.05	
Calcium	SW-846 6010D	mg/kg	520				5	484				5	500	±2xRL	36	
Chromium	SW-846 6010D	mg/kg	0.91	J,D3			5	1.1	J,D3			5	1	±2xRL	0.19	
Cobalt	SW-846 6010D	mg/kg	0.87	J,D3			5	0.85	J,D3			5	5	±2xRL	0.02	
Copper	SW-846 6010D	mg/kg	121				5	126				5	2.5	RPD<35%		4%
Iron	SW-846 6010D	mg/kg	5700				5	5580				5	10	RPD<35%		2%
Lead	SW-846 6010D	mg/kg	175		J	FD	5	333		J	FD	5	1	RPD<35%		**62%**
Magnesium	SW-846 6010D	mg/kg	254				5	272				5	500	±2xRL	18	
Manganese	SW-846 6010D	mg/kg	14900				25	15500				25	1.5	RPD<35%		4%
Mercury	SW-846 7471B	mg/kg	0.46				1	0.44				1	0.1	±2xRL	0.02	
Molybdenum	SW-846 6010D	mg/kg	20.5				5	26.2				5	5	±2xRL	5.7	
Nickel	SW-846 6010D	mg/kg	0.8	U,D3			5	0.85	U,D3			5	4	ND		
Potassium	SW-846 6010D	mg/kg	1370				5	1370				5	500	±2xRL	0	
Selenium	SW-846 6010D	mg/kg	1.6	U,D3			5	1.6	U,D3			5	3.5	ND		
Silver	SW-846 6010D	mg/kg	46.3		J	FD	5	79.7		J	FD	1	1	RPD<35%		**53%**
Sodium	SW-846 6010D	mg/kg	47.3	U,D3			5	49.8	U,D3			5	500	ND		
Thallium	SW-846 6010D	mg/kg	1.8	J,D3			5	1.2	U,D3			5	2.5	±2xRL	0.6	
Vanadium	SW-846 6010D	mg/kg	13.4				5	13.2				5	5	±2xRL	0.2	
Zinc	SW-846 6010D	mg/kg	197				5	212				5	6	RPD<35%		7%
Percent Moisture	ASTM D2974	%	1.2	N2			1	1.5	N2			1	0.1	RPD<35%		22%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10521670					10521670								
		Field Sample ID	20WS-0138-SO5763-D-060420					20WS-0138-SO5763-N-060420								
		Lab Sample ID	10521670006					10521670005								
		Sample Date	6/4/2020					6/4/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	14200				1	14200				1	20	RPD<35%		0%
Antimony	SW-846 6010D	mg/kg	0.75	J			1	0.37	U			1	6	±2xRL	0.38	
Arsenic	SW-846 6010D	mg/kg	49.5				1	48.6				1	1	RPD<35%		2%
Barium	SW-846 6010D	mg/kg	159				1	141				1	20	RPD<35%		12%
Beryllium	SW-846 6010D	mg/kg	0.11	J			1	0.13	J			1	0.5	±2xRL	0.02	
Cadmium	SW-846 6010D	mg/kg	1.1				1	0.91				1	0.5	±2xRL	0.19	
Calcium	SW-846 6010D	mg/kg	2920				5	2790				5	500	±2xRL	130	
Chromium	SW-846 6010D	mg/kg	8.4				1	8.4				1	1	RPD<35%		0%
Cobalt	SW-846 6010D	mg/kg	12.3				5	11.3				5	5	±2xRL	1	
Copper	SW-846 6010D	mg/kg	248				1	215				1	2.5	RPD<35%		14%
Iron	SW-846 6010D	mg/kg	23500				5	22400				5	10	RPD<35%		5%
Lead	SW-846 6010D	mg/kg	52.1				5	46.5				5	1	RPD<35%		11%
Magnesium	SW-846 6010D	mg/kg	5060				1	4770				1	500	RPD<35%		6%
Manganese	SW-846 6010D	mg/kg	1420				5	1150				5	1.5	RPD<35%		21%
Mercury	SW-846 7471B	mg/kg	0.13				1	0.11				1	0.1	±2xRL	0.02	
Molybdenum	SW-846 6010D	mg/kg	2.7				1	2.5				1	5	±2xRL	0.2	
Nickel	SW-846 6010D	mg/kg	8				1	7.2				1	4	±2xRL	0.8	
Potassium	SW-846 6010D	mg/kg	4520				1	4520				1	500	RPD<35%		0%
Selenium	SW-846 6010D	mg/kg	0.32	U			1	0.33	U			1	3.5	ND		
Silver	SW-846 6010D	mg/kg	1.1				1	0.95				1	1	±2xRL	0.15	
Sodium	SW-846 6010D	mg/kg	55.4				1	55.1				1	500	±2xRL	0.3	
Thallium	SW-846 6010D	mg/kg	1.2	U,D3			5	1.2	U,D3			5	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	51.1				5	48.9				5	5	±2xRL	2.2	
Zinc	SW-846 6010D	mg/kg	148				1	142				1	6	RPD<35%		4%
Percent Moisture	ASTM D2974	%	2	N2			1	2.1	N2			1	0.1	RPD<35%		5%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10521670					10521670								
		Field Sample ID*	20WS-1113-SO5858-D-060920					20WS-1113-SO5858-N-060920								
		Lab Sample ID	10521670012					10521670011								
		Sample Date	6/9/2020					6/9/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Acid Potential	Modified Sobek 3.	tons/1000	5.7	AL			1	7.3	AL			1	0.1	RPD<35%		25%
Acid/Base Potential	Modified Sobek 3.	tons/1000	-5.24188	AL	J	D%, FD	1	-6.54101	AL	J	D%, FD	1	0.1	±2xRL	**1.29913**	
Neutralization Potential	Modified Sobek 3.	tons/1000	0.5	AL,D6	J	D%, FD	1	0.75	AL	J	D%, FD	1	0.1	RPD<35%		**40%**
Sulfur, HCl Extractable	Modified Sobek 3.	%w/w	0.0657	N2,AL			1	0.0918	N2,AL			1	0.1	±2xRL	0.0261	
Sulfur, HNO3 Extractable	Modified Sobek 3.	%w/w	0.134	N2,AL			1	0.164	N2,AL			1	0.1	±2xRL	0.03	
Sulfur, Hot Water Extractable	Modified Sobek 3.	%w/w	0.326	N2,AL			1	0.332	N2,AL			1	0.1	±2xRL	0.006	
Sulfur, Residual	Modified Sobek 3.	%w/w	0.05	U,N2,AL			1	0.05	U,N2,AL			1	0.1	ND		
Total Sulfur	Modified Sobek 3.	%w/w	0.526	N2,AL			1	0.588	N2,AL			1	0.1	RPD<35%		11%

*This field duplicate pair was analyzed for metals and SPLP on WO 10521754.

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10521754					10521754								
		Field Sample ID	20WS-0121-SO5801-D-060420					20WS-0121-SO5801-N-060420								
		Lab Sample ID	10521754010					10521754009								
		Sample Date	6/4/2020					6/4/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	12500				1	12700				1	20	RPD<35%		2%
Antimony	SW-846 6010D	mg/kg	1.5				1	2.5				1	6	±2xRL	1	
Arsenic	SW-846 6010D	mg/kg	32.4				1	26				1	1	RPD<35%		22%
Barium	SW-846 6010D	mg/kg	72.2				1	71.8				1	20	±2xRL	0.4	
Beryllium	SW-846 6010D	mg/kg	0.27				1	0.27				1	0.5	±2xRL	0	
Cadmium	SW-846 6010D	mg/kg	4.6		J	FD	1	0.47		J	FD	1	0.5	±2xRL	**4.13**	
Calcium	SW-846 6010D	mg/kg	21000				1	18000				1	500	RPD<35%		15%
Chromium	SW-846 6010D	mg/kg	4.6				1	4.8				1	1	±2xRL	0.2	
Cobalt	SW-846 6010D	mg/kg	9.4				1	8.3				1	5	±2xRL	1.1	
Copper	SW-846 6010D	mg/kg	53.7				1	41.8				1	2.5	RPD<35%		25%
Iron	SW-846 6010D	mg/kg	21800				5	22700				5	10	RPD<35%		4%
Lead	SW-846 6010D	mg/kg	1080		J	FD	1	66.4		J	FD	1	1	RPD<35%		**177%**
Magnesium	SW-846 6010D	mg/kg	5730				1	6160				1	500	RPD<35%		7%
Manganese	SW-846 6010D	mg/kg	5180				10	3830				5	1.5	RPD<35%		30%
Mercury	SW-846 7471B	mg/kg	0.13				1	0.084				1	0.1	±2xRL	0.046	
Molybdenum	SW-846 6010D	mg/kg	7.5				1	1.8				1	5	±2xRL	5.7	
Nickel	SW-846 6010D	mg/kg	6.1				1	6.4				1	4	±2xRL	0.3	
Potassium	SW-846 6010D	mg/kg	3020				1	3180				1	500	RPD<35%		5%
Selenium	SW-846 6010D	mg/kg	0.34	U			1	0.31	U			1	3.5	ND		
Silver	SW-846 6010D	mg/kg	9.3				1	10.6				1	1	RPD<35%		13%
Sodium	SW-846 6010D	mg/kg	33.3	J			1	34.2	J			1	500	±2xRL	0.9	
Thallium	SW-846 6010D	mg/kg	0.89	J			1	0.87	J			1	2.5	±2xRL	0.02	
Vanadium	SW-846 6010D	mg/kg	32				1	33.7				1	5	RPD<35%		5%
Zinc	SW-846 6010D	mg/kg	1300		J	FD	1	93.3		J	FD	1	6	RPD<35%		**173%**
Percent Moisture	ASTM D2974	%	4.9	N2			1	4.1	N2			1	0.1	RPD<35%		18%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10521754					10521754								
		Field Sample ID	20WS-1113-SO5858-D-060920					20WS-1113-SO5858-N-060920								
		Lab Sample ID	10521754020					10521754019								
		Sample Date	6/9/2020					6/9/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	1520				1	1580				1	20	RPD<35%		4%
Antimony	SW-846 6010D	mg/kg	1	J			1	0.76	J			1	6	±2xRL	0.24	
Arsenic	SW-846 6010D	mg/kg	143		J	FD	1	208		J	FD	1	1	RPD<35%		**37%**
Barium	SW-846 6010D	mg/kg	13.2				1	7.1				1	20	±2xRL	6.1	
Beryllium	SW-846 6010D	mg/kg	0.014	U			1	0.015	U			1	0.5	ND		
Cadmium	SW-846 6010D	mg/kg	0.63				1	0.33				1	0.5	±2xRL	0.3	
Calcium	SW-846 6010D	mg/kg	364				1	254				1	500	±2xRL	110	
Chromium	SW-846 6010D	mg/kg	0.78				1	0.89				1	1	±2xRL	0.11	
Cobalt	SW-846 6010D	mg/kg	0.27	J			1	0.46	J			1	5	±2xRL	0.19	
Copper	SW-846 6010D	mg/kg	20.8				1	17				1	2.5	RPD<35%		20%
Iron	SW-846 6010D	mg/kg	25200				5	20800				5	10	RPD<35%		19%
Lead	SW-846 6010D	mg/kg	907				1	925				1	1	RPD<35%		2%
Magnesium	SW-846 6010D	mg/kg	146				1	186				1	500	±2xRL	40	
Manganese	SW-846 6010D	mg/kg	106		J	FD	1	200		J	FD	1	1.5	RPD<35%		**61%**
Mercury	SW-846 7471B	mg/kg	0.049				1	0.012	J			1	0.1	±2xRL	0.037	
Molybdenum	SW-846 6010D	mg/kg	15.3				1	20.3				1	5	±2xRL	5	
Nickel	SW-846 6010D	mg/kg	0.31	J			1	0.48	J			1	4	±2xRL	0.17	
Potassium	SW-846 6010D	mg/kg	2750				1	1800				1	500	±2xRL	950	
Selenium	SW-846 6010D	mg/kg	0.35	U			1	0.58	J			1	3.5	±2xRL	0.23	
Silver	SW-846 6010D	mg/kg	6.2				1	4.9				1	1	±2xRL	1.3	
Sodium	SW-846 6010D	mg/kg	32.1	J			1	23.1	J			1	500	±2xRL	9	
Thallium	SW-846 6010D	mg/kg	0.32	J			1	0.38	J			1	2.5	±2xRL	0.06	
Vanadium	SW-846 6010D	mg/kg	7.7				1	10				1	5	±2xRL	2.3	
Zinc	SW-846 6010D	mg/kg	255		J	FD	1	177		J	FD	1	6	RPD<35%		**36%**
Aluminum, SPLP	SW-846 6010D	mg/L	0.3				1	0.18	J			1	0.2	±2xRL	0.12	
Antimony, SPLP	SW-846 6010D	mg/L	0.007	U			1	0.007	U			1	0.002	ND		
Arsenic, SPLP	SW-846 6010D	mg/L	0.0038	U			1	0.0038	U			1	0.01	ND		
Barium, SPLP	SW-846 6010D	mg/L	0.0039	J			1	0.0026	J			1	0.01	±2xCRQL	0.0013	
Beryllium, SPLP	SW-846 6010D	mg/L	0.00028	U			1	0.00028	U			1	0.001	ND		
Cadmium, SPLP	SW-846 6010D	mg/L	0.00031	U			1	0.00031	U			1	0.001	ND		
Calcium, SPLP	SW-846 6010D	mg/L	0.93	B			1	0.9	B			1	5	±2xCRQL	0.03	
Chromium, SPLP	SW-846 6010D	mg/L	0.00066	U			1	0.00066	U			1	0.01	ND		
Cobalt, SPLP	SW-846 6010D	mg/L	0.00081	J			1	0.00061	U			1	0.05	±2xCRQL	0.0002	
Copper, SPLP	SW-846 6010D	mg/L	0.0013	J			1	0.0025	J			1	0.002	±2xCRQL	0.0012	
Iron, SPLP	SW-846 6010D	mg/L	0.3				1	0.2				1	0.1	±2xCRQL	0.1	
Lead, SPLP	SW-846 6010D	mg/L	0.03		J	FD	1	0.011		J	FD	1	0.001	RPD<35%		**93%**
Magnesium, SPLP	SW-846 6010D	mg/L	0.33	J,B			1	0.24	J,B	U	MB	1	5	±2xCRQL	0.09	
Manganese, SPLP	SW-846 6010D	mg/L	0.074		J	FD	1	0.11		J	FD	1	0.001	RPD<35%		**39%**
Mercury, SPLP	SW-846 7470A	µg/L	0.075	U			1	0.075	U			1	0.0002	ND		
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0015	U			1	0.0015	U			1	0.005	ND		
Nickel, SPLP	SW-846 6010D	mg/L	0.012	J			1	0.0016	J			1	0.04	±2xCRQL	0.0104	
Potassium, SPLP	SW-846 6010D	mg/L	1.5	J			1	1.3	J			1	5	±2xCRQL	0.2	
Selenium, SPLP	SW-846 6010D	mg/L	0.0058	U			1	0.0058	U			1	0.005	ND		
Silver, SPLP	SW-846 6010D	mg/L	0.00058	U			1	0.00058	U			1	0.001	ND		
Sodium, SPLP	SW-846 6010D	mg/L	0.49	J,1M			1	0.37	J,1M			1	5	±2xCRQL	0.12	
Thallium, SPLP	SW-846 6010D	mg/L	0.0055	U			1	0.0055	U			1	0.025	ND		
Vanadium, SPLP	SW-846 6010D	mg/L	0.00049	J			1	0.00043	U			1	0.05	±2xCRQL	0.00006	
Zinc, SPLP	SW-846 6010D	mg/L	0.052				1	0.055				1	0.002	RPD<35%		6%
Percent Moisture	ASTM D2974	%	10.2	N2			1	10	N2			1	0.1	RPD<35%		2%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10522826					10522826								
		Field Sample ID	20WS-0043-SO5896-5.9-6.5-D-061920					20WS-0043-SO5896-5.9-6.5-N-061920								
		Lab Sample ID	10522826013					10522826012								
		Sample Date	6/19/2020					6/19/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	9840				1	9870				1	20	RPD<35%		0%
Antimony	SW-846 6010D	mg/kg	0.4	U			1	0.44	J			1	6	±2xRL	0.04	
Arsenic	SW-846 6010D	mg/kg	10.1		J	FD	1	17.3		J	FD	1	1	RPD<35%		**53%**
Barium	SW-846 6010D	mg/kg	137				1	130				1	20	RPD<35%		5%
Beryllium	SW-846 6010D	mg/kg	0.11	J			1	0.12	J			1	0.5	±2xRL	0.01	
Cadmium	SW-846 6010D	mg/kg	0.26				1	0.24				1	0.5	±2xRL	0.02	
Calcium	SW-846 6010D	mg/kg	2210				1	3140				1	500	±2xRL	930	
Chromium	SW-846 6010D	mg/kg	9.8				1	9.6				1	1	RPD<35%		2%
Cobalt	SW-846 6010D	mg/kg	5.9				1	5.5				1	5	±2xRL	0.4	
Copper	SW-846 6010D	mg/kg	14.3				1	17				1	2.5	RPD<35%		17%
Iron	SW-846 6010D	mg/kg	17900				5	18100				5	10	RPD<35%		1%
Lead	SW-846 6010D	mg/kg	29.9				1	35.9				1	1	RPD<35%		18%
Magnesium	SW-846 6010D	mg/kg	3160				1	3010				1	500	RPD<35%		5%
Manganese	SW-846 6010D	mg/kg	1370				5	1340				5	1.5	RPD<35%		2%
Mercury	SW-846 7471B	mg/kg	0.017	J			1	0.018	J			1	0.1	±2xRL	0.001	
Molybdenum	SW-846 6010D	mg/kg	0.63	J			1	0.5	J			1	5	±2xRL	0.13	
Nickel	SW-846 6010D	mg/kg	6.6				1	6.2				1	4	±2xRL	0.4	
Potassium	SW-846 6010D	mg/kg	2290				1	2260				1	500	±2xRL	30	
Selenium	SW-846 6010D	mg/kg	0.34	U			1	0.33	U			1	3.5	ND		
Silver	SW-846 6010D	mg/kg	4.5				1	3.7				1	1	±2xRL	0.8	
Sodium	SW-846 6010D	mg/kg	78.6				1	75.8				1	500	±2xRL	2.8	
Thallium	SW-846 6010D	mg/kg	0.25	U			1	0.26	J			1	2.5	±2xRL	0.01	
Vanadium	SW-846 6010D	mg/kg	37.5				1	36.8				1	5	RPD<35%		2%
Zinc	SW-846 6010D	mg/kg	86.4				1	93.5				1	6	RPD<35%		8%
Percent Moisture	ASTM D2974	%	8.3	N2			1	8.4	N2			1	0.1	RPD<35%		1%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10523409					10523409								
		Field Sample ID	20WS-0285-SO5918-0.3-0.9-D-062520					20WS-0285-SO5918-0.3-0.9-N-062520								
		Lab Sample ID	10523409016					10523409015								
		Sample Date	6/25/2020					6/25/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	3410		J	FD	5	4950		J	FD	5	20	RPD<35%		**37%**
Antimony	SW-846 6010D	mg/kg	2	U,D3			5	2	U,D3			5	6	ND		
Arsenic	SW-846 6010D	mg/kg	54				5	38.5				5	1	RPD<35%		34%
Barium	SW-846 6010D	mg/kg	43.7				5	95.6				5	20	±2xRL	51.9	
Beryllium	SW-846 6010D	mg/kg	0.31	J,D3			5	0.58	J,D3			5	0.5	±2xRL	0.27	
Cadmium	SW-846 6010D	mg/kg	10.6		J	FD	5	2.8		J	FD	5	0.5	±2xRL	**7.8**	
Calcium	SW-846 6010D	mg/kg	769				5	887				5	500	±2xRL	118	
Chromium	SW-846 6010D	mg/kg	1.4	J,D3			5	2	J,D3			5	1	±2xRL	0.6	
Cobalt	SW-846 6010D	mg/kg	1.4	J,D3			5	4.4				5	5	±2xRL	3	
Copper	SW-846 6010D	mg/kg	36				5	45.9				5	2.5	±2xRL	9.9	
Iron	SW-846 6010D	mg/kg	7100				5	6280				5	10	RPD<35%		12%
Lead	SW-846 6010D	mg/kg	783		J	FD	5	537		J	FD	5	1	RPD<35%		**37%**
Magnesium	SW-846 6010D	mg/kg	395				5	541				5	500	±2xRL	146	
Manganese	SW-846 6010D	mg/kg	10500		J	FD	25	6120		J	FD	10	1.5	RPD<35%		**53%**
Mercury	SW-846 7471B	mg/kg	0.73		J	FD	1	2.1		J	FD	5	0.1	RPD<35%		**97%**
Molybdenum	SW-846 6010D	mg/kg	13.2				5	15.7				5	5	±2xRL	2.5	
Nickel	SW-846 6010D	mg/kg	0.89	U,D3			5	1.8	J,D3			5	4	±2xRL	0.91	
Potassium	SW-846 6010D	mg/kg	718				5	740				5	500	±2xRL	22	
Selenium	SW-846 6010D	mg/kg	1.7	U,D3			5	1.7	U,D3			5	3.5	ND		
Silver	SW-846 6010D	mg/kg	10.9				5	14.2				5	1	±2xRL	3.3	
Sodium	SW-846 6010D	mg/kg	52.3	U,D3			5	52.5	U,D3			5	500	ND		
Thallium	SW-846 6010D	mg/kg	1.3	U,D3			5	1.3	U,D3			5	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	4.2				5	8.7				5	5	±2xRL	4.5	
Zinc	SW-846 6010D	mg/kg	1510				5	1310				5	6	RPD<35%		14%
Percent Moisture	ASTM D2974	%	7.2	N2			1	5.7	N2			1	0.1	RPD<35%		23%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10523968					10523968								
		Field Sample ID	20WS-0016-SO5935-4.0-5.0-D-070120					20WS-0016-SO5935-4.0-5.0-N-070120								
		Lab Sample ID	10523968014					10523968013								
		Sample Date	7/1/2020					7/1/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	14400				1	14600				1	20	RPD<35%		1%
Antimony	SW-846 6010D	mg/kg	0.41	U			1	0.42	U			1	6	ND		
Arsenic	SW-846 6010D	mg/kg	42.2				1	33.7				1	1	RPD<35%		22%
Barium	SW-846 6010D	mg/kg	173				1	161				1	20	RPD<35%		7%
Beryllium	SW-846 6010D	mg/kg	0.29				1	0.33				1	0.5	±2xRL	0.04	
Cadmium	SW-846 6010D	mg/kg	2.5				1	2.6				1	0.5	RPD<35%		4%
Calcium	SW-846 6010D	mg/kg	2300				1	2130				1	500	±2xRL	170	
Chromium	SW-846 6010D	mg/kg	10.5				1	10.8				1	1	RPD<35%		3%
Cobalt	SW-846 6010D	mg/kg	7.1				1	8.1				1	5	±2xRL	1	
Copper	SW-846 6010D	mg/kg	24.8				1	28.5				1	2.5	RPD<35%		14%
Iron	SW-846 6010D	mg/kg	21300				5	20500				5	10	RPD<35%		4%
Lead	SW-846 6010D	mg/kg	403				1	429				1	1	RPD<35%		6%
Magnesium	SW-846 6010D	mg/kg	3950				1	3820				1	500	RPD<35%		3%
Manganese	SW-846 6010D	mg/kg	4630				5	5140				5	1.5	RPD<35%		10%
Mercury	SW-846 7471B	mg/kg	0.0085	U			1	0.0096	J			1	0.1	±2xRL	0.0011	
Molybdenum	SW-846 6010D	mg/kg	0.76	J			1	0.82	J			1	5	±2xRL	0.06	
Nickel	SW-846 6010D	mg/kg	6.7				1	6.5				1	4	±2xRL	0.2	
Potassium	SW-846 6010D	mg/kg	2750				1	2730				1	500	RPD<35%		1%
Selenium	SW-846 6010D	mg/kg	0.36	U			1	0.36	U			1	3.5	ND		
Silver	SW-846 6010D	mg/kg	1.5				1	1.4				1	1	±2xRL	0.1	
Sodium	SW-846 6010D	mg/kg	56.5				1	56.6				1	500	±2xRL	0.1	
Thallium	SW-846 6010D	mg/kg	0.28	U			1	0.33	J			1	2.5	±2xRL	0.05	
Vanadium	SW-846 6010D	mg/kg	38.6				1	38.2				1	5	RPD<35%		1%
Zinc	SW-846 6010D	mg/kg	1170				1	1130				1	6	RPD<35%		3%
Percent Moisture	ASTM D2974	%	11.6	N2			1	11.1	N2			1	0.1	RPD<35%		4%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10524722					10524722								
		Field Sample ID	20WS-0179-SO5954-4.3-4.9-D-070820					20WS-0179-SO5954-4.3-4.9-N-070820								
		Lab Sample ID	10524722015					10524722014								
		Sample Date	7/8/2020					7/8/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	12600				1	12400				1	20	RPD<35%		2%
Antimony	SW-846 6010D	mg/kg	0.63	J			1	1.2				1	6	±2xRL	0.57	
Arsenic	SW-846 6010D	mg/kg	84				1	84.4				1	1	RPD<35%		0%
Barium	SW-846 6010D	mg/kg	146				1	122				1	20	RPD<35%		18%
Beryllium	SW-846 6010D	mg/kg	0.016	U			1	0.055	J			1	0.5	±2xRL	0.039	
Cadmium	SW-846 6010D	mg/kg	0.057	J			1	0.12	J			1	0.5	±2xRL	0.063	
Calcium	SW-846 6010D	mg/kg	2160				5	3230				5	500	±2xRL	1070	
Chromium	SW-846 6010D	mg/kg	9.4				1	9.8				1	1	RPD<35%		4%
Cobalt	SW-846 6010D	mg/kg	5.8				5	6.1				5	5	±2xRL	0.3	
Copper	SW-846 6010D	mg/kg	86.5		J	FD	1	128		J	FD	1	2.5	RPD<35%		**39%**
Iron	SW-846 6010D	mg/kg	32000				5	31300				5	10	RPD<35%		2%
Lead	SW-846 6010D	mg/kg	16.9				5	18.7				5	1	±2xRL	1.8	
Magnesium	SW-846 6010D	mg/kg	4440				1	4200				1	500	RPD<35%		6%
Manganese	SW-846 6010D	mg/kg	298				1	340				1	1.5	RPD<35%		13%
Mercury	SW-846 7471B	mg/kg	0.056				1	0.031				1	0.1	±2xRL	0.025	
Molybdenum	SW-846 6010D	mg/kg	0.8	J			1	0.56	J			1	5	±2xRL	0.24	
Nickel	SW-846 6010D	mg/kg	6.2				1	6.4				1	4	±2xRL	0.2	
Potassium	SW-846 6010D	mg/kg	3770				1	3650				1	500	RPD<35%		3%
Selenium	SW-846 6010D	mg/kg	0.75	J			1	0.37	U			1	3.5	±2xRL	0.38	
Silver	SW-846 6010D	mg/kg	0.76				1	1.2				1	1	±2xRL	0.44	
Sodium	SW-846 6010D	mg/kg	450				1	355				1	500	±2xRL	95	
Thallium	SW-846 6010D	mg/kg	1.4	U,D3			5	1.4	U,D3			5	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	40.1				5	38.8				5	5	±2xRL	1.3	
Zinc	SW-846 6010D	mg/kg	68.8				1	72.7				1	6	RPD<35%		6%
Percent Moisture	ASTM D2974	%	15.9	N2			1	14.6	N2			1	0.1	RPD<35%		9%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 2. Field QA/QC Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order	10524722					10524722								
		Field Sample ID	20WS-0288-SO5942-0.9-1.3-D-070220					20WS-0288-SO5942-0.9-1.3-N-070220								
		Lab Sample ID	10524722002					10524722001								
		Sample Date	7/2/2020					7/2/2020								
		Sample Type	Field Duplicate					Natural Sample								
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	Result	Lab Flag	DV Flag	Reason Code	DF	Project-specific RL	Control Limit	Difference	RPD
Aluminum	SW-846 6010D	mg/kg	2680				5	2920				5	20	RPD<35%		9%
Antimony	SW-846 6010D	mg/kg	1.9	U,D3			5	1.9	U,D3			5	6	ND		
Arsenic	SW-846 6010D	mg/kg	50.4				5	45.2				5	1	RPD<35%		11%
Barium	SW-846 6010D	mg/kg	8				5	9.8				5	20	±2xRL	1.8	
Beryllium	SW-846 6010D	mg/kg	0.28	J,D3			5	0.3	J,D3			5	0.5	±2xRL	0.02	
Cadmium	SW-846 6010D	mg/kg	1.3				5	1.3				5	0.5	±2xRL	0	
Calcium	SW-846 6010D	mg/kg	351				5	376				5	500	±2xRL	25	
Chromium	SW-846 6010D	mg/kg	1.1	J,D3			5	1.2	J,D3			5	1	±2xRL	0.1	
Cobalt	SW-846 6010D	mg/kg	0.84	J,D3			5	1	J,D3			5	5	±2xRL	0.16	
Copper	SW-846 6010D	mg/kg	19				5	21.3				5	2.5	±2xRL	2.3	
Iron	SW-846 6010D	mg/kg	3100				5	3240				5	10	RPD<35%		4%
Lead	SW-846 6010D	mg/kg	11.7				5	15				5	1	±2xRL	3.3	
Magnesium	SW-846 6010D	mg/kg	205				5	229				5	500	±2xRL	24	
Manganese	SW-846 6010D	mg/kg	1190				5	1430				5	1.5	RPD<35%		18%
Mercury	SW-846 7471B	mg/kg	0.01	J			1	0.0084	U			1	0.1	±2xRL	0.0016	
Molybdenum	SW-846 6010D	mg/kg	2.5	J,D3			5	3	J,D3			5	5	±2xRL	0.5	
Nickel	SW-846 6010D	mg/kg	0.85	U,D3			5	0.85	U,D3			5	4	ND		
Potassium	SW-846 6010D	mg/kg	595	J,D3			5	654				5	500	±2xRL	59	
Selenium	SW-846 6010D	mg/kg	1.6	U,D3			5	1.6	U,D3			5	3.5	ND		
Silver	SW-846 6010D	mg/kg	0.32	J,D3			5	0.87	J,D3			5	1	±2xRL	0.55	
Sodium	SW-846 6010D	mg/kg	50.1	U,D3			5	49.8	U,D3			5	500	ND		
Thallium	SW-846 6010D	mg/kg	1.3	U,D3			5	1.3	U,D3			5	2.5	ND		
Vanadium	SW-846 6010D	mg/kg	3.8				5	4				5	5	±2xRL	0.2	
Zinc	SW-846 6010D	mg/kg	525				5	582				5	6	RPD<35%		10%
Percent Moisture	ASTM D2974	%	5	N2			1	4.4	N2			1	0.1	RPD<35%		13%

Notes:

The project-specific RL was adjusted to the least diluted sample for calculations.

Bold - Results outside control limit

ND = Not detected at method detection limit.

Pace Laboratory Flags (Lab Flag)

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

AL = The lab does not hold A2LA accreditation for this parameter.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

D6 = The precision between the sample and sample duplicate exceeded laboratory control limits.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

1M = The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

D% = Qualified due to laboratory duplicate results outside control limits.

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Lab ID[2]	Sample Date	Metals				SPLP		ABA	IVBA	
						ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP	Modified Sobek 3.2	IVBA, calculated	SW-846 6010C, IVBA
20WS-0003-SO5877-N-061020	Natural	SO5877	N/A	10521603001 (S2006476-004)	6/10/2020								X	X
20WS-0003-SO5878-N-061020	Natural	SO5878	N/A	10521603002 (S2006476-005)	6/10/2020								X	X
20WS-0043-SO5896-5.9-6.5-D-061920 (20WS-0043-SO5896-5.9-6.5-D-061)	Field Duplicate	SO5896	5.9 - 6.5	10522826013	6/19/2020	X	X	X						
20WS-0043-SO5896-5.9-6.5-N-061920 (20WS-0043-SO5896-5.9-6.5-N-061)	Natural	SO5896	5.9 - 6.5	10522826012	6/19/2020	X	X	X						
20WS-0043-SO5897-7.3-7.7-N-061920 (20WS-0043-SO5897-7.3-7.7-N-061)	Natural	SO5897	7.3 - 7.7	10522826014	6/19/2020	X	X	X						
20WS-0043-SO5898-10.8-11.2-N-061920 (20WS-0043-SO5898-10.8-11.2-N-0)	Natural	SO5898	10.8 - 11.2	10522826015	6/19/2020	X	X	X						
20WS-0043-SO5899-16.0-16.3-N-061920 (20WS-0043-SO5899-16.0-16.3-N-0)	Natural	SO5899	16 - 16.3	10522826016	6/19/2020	X	X	X						
20WS-0003-SO5900-1.0-1.5-N-062320 (20WS-0003-SO5900-1.0-1.5-N-062)	Natural	SO5900	1 - 1.5	10522826017	6/23/2020	X	X	X						
20WS-0003-SO5901-4.4-4.7-N-062320 (20WS-0003-SO5901-4.4-4.7-N-062)	Natural	SO5901	4.4 - 4.7	10522826018	6/23/2020	X	X	X						
20WS-0003-SO5902-8.6-9.0-N-062320 (20WS-0003-SO5902-8.6-9.0-N-062)	Natural	SO5902	8.6 - 9	10522826019	6/23/2020	X	X	X						
20WS-0003-SO5903-4.6-4.9-N-062320 (20WS-0003-SO5903-4.6-4.9-N-062)	Natural	SO5903	4.6 - 4.9	10522826020	6/23/2020	X	X	X						
20WS-0003-SO5904-12.6-13.0-N-062320 (20WS-0003-SO5904-12.6-13.0-N-0)	Natural	SO5904	12.6 - 13	10523409001	6/23/2020	X	X	X						
20WS-0006-SO5879-N-061020	Natural	SO5879	N/A	10521603003 (S2006476-006)	6/10/2020								X	X
20WS-0006-SO5892-5.7-6.0-N-061820 (20WS-0006-SO5892-5.7-6.0-N-061)	Natural	SO5892	5.7 - 6	10522826008	6/18/2020	X	X	X						
20WS-0006-SO5893-10.4-10.7-N-061920 (20WS-0006-SO5893-10.4-10.7-N-0)	Natural	SO5893	10.4 - 10.7	10522826009	6/19/2020	X	X	X						
20WS-0006-SO5894-11.1-11.4-N-061920 (20WS-0006-SO5894-11.1-11.4-N-0)	Natural	SO5894	11.1 - 11.4	10522826010	6/19/2020	X	X	X						
20WS-0006-SO5895-5.4-5.7-N-061920 (20WS-0006-SO5895-5.4-5.7-N-061)	Natural	SO5895	5.4 - 5.7	10522826011	6/19/2020	X	X	X						
20WS-0010-SO5611-N-060120	Natural	SO5611	N/A	10520797014	6/1/2020	X	X	X						
20WS-0010-SO5905-8.4-8.8-N-062320 (20WS-0010-SO5905-8.4-8.8-N-062)	Natural	SO5905	8.4 - 8.8	10523409002	6/23/2020	X	X	X						
20WS-0010-SO5906-13.0-13.5-N-062320 (20WS-0010-SO5906-13.0-13.5-N-0)	Natural	SO5906	13 - 13.5	10523409003	6/23/2020	X	X	X						
20WS-0010-SO5907-12.2-12.6-N-062320 (20WS-0010-SO5907-12.2-12.6-N-0)	Natural	SO5907	12.2 - 12.6	10523409004	6/23/2020	X	X	X						
20WS-0010-SO5908-12.4-12.8-N-062320 (20WS-0010-SO5908-12.4-12.8-N-0)	Natural	SO5908	12.4 - 12.8	10523409005	6/23/2020	X	X	X						
20WS-0010-SO5909-8.2-8.5-N-062420 (20WS-0010-SO5909-8.2-8.5-N-062)	Natural	SO5909	8.2 - 8.5	10523409006	6/24/2020	X	X	X						
20WS-0010-SO5910-9.2-9.6-N-062420 (20WS-0010-SO5910-9.2-9.6-N-062)	Natural	SO5910	9.2 - 9.6	10523409007	6/24/2020	X	X	X						
20WS-0013-SO5439-N-052120	Natural	SO5439	N/A	10520797005	5/21/2020	X	X	X						
20WS-0013-SO5448-N-052120	Natural	SO5448	N/A	10520797006	5/21/2020	X	X	X						
20WS-0013-SO5601-N-060120	Natural	SO5601	N/A	10520797013	6/1/2020	X	X	X						
20WS-0013-SO5610-N-060120	Natural	SO5610	N/A	10521670002	6/1/2020	X	X	X	X					

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Lab ID[2]	Sample Date	Metals				SPLP		ABA	IVBA	
						ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP	Modified Sobek 3.2	IVBA, calculated	SW-846 6010C, IVBA
20WS-0013-SO5936-12.3-12.6-N-070120 (20WS-0013-SO5936-12.3-12.6-N-0)	Natural	SO5936	12.3 - 12.6	10523968015	7/1/2020	X	X	X						
20WS-0015-SO5884-N-061020	Natural	SO5884	N/A	10521603008 (S2006476-012)	6/10/2020								X	X
20WS-0015-SO5927-5.5-6.2-N-062620 (20WS-0015-SO5927-5.5-6.2-N-062)	Natural	SO5927	5.5 - 6.2	10523968005	6/26/2020	X	X	X						
20WS-0015-SO5928-12.5-12.7-N-062620 (20WS-0015-SO5928-12.5-12.7-N-0)	Natural	SO5928	12.5 - 12.7	10523968006	6/26/2020	X	X	X						
20WS-0015-SO5929-12.7-13.0-N-062620 (20WS-0015-SO5929-12.7-13.0-N-0)	Natural	SO5929	12.7 - 13	10523968007	6/26/2020	X	X	X						
20WS-0015-SO5930-8.7-9.0-N-062620 (20WS-0015-SO5930-8.7-9.0-N-062)	Natural	SO5930	8.7 - 9	10523968008	6/26/2020	X	X	X						
20WS-0015-SO5931-9.2-9.5-N-062620 (20WS-0015-SO5931-9.2-9.5-N-062)	Natural	SO5931	9.2 - 9.5	10523968009	6/26/2020	X	X	X						
20WS-0016-SO5434-N-052120	Natural	SO5434	N/A	10520797004	5/21/2020	X	X	X						
20WS-0016-SO5932-4.8-5.2-N-070120 (20WS-0016-SO5932-4.8-5.2-N-070)	Natural	SO5932	4.8 - 5.2	10523968010	7/1/2020	X	X	X						
20WS-0016-SO5933-12.7-13.0-N-070120 (20WS-0016-SO5933-12.7-13.0-N-0)	Natural	SO5933	12.7 - 13	10523968011	7/1/2020	X	X	X						
20WS-0016-SO5934-12.7-13.2-N-070120 (20WS-0016-SO5934-12.7-13.2-N-0)	Natural	SO5934	12.7 - 13.2	10523968012	7/1/2020	X	X	X						
20WS-0016-SO5935-4.0-5.0-D-070120 (20WS-0016-SO5935-4.0-5.0-D-070)	Field Duplicate	SO5935	4 - 5	10523968014	7/1/2020	X	X	X						
20WS-0016-SO5935-4.0-5.0-N-070120 (20WS-0016-SO5935-4.0-5.0-N-070)	Natural	SO5935	4 - 5	10523968013	7/1/2020	X	X	X						
20WS-0017-SO5956-8.1-8.6-N-070820 (20WS-0017-SO5956-8.1-8.6-N-070)	Natural	SO5956	8.1 - 8.6	10524722017	7/8/2020	X	X	X						
20WS-0019-SO5957-5.3-5.7-N-070820 (20WS-0019-SO5957-5.3-5.7-N-070)	Natural	SO5957	5.3 - 5.7	10524722018	7/8/2020	X	X	X						
20WS-0017-SO5958-12.4-12.8-N-070820 (20WS-0017-SO5958-12.4-12.8-N-0)	Natural	SO5958	12.4 - 12.8	10524722019	7/8/2020	X	X	X						
20WS-0040-SO5880-N-061020	Natural	SO5880	N/A	10521603004 (S2006476-007)	6/10/2020								X	X
20WS-0040-SO5885-5.6-6.2-N-061820 (20WS-0040-SO5885-5.6-6.2-N-061)	Natural	SO5885	5.6 - 6.2	10522826001	6/18/2020	X	X	X						
20WS-0040-SO5886-5.6-10.0-N-061820 (20WS-0040-SO5886-5.6-10.0-N-06)	Natural	SO5886	5.6 - 10	10522826002	6/18/2020	X	X	X						
20WS-0040-SO5887-6.0-6.5-N-061820 (20WS-0040-SO5887-6.0-6.5-N-061)	Natural	SO5887	6 - 6.5	10522826003	6/18/2020	X	X	X						
20WS-0040-SO5888-5.6-6.0-N-061820 (20WS-0040-SO5888-5.6-6.0-N-061)	Natural	SO5888	5.6 - 6	10522826004	6/18/2020	X	X	X						
20WS-0043-SO5889-5.8-6.2-N-061820 (20WS-0043-SO5889-5.8-6.2-N-061)	Natural	SO5889	5.8 - 6.2	10522826005	6/18/2020	X	X	X						
20WS-0043-SO5890-6.2-6.4-N-061820 (20WS-0043-SO5890-6.2-6.4-N-061)	Natural	SO5890	6.2 - 6.4	10522826006	6/18/2020	X	X	X						
20WS-0043-SO5891-10.3-10.9-N-061820 (20WS-0043-SO5891-10.3-10.9-N-0)	Natural	SO5891	10.3 - 10.9	10522826007	6/18/2020	X	X	X						
20WS-0121-SO5801-D-060420	Field Duplicate	SO5801	N/A	10521754010	6/4/2020	X	X	X						
20WS-0121-SO5801-N-060420	Natural	SO5801	N/A	10521754009	6/4/2020	X	X	X						
20WS-0122-SO5693-N-060220	Natural	SO5693	N/A	10521670003	6/2/2020	X	X	X	X					
20WS-0122-SO5704-N-060220	Natural	SO5704	N/A	10521754002	6/2/2020	X	X	X						

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Lab ID[2]	Sample Date	Metals				SPLP		ABA	IVBA	
						ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP	Modified Sobek 3.2	IVBA, calculated	SW-846 6010C, IVBA
20WS-0123-SO5828-N-060420	Natural	SO5828	N/A	10521754012	6/4/2020	X	X	X						
20WS-0123-SO5829-N-060420	Natural	SO5829	N/A	10521754013	6/4/2020	X	X	X						
20WS-0130-SO5728-N-060220	Natural	SO5728	N/A	10521670010	6/2/2020							X		
				10521754018	6/2/2020	X	X	X		X	X			
20WS-0138-SO5700-N-060220	Natural	SO5700	N/A	10521754001	6/2/2020	X	X	X						
20WS-0138-SO5757-N-060320	Natural	SO5757	N/A	10521754007	6/3/2020	X	X	X						
20WS-0138-SO5763-D-060420	Field Duplicate	SO5763	N/A	10521670006	6/4/2020	X	X	X	X					
20WS-0138-SO5763-N-060420	Natural	SO5763	N/A	10521670005	6/4/2020	X	X	X	X					
20WS-0138-SO5787-N-060320	Natural	SO5787	N/A	10521754008	6/3/2020	X	X	X						
20WS-0138-SO5948-12.8-13.3-N-070620 (20WS-0138-SO5948-12.8-13.3-N-0)	Natural	SO5948	12.8 - 13.3	10524722008	7/6/2020	X	X	X						
20WS-0138-SO5949-13.1-13.6-N-070620 (20WS-0138-SO5949-13.1-13.6-N-0)	Natural	SO5949	13.1 - 13.6	10524722009	7/6/2020	X	X	X						
20WS-0138-SO5950-9.5-9.8-N-070620 (20WS-0138-SO5950-9.5-9.8-N-070)	Natural	SO5950	9.5 - 9.8	10524722010	7/6/2020	X	X	X						
20WS-0157-SO5744-N-060320	Natural	SO5744	N/A	10521754006	6/3/2020	X	X	X						
20WS-0162-SO5706-N-060320	Natural	SO5706	N/A	10521754003	6/3/2020	X	X	X						
20WS-0162-SO5722-N-060320	Natural	SO5722	N/A	10521754004	6/3/2020	X	X	X						
20WS-0162-SO5732-N-060320	Natural	SO5732	N/A	10521670004	6/3/2020	X	X	X	X					
20WS-0162-SO5733-N-060320	Natural	SO5733	N/A	10521754005	6/3/2020	X	X	X						
20WS-0162-SO5943-12.3-12.7-N-070620 (20WS-0162-SO5943-12.3-12.7-N-0)	Natural	SO5943	12.3 - 12.7	10524722005	7/6/2020	X	X	X						
20WS-0162-SO5946-16.0-16.4-N-070620 (20WS-0162-SO5946-16.0-16.4-N-0)	Natural	SO5946	16 - 16.4	10524722006	7/6/2020	X	X	X						
20WS-0162-SO5947-20.0-20.4-N-070620 (20WS-0162-SO5947-20.0-20.4-N-0)	Natural	SO5947	20 - 20.4	10524722007	7/6/2020	X	X	X						
20WS-0179-SO5670-N-060220	Natural	SO5670	N/A	10520797020	6/2/2020	X	X	X		X	X			
				10521670009	6/2/2020							X		
20WS-0179-SO5673-N-060220	Natural	SO5673	N/A	10520797017	6/2/2020	X	X	X						
20WS-0179-SO5680-N-060220	Natural	SO5680	N/A	10520797018	6/2/2020	X	X	X						
20WS-0179-SO5951-4.2-4.5-N-070820 (20WS-0179-SO5951-4.2-4.5-N-070)	Natural	SO5951	4.2 - 4.5	10524722011	7/8/2020	X	X	X						
20WS-0179-SO5952-0.2-0.7-N-070820 (20WS-0179-SO5952-0.2-0.7-N-070)	Natural	SO5952	0.2 - 0.7	10524722012	7/8/2020	X	X	X						
20WS-0179-SO5953-5.4-5.7-N-070820 (20WS-0179-SO5953-5.4-5.7-N-070)	Natural	SO5953	5.4 - 5.7	10524722013	7/8/2020	X	X	X						
20WS-0179-SO5954-4.3-4.9-D-070820 (20WS-0179-SO5954-4.3-4.9-D-070)	Field Duplicate	SO5954	4.3 - 4.9	10524722015	7/8/2020	X	X	X						
20WS-0179-SO5954-4.3-4.9-N-070820 (20WS-0179-SO5954-4.3-4.9-N-070)	Natural	SO5954	4.3 - 4.9	10524722014	7/8/2020	X	X	X						
20WS-0179-SO5955-0.7-1.2-N-070820 (20WS-0179-SO5955-0.7-1.2-N-070)	Natural	SO5955	0.7 - 1.2	10524722016	7/8/2020	X	X	X						
20WS-0246-SO5370-N-051820	Natural	SO5370	N/A	10518864017	5/18/2020	X	X	X						
20WS-0246-SO5378-N-051820	Natural	SO5378	N/A	10518864020	5/18/2020	X	X	X		X	X			
				10519814003	5/18/2020							X		
20WS-0246-SO5382-N-051820	Natural	SO5382	N/A	10519814009	5/18/2020	X	X	X	X					
20WS-0246-SO5389-N-051920	Natural	SO5389	N/A	10520797001	5/19/2020	X	X	X						

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Lab ID[2]	Sample Date	Metals				SPLP		ABA	IVBA	
						ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP	Modified Sobek 3.2	IVBA, calculated	SW-846 6010C, IVBA
20WS-0246-SO5921-12.2-12.6-N-062520 (20WS-0246-SO5921-12.2-12.6-N-0)	Natural	SO5921	12.2 - 12.6	10523409019	6/25/2020	X	X	X						
20WS-0246-SO5922-8.8-9.2-N-062520 (20WS-0246-SO5922-8.8-9.2-N-062)	Natural	SO5922	8.8 - 9.2	10523409020	6/25/2020	X	X	X						
20WS-0246-SO5923-4.8-5.1-N-062520 (20WS-0246-SO5923-4.8-5.1-N-062)	Natural	SO5923	4.8 - 5.1	10523968001	6/25/2020	X	X	X						
20WS-0246-SO5924-8.7-9.0-N-062520 (20WS-0246-SO5924-8.7-9.0-N-062)	Natural	SO5924	8.7 - 9	10523968002	6/25/2020	X	X	X						
20WS-0285-SO5925-1.0-1.4-N-062520 (20WS-0285-SO5925-1.0-1.4-N-062)	Natural	SO5925	1 - 1.4	10523968003	6/25/2020	X	X	X						
20WS-0249-SO5406-N-052020	Natural	SO5406	N/A	10519814010	5/20/2020	X	X	X	X					
20WS-0249-SO5409-N-052020	Natural	SO5409	N/A	10520797003	5/20/2020	X	X	X						
20WS-0256-SO5403-N-051920	Natural	SO5403	N/A	10520797002	5/19/2020	X	X	X						
20WS-0285-SO5313-N-051420	Natural	SO5313	N/A	10518864009	5/14/2020	X	X	X						
20WS-0285-SO5323-N-051420	Natural	SO5323	N/A	10518864010	5/14/2020	X	X	X						
20WS-0285-SO5324-N-051420	Natural	SO5324	N/A	10518864011	5/14/2020	X	X	X						
20WS-0285-SO5327-D-051420	Field Duplicate	SO5327	N/A	10518864013	5/14/2020	X	X	X						
20WS-0285-SO5327-N-051420	Natural	SO5327	N/A	10518864012	5/14/2020	X	X	X						
20WS-0285-SO5335-N-051420	Natural	SO5335	N/A	10519814008	5/14/2020	X	X	X	X					
20WS-0285-SO5341-N-051420	Natural	SO5341	N/A	10518864014	5/14/2020	X	X	X						
20WS-0285-SO5347-N-051820	Natural	SO5347	N/A	10518864015	5/18/2020	X	X	X						
20WS-0285-SO5355-N-051820	Natural	SO5355	N/A	10518864016	5/18/2020	X	X	X						
20WS-0285-SO5916-4.4-4.5-N-062520 (20WS-0285-SO5916-4.4-4.5-N-062)	Natural	SO5916	4.4 - 4.5	10523409013	6/25/2020	X	X	X						
20WS-0285-SO5917-8.4-8.7-N-062520 (20WS-0285-SO5917-8.4-8.7-N-062)	Natural	SO5917	8.4 - 8.7	10523409014	6/25/2020	X	X	X						
20WS-0285-SO5918-0.3-0.9-D-062520 (20WS-0285-SO5918-0.3-0.9-D-062)	Field Duplicate	SO5918	0.3 - 0.9	10523409016	6/25/2020	X	X	X						
20WS-0285-SO5918-0.3-0.9-N-062520 (20WS-0285-SO5918-0.3-0.9-N-062)	Natural	SO5918	0.3 - 0.9	10523409015	6/25/2020	X	X	X						
20WS-0285-SO5919-1.2-1.5-N-062520 (20WS-0285-SO5919-1.2-1.5-N-062)	Natural	SO5919	1.2 - 1.5	10523409017	6/25/2020	X	X	X						
20WS-0285-SO5920-1.3-1.5-N-062520 (20WS-0285-SO5920-1.3-1.5-N-062)	Natural	SO5920	1.3 - 1.5	10523409018	6/25/2020	X	X	X						
20WS-0288-SO5276-N-051320	Natural	SO5276	N/A	10518864006	5/13/2020	X	X	X						
20WS-0288-SO5882-N-061020	Natural	SO5882	N/A	10521603006 (S2006476-009)	6/10/2020								X	X
20WS-0288-SO5883-N-061020	Natural	SO5883	N/A	10521603007 (S2006476-010)	6/10/2020								X	X
20WS-0288-SO5939-4.0-4.4-N-070220 (20WS-0288-SO5939-4.0-4.4-N-070)	Natural	SO5939	4 - 4.4	10523968018	7/2/2020	X	X	X						
20WS-0288-SO5940-4.4-4.9-N-070220 (20WS-0288-SO5940-4.4-4.9-N-070)	Natural	SO5940	4.4 - 4.9	10523968019	7/2/2020	X	X	X						
20WS-0288-SO5941-4.0-4.5-N-070220 (20WS-0288-SO5941-4.0-4.5-N-07)	Natural	SO5941	4 - 4.5	10523968020	7/2/2020	X	X	X						
20WS-0288-SO5942-0.9-1.3-D-070220 (20WS-0288-SO5942-0.9-1.3-D-070)	Field Duplicate	SO5942	0.9 - 1.3	10524722002	7/2/2020	X	X	X						
20WS-0288-SO5942-0.9-1.3-N-070220 (20WS-0288-SO5942-0.9-1.3-N-070)	Natural	SO5942	0.9 - 1.3	10524722001	7/2/2020	X	X	X						

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Lab ID[2]	Sample Date	Metals				SPLP		ABA	IVBA	
						ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP	Modified Sobek 3.2	IVBA, calculated	SW-846 6010C, IVBA
20WS-0289-SO5944-12.3-12.6-N-070220 (20WS-0289-SO5944-12.3-12.6-N-0)	Natural	SO5944	12.3 - 12.6	10524722003	7/2/2020	X	X	X						
20WS-0289-SO5945-12.8-13.3-N-070220 (20WS-0289-SO5945-12.8-13.3-N-0)	Natural	SO5945	12.8 - 13.3	10524722004	7/2/2020	X	X	X						
20WS-0297-SO5239-N-051220	Natural	SO5239	N/A	10518864001	5/12/2020	X	X	X						
20WS-0297-SO5244-N-051220	Natural	SO5244	N/A	10518864002	5/12/2020	X	X	X						
20WS-0297-SO5245-N-051220	Natural	SO5245	N/A	10518864003	5/12/2020	X	X	X						
20WS-0297-SO5246-N-051220	Natural	SO5246	N/A	10519814004	5/12/2020	X	X	X	X					
20WS-0297-SO5249-N-051220	Natural	SO5249	N/A	10518864018	5/12/2020	X	X	X		X	X			
				10519814001	5/12/2020							X		
20WS-0297-SO5254-N-051220	Natural	SO5254	N/A	10518864004	5/12/2020	X	X	X						
20WS-0297-SO5256-N-051220	Natural	SO5256	N/A	10519814005	5/12/2020	X	X	X	X					
20WS-0297-SO5287-N-051320	Natural	SO5287	N/A	10519814006	5/13/2020	X	X	X	X					
20WS-0288-SO5881-N-061020	Natural	SO5881	N/A	10521603005 (S2006476-008)	6/10/2020								X	X
20WS-0297-SO5911-12.7-13.0-N-062420 (20WS-0297-SO5911-12.7-13.0-N-0)	Natural	SO5911	12.7 - 13	10523409008	6/24/2020	X	X	X						
20WS-0297-SO5912-4.5-4.8-N-062420 (20WS-0297-SO5912-4.5-4.8-N-062)	Natural	SO5912	4.5 - 4.8	10523409009	6/24/2020	X	X	X						
20WS-0297-SO5913-0.2-0.8-N-062420 (20WS-0297-SO5913-0.2-0.8-N-062)	Natural	SO5913	0.2 - 0.8	10523409010	6/24/2020	X	X	X						
20WS-0297-SO5914-0.4-0.8-N-062420 (20WS-0297-SO5914-0.4-0.8-N-062)	Natural	SO5914	0.4 - 0.8	10523409011	6/24/2020	X	X	X						
20WS-0288-SO5915-4.6-5.0-N-062420 (20WS-0288-SO5915-4.6-5.0-N-062)	Natural	SO5915	4.6 - 5	10523409012	6/24/2020	X	X	X						
20WS-0298-SO5296-N-051320	Natural	SO5296	N/A	10518864008	5/13/2020	X	X	X						
20WS-0298-SO5298-N-051320	Natural	SO5298	N/A	10518864019	5/13/2020	X	X	X		X	X			
				10519814002	5/13/2020							X		
20WS-0299-SO5304-N-051320	Natural	SO5304	N/A	10519814007	5/13/2020	X	X	X	X					
20WS-0300-SO5264-N-051220	Natural	SO5264	N/A	10518864005	5/12/2020	X	X	X						
20WS-0300-SO5285-N-051320	Natural	SO5285	N/A	10518864007	5/13/2020	X	X	X						
20WS-0301-SO5571-N-052920	Natural	SO5571	N/A	10520797012	5/29/2020	X	X	X						
20WS-0306-SO5625-N-060120	Natural	SO5625	N/A	10520797015	6/1/2020	X	X	X						
20WS-0312-SO5544-N-052820	Natural	SO5544	N/A	10520797019	5/28/2020	X	X	X		X	X			
				10521670008	5/28/2020							X		
20WS-0313-SO5554-N-052820	Natural	SO5554	N/A	10521670001	5/28/2020	X	X	X	X					
20WS-0315-SO5455-N-052620	Natural	SO5455	N/A	10520797007	5/26/2020	X	X	X						
20WS-0315-SO5488-N-052720	Natural	SO5488	N/A	10520797008	5/27/2020	X	X	X						
20WS-0315-SO5514-N-052720	Natural	SO5514	N/A	10519814011	5/27/2020	X	X	X	X					
20WS-0315-SO5959-8.8-9-N-070920 (20WS-0315-SO5959-8.8-9-N-0709)	Natural	SO5959	8.9 - 9	10524722020	7/9/2020	X	X	X						
20WS-0315-SO5960-4.3-4.7-N-070920 (20WS-0315-SO5960-4.3-4.7-N-070)	Natural	SO5960	4.3 - 4.7	10524722021	7/9/2020	X	X	X						
20WS-0315-SO5961-4.3-4.6-N-070920 (20WS-0315-SO5961-4.3-4.6-N-070)	Natural	SO5961	4.3 - 4.6	10524722022	7/9/2020	X	X	X						
20WS-0315-SO5962-5.3-5.6-N-070920 (20WS-0315-SO5962-5.3-5.6-N-070)	Natural	SO5962	5.3 - 5.6	10524722023	7/9/2020	X	X	X						
20WS-0319-SO5520-D-052720	Field Duplicate	SO5520	N/A	10520797010	5/27/2020	X	X	X						

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Lab ID[2]	Sample Date	Metals				SPLP		ABA	IVBA	
						ASTM D2974	SW-846 6010D	EPA 7471B	IRTC 6.2.2	SW-846 6010D, SPLP	SW-846 7470A, SPLP	Modified Sobek 3.2	IVBA, calculated	SW-846 6010C, IVBA
20WS-0319-SO5520-N-052720	Natural	SO5520	N/A	10520797009	5/27/2020	X	X	X						
20WS-0319-SO5536-N-052820	Natural	SO5536	N/A	10520797011	5/28/2020	X	X	X						
20WS-0350-SO5645-N-060220	Natural	SO5645	N/A	10520797016	6/2/2020	X	X	X						
20WS-0350-SO5840-N-060420	Natural	SO5840	N/A	10521754014	6/4/2020	X	X	X						
20WS-0350-SO5841-N-060420	Natural	SO5841	N/A	10521754015	6/4/2020	X	X	X						
20WS-1113-SO5858-D-060920	Field Duplicate	SO5858	N/A	10521670012	6/9/2020							X		
				10521754020	6/9/2020	X	X	X		X	X			
20WS-1113-SO5858-N-060920	Natural	SO5858	N/A	10521670011	6/9/2020							X		
				10521754019	6/9/2020	X	X	X		X	X			
20WS-1114-SO5854-N-060920	Natural	SO5854	N/A	10521754017	6/9/2020	X	X	X						
20WS-1115-SO5849-N-060920	Natural	SO5849	N/A	10521754016	6/9/2020	X	X	X						
20WS-1116-SO5821-N-060920	Natural	SO5821	N/A	10521754011	6/9/2020	X	X	X						
20WS-1116-SO5823-N-060920	Natural	SO5823	N/A	10521670007	6/9/2020	X	X	X	X					
20WS-1150-SO5926-20.5-20.8-N-062520 (20WS-1150-SO5926-20.5-20.8-N-0)	Natural	SO5926	20.5 - 20.8	10523968004	6/25/2020	X	X	X						
20WS-1150-SO5937-12.3-12.7-N-070120 (20WS-1150-SO5937-12.3-12.7-N-0)	Natural	SO5937	12.3 - 12.7	10523968016	7/1/2020	X	X	X						
20WS-1150-SO5938-24.4-24.9-N-070120 (20WS-1150-SO5938-24.4-24.9-N-0)	Natural	SO5938	24.4 - 24.9	10523968017	7/1/2020	X	X	X						

Notes:

1. Field sample IDs that exceeded the laboratory maximum character limit were reduced to 30 characters (listed in parentheses).
2. Samples analyzed by Pace in Sheridan, WY received an additional laboratory ID (listed in parentheses).

Method	**Analytes**
ASTM D2974	Percent Moisture
SW-846 6010D	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
EPA 7471B	Mercury
IRTC 6.2.2	Multi-Incremental Sampling
SW-846 6010D, SPLP	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
EPA 7471B, SPLP	Mercury
Modified Sobek 3.2 (ABA)	Acid Potential; Acid/Base Potential; Neutralization Potential; Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual; Total Sulfur
IVBA, calculated	IVBA Arsenic and Lead
SW-846 6010C, IVBA	IVBA dissolved and total recoverable Arsenic and Lead

Attachment A
Data Validation Checklists

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10518864
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 5/12/2020, 5/13/2020, 5/14/2020, 5/18/2020
Analysis Date(s): 6/1/2020, 6/2/2020, 6/3/2020, 6/4/2020, 6/8/2020
Data Validator: J. McElroy
Validation Date(s): 7/20/2020- 7/23/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	5/12/2020, 5/13/2020, 5/14/2020, 5/18/2020	677449, 678538, 678758	6/1/2020, 6/2/2020, 6/3/2020	Y	N
Hg			EPA 7471B	28 days		677450	6/2/2020	Y	N
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		679441	6/8/2020	Y	N
Hg			EPA 7471B	28 days		678397	6/4/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y	N X
Were any data flagged because of preservation problems?	Y	N X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.0°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: All %Rs for ICV and CCV are within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y		N	X
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: On 6/8/2020, a detection in the Continuing Calibration Blanks (CCB) results for Beryllium, SPLP (0.00065 mg/L) was greater than 2 times the instrument detection limit (IDL) (0.00027 mg/L). There were no sample results for Beryllium, SPLP bracketed by this CCB; therefore, no qualifications are required.

On 6/8/2020, a detection of Magnesium, SPLP (0.0724mg/L) in a CCB was greater than 2 times the IDL (0.026 mg/L). There were no sample results for Magnesium, SPLP bracketed by this CCB; therefore, no qualifications are required.

On 6/1/2020, there were detection of Beryllium, Cobalt, Lead, Manganese, Molybdenum, and Vanadium in the CCBs that were less than 2 times the IDL, respectively.

On 6/8/2020, there was a detection of molybdenum in the ICB and detections of Aluminum, Barium, Beryllium, Cadmium, Calcium, Cobalt, Iron, Molybdenum, and Vanadium in the CCBs that were less than 2 times the IDL, respectively.

The MB and Leachate Blank for batch 677441 had detections of sodium that were less than 2 times the MDL.

No qualifications are warranted for ICB and CCB detections less than 2 times the IDL or for MB and Leachate Blank detections less than 2 times the MDL.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: On 6/1/2020, the ICS Solution A and/or ICS Solution AB had detections of Arsenic, Barium, Cadmium, Cobalt, Thallium, Vanadium, Lead, and Molybdenum greater than the MDL and a negative Selenium detection with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 6/2/2020, the ICS Solution A and/or ICS Solution AB had detections of Arsenic, Cobalt, Thallium, and Nickel greater than the MDL and negative Cadmium and Vanadium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 6/3/2020, the ICS Solution A had detections of Arsenic Cobalt, and Vanadium greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 6/8/2020, the ICS Solution A and/or ICS Solution AB had detections of Cobalt, Potassium, and Vanadium greater than the MDL and negative Selenium and Cadmium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs are within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: For batch 677449, the LDS were created from sample 20WS-0285-SO5341-N-051420. The LDS RPDs for Manganese (61%), and Potassium (39%) were above the control limit (RPD<35%); therefore, 20WS-0285-SO5341-N-051420 was qualified with a "J" for these analytes.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 677449, the LDS created from sample 20WS-0285-SO5341-N-051420 had an RPD for Silver (53%) above the control limit; however, the Silver result for 20WS-0285-SO5341-N-051420 was reported from batch 678538, and the LDS results for Silver in this batch were within the control limit. No qualification is required.

The rest of the LDS results were within control limits. The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each EPA 6010D batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
677449	3626143MS	3626144MSD	20WS-0285-SO5341-N-051420	EPA 6010D
678538	3631325MS	3631326MSD	20WS-0285-SO5341-N-051420	EPA 6010D
678758	3632331MS	3632332MSD	20WS-0285-SO5355-N-051820	EPA 6010D
679441	3635792MS	3635793MSD	20WS-0297-SO5249-N-051220	EPA 6010D, SPLP

For the Mercury, SPLP, the LDS were created from 20WS-0297-SO5249-N-051220. The RPD were within the control limits; therefore, no qualifications are required.

For Mercury, the LDS were created from 20WS-0285-SO5341-N-051420. The RPD were within the control limits; therefore, no qualifications are required.

For the Percent Moisture, the LDS were created from 20WS-0298-SO5296-N-051320, 20WS-0298-SO5298-N-051320, and a sample not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Aluminum	MS	196%	101.2%	J	677449	20WS-0285-SO5341-N-051420
	MSD	206%				
Antimony	MS	56%	70.0%	J-	677449	20WS-0285-SO5341-N-051420
	MSD	54%				
Beryllium	MS	71%	72%	J-	677449	20WS-0285-SO5341-N-051420
	MSD	73%				
Cobalt	MS	72%	74.15%	J-	677449	20WS-0285-SO5341-N-051420
Cadmium	MSD	74%	74.4%	J-	677449	20WS-0285-SO5341-N-051420
Nickel	MS	72%	73.3%	J-	677449	20WS-0285-SO5341-N-051420
	MSD	74%				
Potassium	MS	227%	78.5%	J	677449	20WS-0285-SO5341-N-051420
Silver	MSD	63%	93.8%	J	678758	20WS-0285-SO5355-N-051820
Mercury	MS	52%	N/A	J-	677450	20WS-0285-SO5341-N-051420

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 677449, the LMS and LMSD %R for Arsenic (-149% and 42% respectively), Copper (154% and 168% respectively), Lead (3410% and -1580% respectively), Manganese (57300% and 2110% respectively), Molybdenum (-825% and -868% respectively), Silver (584% and 156% respectively), and Zinc (1370% and -301% respectively), and the LMS for Iron (-636%) were outside the control limit (75-125%). Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria*." (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 678538, sample 20WS-0285-SO5341-N-051420 was also used to generate an LMS/LMSD sample pair for silver. The %R was within the control limit.

For batch 679441, sample 20WS-0297-SO5249-N-051220 was also used to generate an LMS/LMSD sample pair for the SPLP metals. The %Rs were within the control limit.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 677449, the serial dilution for sample 20WS-0285-SO5341-N-051420 had some analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limit for this sample were Arsenic (22.1%), Barium (22.1%), Cadmium (27.9%), Potassium (15.5%), and Vanadium (19.9%) and are therefore qualified "J". The Cadmium results had a previous qualification of "J-" due to a matrix spike result outside the control limits; therefore, sample 20WS-0285-SO5341-N-051420 will have a final qualification of "J" for Cadmium.

For batch 679441, the serial dilution for sample 20WS-0297-SO5249-N-051220 had an aluminum, SPLP (52.8%) result that was outside the control limit (%D>10%, sample concentration >50x MDL, and SD concentration > project-specific RL), and was therefore qualified "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 677449, there were results for Antimony (14.5%), Beryllium (21%), Cobalt (42.7%), Magnesium (21.5%), and Nickel (53.3%) that had %Ds greater than 10%; however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

For batch 679441, there were results for Magnesium (41.1%) and Potassium (39.7%) that had %Ds greater than 10%; however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N			
Were the percent relative recoveries (%RI) within the control window?	Y	X	N			
Were any data flagged because of internal standard problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: Internal standard used for SW-846 6010D in WO 10518864 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 85.1% to 118.9%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate pair on this WO was 20WS-0285-SO5327-D-051420 and 20WS-0285-SO5327-N-051420. The results for were outside the control limit as summarized below. Therefore, 20WS-0285-SO5327-D-051420 and 20WS-0285-SO5327-N-051420 have been qualified "J" for Silver.

Analyte	project-specific RL	Control Limit	Difference
Silver	1	±2x project-specific RL	59

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The remaining analytes were within the control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10518864, the following qualifications were made:

One (1) Aluminum result is qualified "J" due to high percent recovery of the matrix spike.
One (1) Antimony result is qualified "J-" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Arsenic result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Barium result is qualified "J" due to Serial Dilution results outside the control limits.
One (1) Beryllium result is qualified "J-" due to the low percent recovery of the matrix spike and post-digestion spike.
One (1) Cadmium result is qualified "J" due to matrix spike and Serial Dilution results outside the control limits.
One (1) Cobalt result is qualified "J-" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Manganese result is qualified "J" due to the laboratory duplicate sample results outside the control limits.
One (1) Nickel result is qualified "J-" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Potassium result is qualified "J" due to the matrix spike, laboratory duplicate sample, and Serial Dilution results being outside the control limit.
Two (2) Silver results are qualified "J" due to Field Duplicate results outside the control limits.
One (1) Silver result is qualified "J" due to low percent recovery of the matrix spike.
One (1) Vanadium result is qualified "J" due to Serial Dilution results outside the control limits.
One (1) Aluminum, SPLP, result is qualified "J" due to Serial Dilution results outside the control limits
One (1) Mercury result is qualified "J-" due to low percent recovery of the matrix spike and post-digestion spike.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Josie McElroy

Reviewed by: Laura Moon

Signature: 

Date: 7/28/2020

8/4/2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10519814
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 5/12/2020, 5/13/2020, 5/14/2020, 5/18/2020, 5/20/2020, 5/27/2020
Analysis Date(s): 6/9/2020 and 6/10/2020
Data Validator: S. Green
Validation Date(s): 7/15/2020 – 8/6/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	5/12/2020, 5/13/2020, 5/14/2020, 5/18/2020, 5/20/2020, 5/27/2020	679252, 680082	6/9/2020, 6/10/2020	Y	N
Hg			EPA 7471B	28 days		679195	6/9/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 23.9°C. An email from Pace dated 6/1/2020 stated, "there was a delay by FedEx causing the cooler to not be delivered until today. The samples were noted to arrive over 6 degrees Celsius, the temperature was noted to be 23.9 degrees." Method SW-846 6010D has no temperature preservation requirements. Method EPA 7471B has a temperature preservation requirement of ≤ 6ºC; therefore, mercury results on this work order have been qualified "J-" for detected results and "UJ" for non-detected results.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: All percent recoveries (%R) for ICV and CCV were within control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y	X	N	
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: On 6/9/2020, there were detections of Molybdenum and Vanadium in the CCBs that were less than 2 times the instrument detection limit (IDL). No qualifications are warranted for CCB detections less than 2 times the IDL.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: On 6/9/2020, the opening and closing ICS Solution A had detections of Arsenic, Beryllium, Cobalt, Nickel, Thallium, and/or Vanadium with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are required. The %R for the ICS (Solution A and AB) were within control limits.

On 6/10/2020, there were no detections with an absolute value greater than the MDL for applicable analytes in the ICS Solution A. The %R for the ICS (Solution A and AB) were within control limits.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs were within control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The following table lists the LMS and LMS Duplicate (LMSD) parent sample for each EPA 6010D and EPA 7471B batch on this work order (WO). These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
679252	3634631MS	3634632MSD	20WS-0297-SO5246-N-051220	EPA 6010D
680082	3639289MS	3639290MSD	20WS-0297-SO5246-N-051220	EPA 6010D
679195	3634267MS	3634268MSD	20WS-0297-SO5246-N-051220	EPA 7471B

For Percent Moisture, the LDS was generated from sample 20WS-0315-SO5514-N-052720 and a sample not on this work order. The RPDs were within control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the analytes that had %R for the LMS and/ or LMSD outside control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Aluminum	MS	222%	95.1%	J	679252	20WS-0297-SO5246-N-051220
	MSD	227%				
Antimony	MS	59%	88.6%	UJ	679252	20WS-0297-SO5246-N-051220
	MSD	59%				
Arsenic	MSD	35%	91.6%	J	679252	20WS-0297-SO5246-N-051220

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 679252, the LMS and LMSD %R for Lead (-167% and 546%, respectively), Manganese (6650% and 2690%, respectively), and Zinc (2440% and 361%, respectively) were outside control limits. The LMSD %R for Iron (0%) was also outside control limits. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 679252, the LMS and LMSD %R for Silver (50% and 11%, respectively) were outside the control limit. However, the Silver result for the parent sample, 20WS-0297-SO5246-N-051220, was reported from batch 680082, which had the LMS and LMSD %R for Silver (97% and 100%, respectively) within the control limits. No qualifications are warranted.

For batches 680082 (Silver only) and 679195 (Mercury only), sample 20WS-0297-SO5246-N-051220 was used to generate the LMS/LMSD sample pairs. The %Rs were within control limits.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 680082, the SD for sample 20WS-0297-SO5246-N-051220 had a Silver (10.4%) result that was outside control limits (%D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL), and was qualified "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 679252, the SD results for Calcium (12.7%), Molybdenum (11.1%), and Vanadium (13.3%) had %Ds greater than 10%; however, the sample concentrations were less than 50 times the MDL and/ or the SD concentrations were less than the project-specific RL. No qualifications were warranted.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for SW-846 6010D in WO 10519814 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 85.1% to 114.9%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: There was no field duplicate pair submitted on this WO.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10519814, the following qualifications were made:

One (1) Aluminum result is qualified "J" due to high matrix spike recovery.
One (1) Antimony result is qualified "UJ" due to low matrix spike recovery.
One (1) Arsenic result is qualified "J" due to low matrix spike recovery.
One (1) Silver result is qualified "J" due to serial dilution results being outside control limits.
Seven (7) Mercury results are qualified "J-" due to preservation requirement not being met.
One (1) Mercury result is qualified "UJ" due to preservation requirement not being met.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Shelby Green

Reviewed by: Laura Moon

Signature: Shelby Green

Laura Moon

Date: August 6, 2020

September 14, 2020

Stage 4 Data Validation Checklist for General Chemistry Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10519814
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil
Analyses: Acid Potential; Acid/Base Potential; Neutralization Potential; Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual
Sample Date(s): 5/12/2020, 5/13/2020, 5/18/2020
Analysis Date(s): 6/10/2020, 6/15/2020, 6/16/2020
Data Validator: S. Green
Validation Date(s): 8/6/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Acid Potential; Acid/Base Potential	Pace	Soil	Modified Sobek 3.2	None	5/12/2020, 5/13/2020, 5/18/2020	681406	6/16/2020	N/A	N/A
Neutralization Potential						680260	6/10/2020		
Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual						679785	6/15/2020		

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 23.9°C. An email from Pace dated 6/1/2020 stated, "there was a delay by FedEx causing the cooler to not be delivered until today. The samples were noted to arrive over 6 degrees Celsius, the temperature was noted to be 23.9 degrees." A follow-up email from Pace dated 6/2/2020 stated, "ABA does not have a temperature requirement." Email correspondence are included in the 10519814 Analytical Data package. No qualifications are necessary.

2. Instrument Calibration

Was Instrument successfully calibrated at the correct frequency?	Y [X]	N [ ]
Was Instrument calibrated with appropriate standards and blanks?	Y [X]	N [ ]
Was Initial Calibration Verification sample analyzed?	Y [X]	N [ ]
Was ICV and Continuing Calibration Verifications (ICV) results within the control window?	Y [X]	N [ ]
Were any data flagged because of calibration problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

3. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y [X]	N [ ]
Were MBs within the control window?	Y [X]	N [ ]
Were any data flagged because of blank problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

4. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
What was the source of the LCS?	Unknown	
Were LCS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LCS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

5. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N		
Were LDS results within the control window?	Y		N	X	
Were any data flagged because of LDS problems?	Y	X	N		

Describe Any Actions Taken: For Modified Sobek 3.2, Neutralization Potential (NP), sample 20WS-0246-SO5378-N-051820 was used to generate the LDS. The RPD was outside control limits (40%); therefore, the NP result for the parent sample is qualified "J". By extension, the Acid/Base Potential result for this sample, 20WS-0246-SO5378-N-051820, is qualified "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: Sample 20WS-0297-SO5249-N-051220 was used to generate the LDS for Modified Sobek 3.2, Sulfur analyses. The RPDs were within control limits; therefore, no qualifications are required.

6. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y		N		N/A	X
Were LMS results within the control window?	Y		N		N/A	X
Were any data flagged because of LMS problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Matrix Spike samples are not performed for the Modified Sobek 3.2 method.

7. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

8. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: No field duplicate sample pair was submitted on this work order (WO).

9. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: On WO 10519814, the following qualifications were made:

One (1) Neutralization Potential result is qualified "J" due to an LDS result outside control limits.
One (1) Acid/Base Potential result is qualified "J" due to an LDS result outside control limits.

Comments:

10. Authorization of Data Validation

Data Validator

Name: Shelby Green **Reviewed by:** Laura Moon

Signature: Shelby Green Laura Moon

Date: August 6, 2020 September 10, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit **Case No:** 10520797 **Laboratory:** Pace Analytical

Project: WSSOU RI Sampling - 2020 **Sample Matrix:** Soil **Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury

Sample Date(s): 5/19/2020, 5/20/2020, 5/21/2020, 5/26/2020, 5/27/2020, 5/28/2020, 5/29/2020, 6/1/2020, 6/2/2020 **Analysis Date(s):** 6/15/2020, 6/16/2020, 6/17/2020, 6/18/2020, 6/22/2020

Data Validator: J. McElroy **Validation Date(s):** 7/29/2020, 7/31/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	5/19/2020, 5/20/2020, 5/21/2020, 5/26/2020, 5/27/2020, 5/28/2020, 5/29/2020, 6/1/2020, 6/2/2020	680074, 681539	6/16/2020, 6/17/2020	Y	N
Hg			EPA 7471B	28 days		680078	6/15/2020	Y	N
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		680861, 682497	6/15/2020, 6/22/2020	Y	N
Hg			EPA 7470A	28 days		680858	6/18/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 1.8°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y	[ ]	N	[ ]	N/A	[X]
Was the peak widths and resolution of the masses within the required control limits?	Y	[ ]	N	[ ]	N/A	[X]
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y	[ ]	N	[ ]	N/A	[X]
Was Instrument successfully calibrated at the correct frequency?	Y	[X]	N	[ ]		
Was Instrument calibrated with appropriate standards and blanks?	Y	[X]	N	[ ]		
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	[X]	N	[ ]		
Were ICV and CCV results within the control window?	Y	[X]	N	[ ]		
Were any data flagged because of calibration problems?	Y	[ ]	N	[X]		

Describe Any Actions Taken: None required

Comments: All %Rs for the ICV and CCV samples were within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: On 6/15/2020, a detection in the Continuing Calibration Blanks (CCB) results for Magnesium, SPLP (0.076 mg/L) was greater than 2 times the instrument detection limit (IDL) (0.052 mg/L). There were no sample results for Magnesium, SPLP bracketed by this CCB; therefore, no qualifications are required.

On 6/15/2020, there was a detection of Molybdenum in the ICB and detections of Aluminum, Beryllium, Cadmium, Iron, Magnesium, Molybdenum, and Vanadium in the CCBs that were less than 2 times the IDL, respectively.

For batch 680861, the MB had a detection for Sodium and the Leachate Blank had detections of Barium, Calcium, and Sodium that were less than 2 times the MDL.

On 6/16/2020, a detection in the CCB results for Molybdenum that were less than 2 times the IDL; therefore, no qualifications are required.

No qualifications are warranted for ICB and CCB detections less than 2 times the IDL or for MB and Leachate Blank detections less than 2 times the MDL.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: On 6/15/2020, the opening and closing ICS Solution A had detections of Beryllium, Cobalt, and Arsenic greater than the MDL along with negative Cadmium and Vanadium detections with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control criteria.

On 6/16/2020, the ICS Solution A and/or ICS Solution AB had detections of Arsenic, Cobalt, Thallium, Vanadium, Lead, and Nickel greater than the MDL and negative Cadmium and Vanadium detections with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control criteria.

On 6/17/2020, the ICS Solution A and ICS solution AB were within the control criteria; therefore, no qualifications are required.

On 6/22/2020, the ICS Solution A's had detections of Arsenic, Beryllium, Cobalt, Thallium and Nickel greater than the MDL and negative Cadmium and Vanadium detections with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control criteria

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs for the LCS samples were within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The LDS results were within control limits. The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for EPA 6010D batches on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
681539	3647016MS	3647017MSD	20WS-0013-SO5448-N-052120	EPA 6010D
680861	3643458MS	3643459MSD	20WS-0312-SO5544-N-052820	EPA 6010D, SPLP
680074	3639269MS	3639270MSD	20WS-0013-SO5448-N-052120	EPA 6010D
682497	3652340MS	3652341MSD	20WS-0312-SO5544-N-052820	EPA 6010D, SPLP

For the Mercury, SPLP, the LDS were created from 20WS-0312-SO5544-N-052820. The RPD were within the control limits; therefore, no qualifications are required.

For Mercury, the LDS were created from 20WS-0013-SO5448-N-052120. The RPD were within the control limits; therefore, no qualifications are required.

For the Percent Moisture, the LDS were created from 20WS-0013-SO5448-N-052120, 20WS-0179-SO5680-N-060220, 20WS-0312-SO5544-N-052820 and a sample not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Silver	MS	72%	88%	J	681539	20WS-0013-SO5448-N-052120
Antimony	MS	67%	83.9%	J	680074	20WS-0013-SO5448-N-052120
	MSD	60%				
Chromium	MS	137%	91.5%	J	680074	20WS-0013-SO5448-N-052120
	MSD	141%				
Magnesium	MS	129%	89.7%	J	680074	20WS-0013-SO5448-N-052120

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 680861, sample 20WS-0312-SO5544-N-052820 was used to generate an LMS/LMSD sample pair for the SPLP metals. The %Rs were within the control limit.

The LMS and LMSD %R for Aluminum (323% and 269% respectively), Lead (847% and 648% respectively), Manganese (2600% and 1190% respectively), Silver (352% and 364% respectively), and Zinc (1080% and 400% respectively), along with the LMS for Arsenic (159%), Copper (156%), and Iron (385%) for batch 680074 were outside the control limit (75-125%). Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 682497, sample 20WS-0312-SO5544-N-052820 was used to generate an LMS/LMSD sample pair for a Zinc, SPLP. The %Rs were within the control limit.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 680074, the serial dilution for sample 20WS-0013-SO5448-N-052120 had analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limit for this sample were Cadmium (12.8%), Cobalt (18.4%), Iron (12.3%), and Lead (14.1%). Therefore, 20WS-0013-SO5448-N-052120 has been qualified "J" for these analytes.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 681539, the %D was within the control limit; therefore, no qualifications are required

For batch 680861, there were SD results for Aluminum (141.5%), Barium (15.1%), Calcium (45.1%), Chromium (16.2%), Iron (13.0%), Magnesium (56.0%), Manganese (13.0%), Molybdenum (17.6%), Potassium (66.4%), and Silver (62.6%) that had %Ds greater than 10%; however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

For batch 680074, there were SD results for Nickel (10.7%) that had %D greater than 10%; however, the sample concentration was less than 50 times MDL and/or the SD concentration were less than the project-specific RL. No qualifications were required.

For batch 682497, there were SD results for Zinc (44.3%) that had %D greater than 10%; however, the sample concentration was less than 50 times MDL and/or the SD concentration were less than the project-specific RL. No qualifications were required.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for SW-846 6010D in WO 10520797 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 85.6% to 115.7%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate pair on this WO was 20WS-0319-SO5520-D-052720 and 20WS-0319-SO5520-N-052720. The RPDs for Lead (62%) and Silver (53%) were outside the control limits (35%). 20WS-0319-SO5520-D-052720 and 20WS-0319-SO5520-N-052720 are therefore qualified "J" for these analytes.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The remaining analytes were within the control limits.

12. Overall Assessment

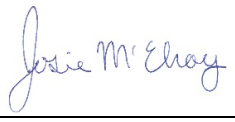
Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10520797, the following qualifications were made:
One (1) Antimony result is qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Cadmium result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Chromium result is qualified "J" due to high percent recovery of the matrix spike and post-digestion spike.
One (1) Cobalt result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Iron result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Lead result is qualified "J" due to Serial Dilution being outside the control limits.
Two (2) Lead results are qualified "J" due to Field Duplicates results outside the control limits.
One (1) Magnesium result is qualified "J" due to high percent recovery of the matrix spike and post-digestion spike.
One (1) Silver result is qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
Two (2) Silver results are qualified "J" due to Field Duplicates results outside the control limits.

Comments:

13. Authorization of Data Validation

Data Validator
Name: Josie McElroy **Reviewed By:** Shelby Green

Signature:  

Date: August 4, 2020 August 17, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10521603 (S2006476)
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil, Water
Analyses: Total Recoverable: Arsenic, Lead; Dissolved: Arsenic, Lead; IVBA: Arsenic, Lead
Sample Date(s): 6/10/2020, 6/29/2020
Analysis Date(s): 7/8/2020, 7/23/2020, 7/27/2020 10/20/2020, 10/21/2020,
Data Validator: J. McElroy
Validation Date(s): 10/23/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Dissolved (IVBA leachate): As, Pb	Pace (Sheridan, WY)	IVBA Leachate	EPA 6010C	6 months	6/10/2020	NA	7/8/2020	Y	NA
As, Pb		Solid	EPA 6010C	6 months		17551	7/23/2020	Y	NA
IVBA: As, Pb		Calculation	EPA 3050 (Calculation)	6 months		NA	7/27/2020	Y	NA

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y	N X
Were any data flagged because of preservation problems?	Y	N X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 1.3°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

Samples on this Work Order (WO) were assigned a WO of 10521603, and the Pace Network lab in Pace Sheridan, WY assigned a Lab Order number of S2006476 to this sample delivery group.

The laboratory reported the matrix of all samples as Water. This is incorrect as all WSSOU samples are soils. An email from the lab on 8/6/2020 (attached) stated, "this is how we usually submit samples to our water department." The data user should be aware that all total metal results are for soils and all dissolved metal results are for the IVBA leachate.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y	X	N			

Describe Any Actions Taken: The raw results for total recoverable Lead for 20WS-0015-SO5884-N-061020 (54.9867 mg/L) and 20WS-0288-SO5881-N-061020 (17.456 mg/L) were greater than the highest calibration standard (10 mg/L). These total recoverable Lead results have been qualified "J" because they are outside the calibration range of the instrument. Additionally, the IVBA Lead results for these samples have been qualified "J" because total recoverable Lead is used in the IVBA calculation.

Comments: All %Rs for the ICV and CCV samples were within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: There was a detection for Arsenic in the CCB sample analyzed 7/23/2020 at 16:58 (0.007713 mg/L) that was greater than 2 times the Method Detection Limit (MDL). The Arsenic results bracketed by this CCB had raw results greater than 5 times the CCB result; therefore, no qualifications are warranted.

The MB, ICB, and remaining CCB samples for the dissolved and total recoverable analyses were within the control limits.

A reagent blank was not analyzed for IVBA, so the EPA IVBA SOP (EPA 2017) requirement of 1 reagent blank for every 20 samples was not met. However, the MB requirement for IVBA was met, and this MB (Lab ID S2006476-001) had results within the control limit. Applying professional judgement, no qualifications were made due to lack of reagent blank.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: On 7/7/20, there was a detection of Lead (0.0156 mg/L) in the ICS Solution A sample that was greater than the MDL. The samples with Lead results less than 10 times the ICS Solution A detection (20WS-0040-SO5880-N-061020 and 20WS-0288-SO5882-N-061020) did not have raw results for the interferents (Al, Ca, Fe, Mg, Na) that were similar to the concentration in the ICS Solution A; therefore no qualifications were warranted. The %Rs for Solution A and Solution AB were within the control limit (80-120%).

On 7/23/20, in ICS Solution A, Arsenic and Lead results were less than the MDL. The %Rs for Solution A and Solution AB were within the control limit (80-120%).

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y		N	X
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y	X	N	

Describe Any Actions Taken: The IVBA LCS (Lab ID of S2006476-002) did not include a spike for Arsenic. Additionally, a standard reference material (SRM) for the IVBA analysis of Arsenic was not analyzed. The analyses of an LCS and SRM are listed as requirements in the WSSOU RI Sampling Addendum 1 - In Vitro Bioaccessibility Study (CDM Smith, 2019) and the Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead and Arsenic in Soil (EPA, 2017). Therefore, all IVBA Arsenic results on this WO have been qualified "J".

Comments: All %Rs for the LCS samples were within the control limits.

The spike amount for the IVBA LCS (Lab ID of S2006476-002) was not included in the lab report. An email from the lab on 8/6/2020 (attached) stated "the spike solution was 1000 ppm Pb, so the spike value was 10 ppm in solution." The dissolve Lead result was reported as 9.88 mg/L. The %R of 98.8% was within the control limits (85–115%) specified in the Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead and Arsenic in Soil (EPA, 2017).

The standard reference material (SRM) for the IVBA analysis of Lead was NIST-2711a. The dissolved Lead result was reported as 11.1 mg/L. Using a total recoverable Lead concentration of 1,300 mg/kg, the IVBA Lead result is 84.6%, which is within the acceptable range of 75.2-96.2% as specified in the Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead and Arsenic in Soil (EPA, 2017).

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: For dissolved metals, LDS were created from sample 20WS-0288-SO5883-N-061020 and 20WS-0288-SO5882-N-061020.
For total recoverable metals, the LDS were created from sample 20WS-0003-SO5877-N-061020 and 20WS-0288-SO5883-N-061020.
For IVBA, the LDS was created from 20WS-0288-SO5883-N-061020.
The data user should be aware that all results were within control limits. No qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y		N	X
Were LMS percent recovery (%R) results within the control window?	Y	X	N	
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The IVBA LMS (Lab ID of S2006476-013) did not include a spike for Arsenic. The analysis of an LMS is listed as a requirement in the WSSOU RI Sampling Addendum 1 - In Vitro Bioaccessibility Study (CDM Smith, 2020) and the Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead and Arsenic in Soil (EPA, 2017). Therefore, all IVBA results for Arsenic on this WO have been qualified "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: Sample 20WS-0288-SO5883-N-061020 was used to generate an LMS/LMS Duplicate (LMSD) sample pair for the dissolved metals. The %Rs were within the control limits (80-120%).

Sample 20WS-0015-SO5884-N-061020 was used to generate an LMS for IVBA Lead. The spike amount for the LMS with a Lab ID of S2006476-012 was not included in the lab report. An email from the lab on 8/6/2020 (attached) stated "the spike solution was 1000 ppm Pb, so the spike value was 10 ppm in solution." The %R (95%) was within the control limits (75-125%) specified in the Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead and Arsenic in Soil (EPA, 2017).

Sample 20WS-0003-SO5877-N-061020 was used to generate an LMS/LMS Duplicate (LMSD) sample pair for the total recoverable metals. The %Rs were within the control limits (80-120%).

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y	X	N	
Were any data flagged because of SD problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: On 7/8/2020, sample 20WS-0015-SO5884-N-061020 was used for the serial dilution. The %Ds were within the control limit; therefore, no qualifications are required.

On 7/23/2020, a sample not on this WO was used for the serial dilution.

9. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

10. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: There was no field duplicate pair on this WO.

11. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

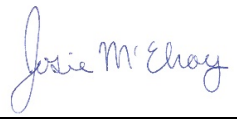
If so, explain: Eight (8) IVBA Arsenic results have been qualified "J" due to the frequency requirement for LCS, SRM, and LMS samples not being met.
Two (2) total recoverable Lead results have been qualified "J" due to raw results being above calibration range of the instrument.
Two (2) IVBA Lead results have been qualified "J" due to qualification made for the corresponding total recoverable Lead results being above calibration range of the instrument.

Comments:

12. Authorization of Data Validation

Data Validator

Name: Josie McElroy **Reviewed By:** Laura Moon

Signature:  

Date: 10/23/2020 11/10/2020

Stewart Smith

From: Tom Patten <tpatten@imlinc.com>
Sent: Thursday, August 6, 2020 2:02 PM
To: Stewart Smith
Cc: 'Jennifer Anderson'
Subject: RE: questions on data from project S2006476 / 10521603
Attachments: image006.jpg; image001.png; image007.png

Stewart,

1) The spike solution was 1000 ppm Pb, so the spike value was 10 ppm in solution.

2) The extraction solution was 0.4M glycine, or 90 g in 3000 ml.

3) Yes this is how we usually submit samples to our water department.

Sorry for the confusion, we have only done this method a couple of times and have obviously not perfected how best to report these.

Thanks,

Tom Patten
Lab Services Manager | Pace Wyoming
1673 Terra Ave, Sheridan, WY 82801
o: 307.461.4987 | m: 307.751.0325 | pacelabs.com

From: Stewart Smith [mailto:ssmith@pioneer-technical.com]
Sent: Thursday, August 06, 2020 9:14 AM
To: Tom Patten
Cc: Jennifer Anderson
Subject: questions on data from project S2006476 / 10521603

Tom-

A scientist at BP/ Atlantic Richfield is reviewing the IVBA data that you reported to Pioneer Technical on 7/31/20 under Pace Project #10521603 and has some questions. On page 8 of 1543 are the results for the LCS, however there is no

spike amount given for either analyte. The same question applies to page 19 of 1543 that has results for a matrix spike sample. Can you tell us what those spike amounts are?

Page 1539 of 1543 gives details of the IVBA solution preparation. Could you please clarify the final concentration of the glycine solution. Since there are 2 numbers written there, it is not clear if it is supposed to be a sum.

Separately, I also have a question about the chain-of-custodies (COC) included with the report. I am a little confused by the WEB COC for the aqueous samples. Was some of the sample prep done at a lab other than Sheridan? Or is that your internal procedure for dealing with leachate samples?

Thank you,
Stewart

PIONEER TECHNICAL SERVICES, INC.

Stewart Smith | Senior Hydrogeologist

Pioneer Technical Services Inc. | 1101 South Montana. P.O. Box 3445 | Butte, MT 59702
(406) 497-8017 | ssmith@pioneer-technical.com | www.pioneer-technical.com

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10521670
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 5/28/2020, 6/1/2020, 6/2/2020, 6/3/2020, 6/4/2020 & 6/9/2020
Analysis Date(s): 6/25/2020 & 6/26/2020
Data Validator: S. Green
Validation Date(s): 8/12/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	5/28/2020, 6/1/2020, 6/2/2020, 6/3/2020, 6/4/2020, 6/9/2020	682958, 683453	6/25/2020, 6/26/2020	Y	N
Hg			EPA 7471B	28 days		681963	6/25/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 3.4°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: All percent recoveries (%R) for ICV and CCV were within control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y	X	N	
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: On 6/25/2020, there were detections of Molybdenum and Vanadium in the bracketing CCBs that were less than 2 times the instrument detection limit (IDL). No qualifications are warranted for CCB detections less than 2 times the IDL.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: On 6/25/2020, the opening and closing ICS Solution A samples had detections of Beryllium, Cobalt, Thallium, and/or Vanadium, and a negative detection of Cadmium with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are required. The %R for the ICS (Solution A and AB) were within control limits.

On 6/26/2020, there were no detections with an absolute value greater than the MDL for applicable analytes in the ICS Solution A. The %R for the ICS (Solution A and AB) were within control limits.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs were within control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The following table lists the LMS and LMS Duplicate (LMSD) parent sample for each EPA 6010D and EPA 7471B batch on this work order (WO). These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
682958	3654432MS	3654433MSD	20WS-0313-SO5554-N-052820	EPA 6010D
683453	3656590MS	3656591MSD	20WS-0162-SO5732-N-060320	EPA 6010D
681963	3649312MS	3649313MSD	20WS-0313-SO5554-N-052820	EPA 7471B

For Percent Moisture, the LDS samples were generated from sample 20WS-0313-SO5554-N-052820 and a sample not on this WO. The RPDs were within control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the analytes that had %R for the LMS and/ or LMSD outside control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Antimony	MS	47%	74.3%	J-	682958	20WS-0313-SO5554-N-052820
	MSD	47%				
Calcium	MSD	72%	82.3%	J	682958	20WS-0313-SO5554-N-052820

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For Batch 682958, the LMS and LMSD %R for Aluminum (183% and 196%, respectively), Iron (-34% and -11%, respectively), Manganese (2200% and 425%, respectively), and Zinc (-13% and 37%, respectively), and the LMSD %R for Lead (194%) were outside control limits. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For Batch 683453 (Silver only), sample 20WS-0162-SO5732-N-060320 was used to generate an LMS/LMSD sample pair. For Batch 681963 (Mercury only), sample 20WS-0313-SO5554-N-052820 was used to generate the LMS/LMSD sample pair. The %Rs were within control limits.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For Batch 682958, the SD for sample 20WS-0313-SO5554-N-052820 had several analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limits for the sample were Aluminum (16.0%), Arsenic (13.9%), Barium (15.8%), Cadmium (17.2%), Calcium (14.2%), Chromium (14.1%), Iron (23.0%), Lead (18.8%), Magnesium (13.7%), Manganese (16.5%), Potassium (11.9%), Silver (11.9%), Vanadium (12.6%), and Zinc (20.9%); therefore, these analytes are qualified "J" for 20WS-0313-SO5554-N-052820 .

The Calcium result was previously qualified "J" due to poor matrix spike recovery and will receive a final qualification of "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For Batch 682958, the results for Beryllium (11.8%), Cobalt (21.8%), and Nickel (10.9%) had %Ds greater than 10%; however, the sample concentrations were less than 50 times the MDL and/ or the SD concentrations were less than the project-specific RL. No additional qualifications were warranted.

For Batch 683453, sample 20WS-0162-SO5732-N-060320 was used for the SD. The results were within control limits.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for SW-846 6010D in WO 10521670 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 87.2% to 112.7%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y	X	N		N/A	
Were any data qualified because of field duplicate problems?	Y		N	X	N/A	

Describe Any Actions Taken: None required

Comments: The field duplicate pair on this WO were samples 20WS-0138-SO5763-N-060420 and 20WS-0138-SO5763-D-060420. The results for all analytes were within control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10521670, the following qualifications were made:

One (1) Antimony result is qualified "J" due to poor matrix spike recovery.
One (1) Calcium result is qualified "J" due to poor laboratory precision and an SD result outside control limits.
One (1) Aluminum result is qualified "J" due to a SD result outside control limits.
One (1) Arsenic result is qualified "J" due to a SD result outside control limits.
One (1) Barium result is qualified "J" due to a SD result outside control limits.
One (1) Cadmium result is qualified "J" due to a SD result outside control limits.
One (1) Chromium result is qualified "J" due to a SD result outside control limits.
One (1) Iron result is qualified "J" due to a SD result outside control limits.
One (1) Lead result is qualified "J" due to a SD result outside control limits.
One (1) Magnesium result is qualified "J" due to a SD result outside control limits.
One (1) Manganese result is qualified "J" due to a SD result outside control limits.
One (1) Potassium result is qualified "J" due to a SD result outside control limits.
One (1) Silver result is qualified "J" due to a SD result outside control limits.
One (1) Vanadium result is qualified "J" due to a SD result outside control limits.
One (1) Zinc result is qualified "J" due to a SD result outside control limits.

Comments:

13. Authorization of Data Validation

Data Validator
Name: Shelby Green

Reviewed by: Laura Moon

Signature: Shelby Green

Laura Moon

Date: August 12, 2020

September 14, 2020

Stage 4 Data Validation Checklist for General Chemistry Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10521670
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil
Analyses: Acid Potential; Acid/Base Potential; Neutralization Potential; Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual
Sample Date(s): 5/28/2020, 6/2/2020 & 6/9/2020
Analysis Date(s): 6/26/2020, 7/23/2020 & 7/27/2020
Data Validator: S. Green
Validation Date(s): 8/13/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Acid Potential; Acid/Base Potential	Pace	Soil	Modified Sobek 3.2	None	5/28/2020, 6/2/2020 6/9/2020	682537	7/27/2020	N/A	N/A
Neutralization Potential						682537	7/23/2020		
Sulfur, HCl Extractable; Sulfur, HNO3 Extractable; Sulfur, Hot Water Extractable; Sulfur, Residual						682537	6/26/2020		

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 3.4°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was Instrument successfully calibrated at the correct frequency?	Y [X]	N [ ]
Was Instrument calibrated with appropriate standards and blanks?	Y [X]	N [ ]
Was Initial Calibration Verification sample analyzed?	Y [X]	N [ ]
Was ICV and Continuing Calibration Verifications (ICV) results within the control window?	Y [X]	N [ ]
Were any data flagged because of calibration problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

3. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y [X]	N [ ]
Were MBs within the control window?	Y [X]	N [ ]
Were any data flagged because of blank problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

4. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
What was the source of the LCS?	Unknown	
Were LCS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LCS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments:

5. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: For Modified Sobek 3.2, Neutralization Potential, sample 20WS-1113-SO5858-D-060920 was used to generate the LDS. The RPD was outside control limits (41%); therefore, the NP result for the parent sample is qualified "J". Sample 20WS-1113-SO5858-D-060920 is the field duplicate of sample 20WS-1113-SO5858-N-060920; therefore 20WS-1113-SO5858-N-060920 is also qualified "J" for NP. By extension, the Acid/Base Potential results for both samples are qualified "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: A sample not on this work order (WO) was used to generate the LDS for the Modified Sobek 3.2, Sulfur analyses. The RPDs were outside control limits, but no qualifications are required as the parent sample is from a different WO.

6. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y		N		N/A	X
Were LMS results within the control window?	Y		N		N/A	X
Were any data flagged because of LMS problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Matrix Spike samples are not performed for the Modified Sobek 3.2 method.

7. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

8. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The results for Neutralization Potential (RPD = 40%) and Acid/Base Potential (difference = 1.3) were outside control limits (RPD ≤ 35%, difference ≤ 2 times project-specific RL [respectively]) for the field duplicate pair, 20WS-1113-SO5858-N-060920 and 20WS-1113-SO5858-D-060920. These samples are qualified "J" due to poor field precision. The Neutralization Potential and Acid/Base Potential results were previously qualified "J" due to poor laboratory precision and will receive a final qualification of "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The other analytes were within the control limits for field duplicate precision.

9. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: On WO 10521670, the following qualifications were made:

Two (2) Neutralization Potential results are qualified "J" due to poor laboratory and field precision.
Two (2) Acid/Base Potential results are qualified "J" due to poor laboratory and field precision.

Comments:

10. Authorization of Data Validation

Data Validator		
Name:	Shelby Green	**Reviewed by:** Laura Moon
Signature:	Shelby Green	Laura Moon
Date:	August 13, 2020	September 10, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit **Case No:** 10521754 **Laboratory:** Pace Analytical

Project: WSSOU RI Sampling - 2020 **Sample Matrix:** Soil **Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury

Sample Date(s): 6/2/2020, 6/3/2020, 6/4/2020 & 6/9/2020 **Analysis Date(s):** 6/22/2020, 6/24/2020, 6/25/2020 & 6/26/2020

Data Validator: S. Green **Validation Date(s):** 8/11/2020 – 8/12/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	6/2/2020, 6/3/2020, 6/4/2020, 6/9/2020	681567, 682749	6/22/2020, 6/24/2020	Y	N
Hg			EPA 7471B	28 days		681569	6/25/2020	Y	N
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		682497, 683422	6/22/2020, 6/26/2020	Y	N
Hg			EPA 7470A	28 days		682007	6/24/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y	N X
Were any data flagged because of preservation problems?	Y	N X

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 4.1°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: All %Rs for the ICV and CCV samples were within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y		N	X
Were any data flagged because of blank problems?	Y	X	N	

Describe Any Actions Taken: The leachate blank (LB) for batch 682497 for SPLP Metals had a detection of Magnesium (0.051 mg/L) greater than 2 times the MDL (0.044 mg/L). The Magnesium, SPLP result for sample 20WS-1113-SO5858-N-060920 is less than 5 times the leachate blank detection and is therefore qualified "U".

Comments: The MB for batch 681567 had a detection of Manganese (0.61 mg/kg) greater than 2 times the MDL (0.28 mg/kg). No Manganese results in this batch were less than 5 times the MB detection. No qualifications are required. The MB also had a detection of Lead (0.15 mg/kg) less than 2 times the MDL (0.22 mg/kg). No qualification is warranted.

There were detections of Molybdenum in the 6/22/2020 bracketing CCBs less than 2 times the instrument detection limit (IDL). Additionally, there were detections of Calcium in the LB for batch 682497 and Sodium in the LB and MB for batch 683422 less than 2 times the MDL. No additional qualifications are required.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None required

Comments: On 6/24/2020 (Silver only), the ICS Solution A and ICS Solution AB were within control limits.

On 6/22/2020, the opening and closing ICS Solution A had detections of Arsenic, Beryllium, Cobalt, Nickel, and Thallium greater than the MDL and negative Cadmium and Vanadium detections with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control criteria.

On 6/26/2020 (Sodium only), the percent recoveries of the interference check samples (Solutions A and AB) were within the control criteria.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs for the LCS samples were within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: The Silver result for sample 20WS-1116-SO5821-N-060920 (RPD: 57%) and the Manganese result for sample 20WS-1114-SO5854-N-060920 (RPD: 41%) are qualified "J" due to poor laboratory precision.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The rest of the Duplicate Samples were within control limits. The following table lists the LMS and LMS Duplicate (LMSD) parent samples for each batch on this work order (WO). These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
682749	3653344MS	3653345MSD	20WS-1116-SO5821-N-060920	EPA 6010D
681567	3647400MS	3647401MSD	20WS-1114-SO5854-N-060920	EPA 6010D
683422	3656481MS	3656482MSD	20WS-0130-SO5728-N-060220	EPA 6010D, SPLP
681569	3647408MS	3647409MSD	20WS-1114-SO5854-N-060920	EPA 7471B
682007	3649517MS	3649518MSD	20WS-0130-SO5728-N-060220	EPA 7470A, SPLP

For batch 682497 (SPLP Metals), the LDS was generated from a sample not on this WO. The RPDs were within control limits.

For the Percent Moisture, the LDS were created from 20WS-0162-SO5733-N-060320, 20WS-1114-SO58584-N-060920, and two samples not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Copper	MSD	57%	89.8%	J	681567	20WS-1114-SO5854-N-060920
Aluminum	MS	221%	91.0%	J	681567	20WS-1114-SO5854-N-060920
	MSD	235%				
Antimony	MS	52%	83.0%	J	681567	20WS-1114-SO5854-N-060920
	MSD	45%				
Arsenic	MS	153%	87.0%	J	681567	20WS-1114-SO5854-N-060920
	MSD	70%				
Lead	MS	39%	80.7%	J	681567	20WS-1114-SO5854-N-060920
	MSD	56%				
Zinc	MS	31%	81.0%	J	681567	20WS-1114-SO5854-N-060920
Silver	MSD	131%	86.0%	J	682749	20WS-1116-SO5821-N-060920

The Silver result for 20WS-1116-SO5821-N-060920 was previously qualified "J" due to poor laboratory precision and will receive a final qualification of "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 682497, a sample not on this WO was used to generate an LMS/LMSD sample pair for the SPLP metals. The %Rs were within the control limit.

The LMS and LMSD %R for Calcium (-10% and -95% respectively), Manganese (-256% and 314% respectively), and Iron (-65% and -9% respectively) for batch 681567 were outside the control limit (75-125%). Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria*." (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications were warranted.

For batch 681569 (Mercury), sample 20WS-1114-SO5854-N-060920 was used to generate the LMS/LMSD sample pair. For batch 682007 (Mercury, SPLP), sample 20WS-0130-SO5728-N-060220 was sued to generate the LMS/LMSD sample pair. The %R were within control limits.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 681567, the serial dilution for sample 20WS-1114-SO5854-N-060920 had analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limit for this sample were Cobalt (15.6%), Lead (12.6%), Manganese (13.7%), and Zinc (13.4%); therefore, these results were qualified "J". The Lead and Zinc results were previously qualified "J" due to poor matrix spike recovery and will receive a final qualification of "J". The Manganese result was previously qualified "J" due to poor laboratory precision and will receive a final qualification of "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 681567, there were SD results for Antimony (49.7%), Cadmium (10.7%), and Nickel (17.1%) with %D greater than 10%; however, the sample concentration was less than 50 times MDL and/or the SD concentration were less than the project-specific RL. No additional qualifications were required.

For batch 682749, the SD %D was within the control limit; therefore, no qualifications were required.

For batch 683422, the SD %D was within the control limit; therefore, no qualifications were required.

For batch 682497, the SD was generated from a sample not on this WO. The %D was outside control limits for Antimony, Arsenic, Calcium, Chromium, Cobalt, Molybdenum, Silver, and Zinc. No qualifications are required.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N			
Were the percent relative recoveries (%RI) within the control window?	Y	X	N			
Were any data flagged because of internal standard problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: Internal standards used for SW-846 6010D in WO 10521754 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 83.2% to 112.1%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The Cadmium, Lead, and Zinc results for the field duplicate sample pair (20WS-0121-SO5801-N-060420 and 20WS-0121-SO5801-D-060420) are qualified "J" due to poor field precision as summarized below.

The Lead, SPLP, Manganese, SPLP, Arsenic, Manganese, and Zinc results for the other field duplicate sample pair (20WS-1113-SO5858-N-060920 and 20WS-1113-SO5858-D-060920) are qualified J" due to poor field precision as summarized below.

Field Duplicate Sample	Parent Sample	Analyte	Control Limit	Difference	RPD
20WS-0121-SO5801-D-060420	20WS-0121-SO5801-N-060420	Cadmium	±2x project-specific RL	4.13	-
		Lead	RPD≤35%	-	177%
		Zinc	RPD≤35%	-	173%
20WS-1113-SO5858-D-060920	20WS-1113-SO5858-N-060920	Lead, SPLP	RPD≤35%	-	93%
		Manganese, SPLP	RPD≤35%	-	39%
		Arsenic	RPD≤35%	-	37%
		Manganese	RPD≤35%	-	61%
		Zinc	RPD≤35%	-	36%

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The remaining analytes were within the control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10521754, the following qualifications were made:

One (1) Magnesium, SPLP result is qualified "U" due to a detect in the leachate blank.
One (1) Silver result is qualified "J" due to poor laboratory precision and poor matrix spike recovery.
One (1) Cobalt result is qualified "J" due to an SD result outside control limits.
One (1) Manganese result is qualified "J" due to poor laboratory precision and a serial dilution result outside control limits.
One (1) Lead result is qualified "J" due to poor matrix spike recovery and a serial dilution result outside control limits.
One (1) Zinc result is qualified "J" due to poor matrix spike recovery and a serial dilution result outside control limits.
One (1) Copper result is qualified "J" due to poor matrix spike recovery.
One (1) Aluminum result is qualified "J" due to poor matrix spike recovery.
One (1) Arsenic result is qualified "J" due to poor matrix spike recovery.
One (1) Antimony result is qualified "J" due to poor matrix spike recovery.
Two (2) Cadmium results are qualified "J" due to poor field precision.
Two (2) Lead results are qualified "J" due to poor field precision.
Four (4) Zinc results are qualified "J" due to poor field precision.
Two (2) Lead, SPLP results are qualified "J" due to poor field precision.
Two (2) Manganese, SPLP results are qualified "J" due to poor field precision.
Two (2) Arsenic results are qualified "J" due to poor field precision.
Two (2) Manganese results are qualified "J" due to poor field precision.

Comments:

13. Authorization of Data Validation

Data Validator

Name:	Shelby Green	**Reviewed by:** Laura Moon
Signature:	Shelby Green	Laura Moon
Date:	August 12, 2020	September 15, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit **Case No:** 10522826 **Laboratory:** Pace Analytical

Project: WSSOU RI Sampling - 2020 **Sample Matrix:** Soil **Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury

Sample Date(s): 6/18/2020, 6/19/2020, 6/23/2020 **Analysis Date(s):** 7/7/2020, 7/8/2020

Data Validator: J. McElroy **Validation Date(s):** 8/4/2020, 8/6/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	6/18/2020, 6/19/2020, 6/23/2020	683551	7/7/2020	Y	N
Hg			EPA 7471B	28 days		683552	7/8/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.2°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y	[ ]	N	[ ]	N/A	[X]
Was the peak widths and resolution of the masses within the required control limits?	Y	[ ]	N	[ ]	N/A	[X]
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y	[ ]	N	[ ]	N/A	[X]
Was Instrument successfully calibrated at the correct frequency?	Y	[X]	N	[ ]		
Was Instrument calibrated with appropriate standards and blanks?	Y	[X]	N	[ ]		
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	[X]	N	[ ]		
Were ICV and CCV results within the control window?	Y	[X]	N	[ ]		
Were any data flagged because of calibration problems?	Y	[X]	N	[ ]		

Describe Any Actions Taken: None required

Comments: All %Rs for the ICV and CCV samples were within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	[X]	N	[ ]
Were ICBs and CCBs within the control window?	Y	[X]	N	[ ]
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	[X]	N	[ ]
Were MBs within the control window?	Y	[X]	N	[ ]
Were any data flagged because of blank problems?	Y	[ ]	N	[X]

Describe Any Actions Taken: None required

Comments: On 7/7/2020, there was a detection of Vanadium in the ICB less than 2 times the IDL and detections of Manganese, Molybdenum, and Vanadium that were less than 2 times the MDL; therefore, no qualifications are required

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y	[ ]	N	[X]
Were any data flagged because of ICS problems?	Y	[ ]	N	[X]

Describe Any Actions Take: None required

Comments: On 7/7/2020, the opening and closing ICS solution A had detections of Arsenic, Cobalt, Nickel, Lead, Potassium, and Thallium that were greater than the MDL and negative Cadmium, Selenium, and Vanadium detections with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control limits.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs for the LCS samples were within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The LDS results were within control limits. The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each EPA 6010D and EPA 7471B batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
683552	3657150MS	3657151MSD	20WS-0043-SO5898-10.8-11.2-N-061920	EPA 7471B
683551	3657146MS	3657147MSD	20WS-0043-SO5898-10.8-11.2-N-061920	EPA 6010D

For the Percent Moisture, the LDS were created from 20WS-0043-SO5898-10.8-11.2-N-061920 and three samples not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following qualifications were made on the indicated parent sample due to LMS/LMSD outside the control limit:

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Antimony	MS	31%	71.3%	J-	683551	20WS-0043-SO5898-10.8-11.2-N-061920
	MSD	35%				
Barium	MS	70%	73.8%	J-	683551	20WS-0043-SO5898-10.8-11.2-N-061920
	MSD	30%				
Calcium	MS	128%	74.2%	J	683551	20WS-0043-SO5898-10.8-11.2-N-061920
	MSD	70%				
Magnesium	MSD	42%	74.9%	J	683551	20WS-0043-SO5898-10.8-11.2-N-061920
Potassium	MSD	51%	79.3%	J	683551	20WS-0043-SO5898-10.8-11.2-N-061920
Zinc	MSD	49%	69.9%	J-	683551	20WS-0043-SO5898-10.8-11.2-N-061920

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 683551, the LMS and LMSD %R for Aluminum (237% and 49% respectively), Iron (185% and -186% respectively), and Manganese (662% and -802% respectively) were outside the control limit (75%- 125%). Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 683551, the serial dilution for sample 20WS-0043-SO5898-10.8-11.2-N-061920 had analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limit for this sample were Aluminum (14.6%), Arsenic (16.6%), Barium (16.0%), Calcium (12.3%), Chromium (15.2%), Cobalt (23.8%), Iron (10.3%) Lead (20.4%), Magnesium (11.4%), Manganese (12.1%), Potassium (10.3%), Vanadium (12.7%) and Zinc (20.9%). Therefore, 20WS-0043-SO5898-10.8-11.2-N-061920 was qualified "J" for these analytes.

Barium and Zinc were originally qualified with a "J-" for low matrix spike recovery, but since both analytes were qualified "J" due to SD results outside the control limits, the final qualification for these analytes is "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 683551, there were also SD results for Beryllium (22.5%), Cadmium (63.8%), Molybdenum (28.1%) Nickel (22.0%) and Silver (34.1%) that had %D greater than 10%; however, the sample concentrations was less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for WO 10522826 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 88.2% to 110%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate pair on this WO was 20WS-0043-SO5896-5.9-6.5-D-061920 and 20WS-0043-SO5896-5.9-6.5-N-061920. The RPD for Arsenic (53%) was outside the control limit (35%). Therefore, 20WS-0043-SO5896-5.9-6.5-D-061920 and 20WS-0043-SO5896-5.9-6.5-N-061920 are qualified "J" for Arsenic.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The remaining analytes were within the control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

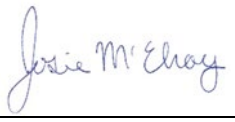
If so, explain: On this WO 10522826, the following qualifications were made:
One (1) Aluminum result was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Antimony result was qualified "J-" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Arsenic result was qualified "J" due to Serial Dilution being outside the control limits.
Two (2) Arsenic results were qualified "J" due to Field Duplicate results outside the control limits.
One (1) Barium result was qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.
One (1) Calcium result was qualified "J" due to Serial Dilution and high percent recovery of the matrix spike and post-digestion spike.
One (1) Chromium result was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Cobalt result was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Iron result was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Lead result was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Magnesium was qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.
One (1) Manganese was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Potassium was qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.
One (1) Vanadium was qualified "J" due to Serial Dilution being outside the control limits.
One (1) Zinc was qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Josie McElroy **Reviewed By:** Shelby Green

Signature:  

Date: August 6, 2020 August 31, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit **Case No:** 10523409 **Laboratory:** Pace Analytical

Project: WSSOU RI Sampling - 2020 **Sample Matrix:** Soil **Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury

Sample Date(s): 6/23/2020, 6/24/2020 & 6/25/2020 **Analysis Date(s):** 7/9/2020 & 7/13/2020

Data Validator: S. Green **Validation Date(s):** 8/6/2020 – 8/11/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	6/23/2020, 6/24/2020, 6/25/2020	685124, 685894	7/9/2020, 7/13/2020	Y	N
Hg			EPA 7471B	28 days		685126	7/14/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 1.5°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y	[ ]	N	[ ]	N/A	[X]
Was the peak widths and resolution of the masses within the required control limits?	Y	[ ]	N	[ ]	N/A	[X]
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y	[ ]	N	[ ]	N/A	[X]
Was Instrument successfully calibrated at the correct frequency?	Y	[X]	N	[ ]		
Was Instrument calibrated with appropriate standards and blanks?	Y	[X]	N	[ ]		
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	[X]	N	[ ]		
Were ICV and CCV results within the control window?	Y	[X]	N	[ ]		
Were any data flagged because of calibration problems?	Y	[ ]	N	[X]		

Describe Any Actions Taken: None required

Comments: All percent recoveries (%R) for ICV and CCV were within control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	[X]	N	[ ]
Were ICBs and CCBs within the control window?	Y	[X]	N	[ ]
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	[X]	N	[ ]
Were MBs within the control window?	Y	[X]	N	[ ]
Were any data flagged because of blank problems?	Y	[ ]	N	[X]

Describe Any Actions Taken: None required

Comments: On 7/9/2020, there were detections of Manganese, Molybdenum, and Vanadium in the CCBs that were less than 2 times the instrument detection limit (IDL). No qualifications are warranted for CCB detections less than 2 times the IDL.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y	[ ]	N	[X]
Were any data flagged because of ICS problems?	Y	[ ]	N	[X]

Describe Any Actions Take: None required

Comments: On 7/9/2020, the ICS Solution A had detections of Cadmium, Cobalt, Selenium, and Vanadium with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are required. The %R for the ICS (Solution A and AB) were within control limits.

On 7/13/2020, the ICS Solution A had detections of Arsenic and Cobalt with an absolute value greater than the MDL. The %R for the ICS (Solution A and AB) were within control limits.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs were within control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken: Sample 20WS-0297-SO5913-0.2-0.8-N-062 was used to generate the LDS for batch 685154. The Manganese result for this sample is qualified "J" due to poor laboratory precision (RPD: 70%).

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The following table lists the LMS and LMS Duplicate (LMSD) parent sample for each EPA 6010D and EPA 7471B batch on this work order (WO). These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
685124	3664573MS	3664574MSD	20WS-0297-SO5913-0.2-0.8-N-062	EPA 6010D
685894	3668247MS	3668248MSD	20WS-0285-SO5919-1.2-1.5-N-062	EPA 6010D
689126	3664581MS	3664582MSD	20WS-0297-SO5913-0.2-0.8-N-062	EPA 7471B

For Percent Moisture, the LDS was generated from sample 20WS-0297-SO5913-0.2-0.8-N-062, 20WS-0285-SO5917-8.4-8.7-N-062, and two samples not on this WO. The RPDs were within control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table lists the analytes that had %R for the LMS and/ or LMSD outside control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Antimony	MS	34%	70.9%	J-	685124	20WS-0297-SO5913-0.2-0.8-N-062
	MSD	33%				
Arsenic	MS	61%	75.8%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
	MSD	57%				
Barium	MS	27%	77%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
	MSD	42%				
Lead	MS	71%	73.3%	J-	685124	20WS-0297-SO5913-0.2-0.8-N-062
	MSD	21%				
Selenium	MS	72%	73.2%	UJ	685124	20WS-0297-SO5913-0.2-0.8-N-062
	MSD	67%				
Thallium	MS	74%	73.8%	J-	685124	20WS-0297-SO5913-0.2-0.8-N-062
	MSD	69%				
Beryllium	MSD	70%	74.4%	J-	685124	20WS-0297-SO5913-0.2-0.8-N-062
Cadmium	MSD	71%	76.9%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
Chromium	MSD	74%	77.5%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
Cobalt	MSD	73%	76.9%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
Copper	MSD	72%	82.6%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
Molybdenum	MSD	74%	79.1%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
Nickel	MSD	72%	75.8%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062
Silver	MSD	74%	74.5%	J-	685124	20WS-0297-SO5913-0.2-0.8-N-062
Sodium	MSD	74%	78.3%	J	685124	20WS-0297-SO5913-0.2-0.8-N-062

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 685124, the LMS and LMSD %R for Aluminum (322% and 255%, respectively) and Manganese (-1630% and 2080%, respectively) were outside control limits. Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria.*" (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 685894 (Silver only), sample 20WS-0285-SO5919-1.2-1.5-N-062 was used to generate an LMS/LMSD sample pair. For batch 685126 (Mercury only), sample 20WS-0297-SO5913-0.2-0.8-N-062 was used to generate the LMS/LMSD sample pair. The %Rs were within control limits.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 685124, the SD for sample 20WS-0297-SO5913-0.2-0.8-N-062 had several analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limits for the sample were Aluminum (22.5%), Arsenic (20.9%), Barium (21.4%), Cadmium (25.4%), Chromium (20.3%), Copper (14.4%), Lead (25.5%), Magnesium (19.6%), Potassium (17.6%), Silver (13.7%), Vanadium (18.4%), and Zinc (25.4%); therefore, these analytes are qualified "J".

The results for Lead and Silver were previously qualified "J-" due to low matrix spike recovery and will receive a final qualification of "J".

The results for Arsenic, Barium, Cadmium, Copper, and Chromium were previously qualified "J" due to low matrix spike recovery and will receive a final qualification of "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 685124, the results for Beryllium (18.6%), Calcium (19.8%), Cobalt (26.8%), and Nickel (27.0%) had %Ds greater than 10%; however, the sample concentrations were less than 50 times the MDL and/ or the SD concentrations were less than the project-specific RL. No additional qualifications were warranted.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N			
Were the percent relative recoveries (%RI) within the control window?	Y	X	N			
Were any data flagged because of internal standard problems?	Y		N	X		

Describe Any Actions Taken: None required

Comments: Internal standards used for SW-846 6010D in WO 10523409 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 86.3% to 122.3%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The Aluminum, Cadmium, Lead, Manganese, and Mercury results for the field duplicate pair (20WS-0285-SO5918-0.3-0.9-N-062 and 20WS-0285-SO5918-0.3-0.9-D-062) are qualified "J" due to poor field precision due to exceeding the control limit as summarized below.

Analyte	Control Limit	Difference	RPD
Aluminum	RPD≤35%	-	37%
Cadmium	RPD≤35%	-	116%
Lead	RPD≤35%	-	37%
Manganese	RPD≤35%	-	53%
Mercury	RPD≤35%	-	97%

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The field duplicate pair on this WO were samples 20WS-0285-SO5918-0.3-0.9-N-062 and 20WS-0285-SO5918-0.3-0.9-D-062. The remaining results were within control limits; therefore, no additional qualifications are required.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10523409, the following qualifications were made:

Two (2) Aluminum results are qualified "J" due to poor field precision.
One (1) Aluminum result is qualified "J" due to a serial dilution result outside control limits.
One (1) Antimony result is qualified "J-" due to low matrix spike recovery.
One (1) Arsenic result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
One (1) Barium result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
One (1) Beryllium result is qualified "J-" due to low matrix spike recovery.
Two (2) Cadmium results are qualified "J" due to poor field precision.
One (1) Cadmium result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
One (1) Chromium result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
One (1) Cobalt result is qualified "J" due to low matrix spike recovery.
One (1) Copper result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
Two (2) Lead results are qualified "J" due to poor field precision.
One (1) Lead result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
One (1) Magnesium result is qualified "J" due to a serial dilution result outside control limits.
Two (2) Manganese results are qualified "J" due to poor field precision.
One (1) Manganese result is qualified "J" due to poor laboratory precision.
One (1) Molybdenum result is qualified "J" due to low matrix spike recovery.
One (1) Nickel result is qualified "J" due to low matrix spike recovery.
One (1) Potassium result is qualified "J" due to a serial dilution result outside control limits.
One (1) Selenium result is qualified "UJ" due to low matrix spike recovery.
One (1) Silver result is qualified "J" due to low matrix spike recovery and a serial dilution result outside control limits.
One (1) Sodium result is qualified "J" due to low matrix spike recovery.
One (1) Thallium result is qualified "J-" due to low matrix spike recovery.
One (1) Vanadium result is qualified "J" due to a serial dilution result outside control limits.
One (1) Zinc result is qualified "J" due to a serial dilution result outside control limits.
Two (2) Mercury results are qualified "J" due to poor field precision.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Shelby Green **Reviewed by:** Laura Moon

Signature: Shelby Green Laura Moon

Date: August 11, 2020 August 28, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit **Case No:** 10523968 **Laboratory:** Pace Analytical

Project: WSSOU RI Sampling - 2020 **Sample Matrix:** Soil **Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury

Sample Date(s): 6/25/2020, 6/26/2020 7/1/2020, 7/2/2020 **Analysis Date(s):** 7/15/2020, 7/16/2020

Data Validator: J. McElroy **Validation Date(s):** 8/6/2020, 8/7/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	6/25/2020, 6/26/2020, 7/1/2020, 7/2/2020	685685, 687028	7/15/2020	Y	N
Hg			EPA 7471B	28 days		685686	7/16/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.4°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y	[ ]	N	[ ]	N/A	[X]
Was the peak widths and resolution of the masses within the required control limits?	Y	[ ]	N	[ ]	N/A	[X]
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y	[ ]	N	[ ]	N/A	[X]
Was Instrument successfully calibrated at the correct frequency?	Y	[X]	N	[ ]		
Was Instrument calibrated with appropriate standards and blanks?	Y	[X]	N	[ ]		
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	[X]	N	[ ]		
Were ICV and CCV results within the control window?	Y	[X]	N	[ ]		
Were any data flagged because of calibration problems?	Y	[ ]	N	[X]		

Describe Any Actions Taken: None required

Comments: All %Rs for the ICV and CCV samples were within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	[X]	N	[ ]
Were ICBs and CCBs within the control window?	Y	[X]	N	[ ]
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	[X]	N	[ ]
Were MBs within the control window?	Y	[X]	N	[ ]
Were any data flagged because of blank problems?	Y	[ ]	N	[X]

Describe Any Actions Taken: None required

Comments: On 7/15/2020, there was a detection of Molybdenum and Vanadium that were less than 2 times the MDL; therefore, no qualifications are required.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y	[X]	N	[ ]
Were any data flagged because of ICS problems?	Y	[ ]	N	[X]

Describe Any Actions Take: None required

Comments: On 7/15/2020, the opening and closing ICS solution A had detections of Arsenic, Cobalt, Vanadium, Beryllium, and Thallium that were greater than the MDL and negative Cadmium detection with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control limits.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
What was the source of the LCS?	Unknown	
Were LCS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LCS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments: All %Rs for the LCS samples were within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
Were LDS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LDS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments: The rest of the LDS results were within control limits. The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each EPA 6010D and EPA 7471B batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
685686	3667446MS	3667447MSD	20WS-0015-SO5927-5.5-6.2-N-062620	EPA 7471B
685685	3667442MS	3667443MSD	20WS-0015-SO5927-5.5-6.2-N-062620	EPA 6010D
687028	3673776MS	3673777MSD	20WS-0288-SO5939-4.0-4.4-N-070220	EPA 6010D

For the Percent Moisture, the LDS were created from 20WS-0015-SO5927-5.5-6.2-N-062620, 20WS-0016-SO5935-4.0-5.0-D-070120, 20WS-0013-SO5936-12.3-12.6-N-070120 and a sample not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
Were LMS percent recovery (%R) results within the control window?	Y [ ]	N [X]
Were any data flagged because of LMS problems?	Y [X]	N [ ]

Describe Any Actions Taken: The following table list the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Barium	MS	19%	80.1%	J	685685	20WS-0015-SO5927-5.5-6.2-N-062620
	MSD	5%				
Calcium	MS	30%	86.5%	J	685685	20WS-0015-SO5927-5.5-6.2-N-062620
	MSD	10%				
Lead	MS	27%	76.2%	J	685685	20WS-0015-SO5927-5.5-6.2-N-062620
Magnesium	MS	49%	90.4%	J	685685	20WS-0015-SO5927-5.5-6.2-N-062620
	MSD	13%				
Potassium	MS	44%	84.1%	J	685685	20WS-0015-SO5927-5.5-6.2-N-062620
	MSD	16%				
Vanadium	MSD	73%	83.5%	J	685685	20WS-0015-SO5927-5.5-6.2-N-062620
Antimony	MS	41%	76.2%	UJ	685685	20WS-0015-SO5927-5.5-6.2-N-062620
	MSD	40%				

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 685685, the LMS and LMSD %R for Aluminum (71% and -6% respectively), Manganese (-591% and -328 respectively), and Zinc (22% and -79% respectively), along with the LMSD for Iron (-183%) and Lead (138%) were outside the control limit (75-125%). Per the NFG *"spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria."* (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 687028, sample 20WS-0288-SO5939-4.0-4.4-N-070220 was used to generate an LMS/LMSD sample pair for silver. The %R was within the control limit.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 685685, the serial dilution for sample 20WS-0015-SO5927-5.5-6.2-N-062620 had some analytes that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. The analytes that were outside the control limits for this ample were Aluminum (10.7%), Barium (11.4%) Chromium (10.6%), Cobalt (24.5%), Lead (15.8%) and Zinc (16.5%). Therefore, 20WS-0015-SO5927-5.5-6.2-N-062620 is qualified "J" for these analytes.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 685685, there were SD results for Beryllium (11.8%), Cadmium (18.6%), and Nickel (22.5%) that had %Ds greater than 10%; however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: On 7/15/2020, Internal standards used for SW-846 6010D in WO 10523968 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 116% to 83.2%.

On 7/17/2020, Internal standards used for SW-846 6010D in WO 10523968 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 105.2% to 85.7%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y	X	N		N/A	
Were any data qualified because of field duplicate problems?	Y		N	X	N/A	

Describe Any Actions Taken: None required

Comments: The field duplicate pair on this WO were 20WS-0016-SO5935-4.0-5.0-D-070120 and 20WS-0016-SO5935-4.0-5.0-N-070120. The results were within the control limit and therefore required no qualifications.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

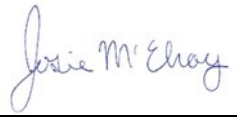
If so, explain: On this WO 10523968, the following qualifications were made:
One (1) Aluminum result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Antimony result was qualified "UJ" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Barium result is qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.
One (1) Calcium result is qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Chromium result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Cobalt result is qualified "J" due to Serial Dilution being outside the control limits.
One (1) Lead result is qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.
One (1) Magnesium result is qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Potassium result is qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Vanadium result is qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Zinc result is qualified "J" due to Serial Dilution being outside the control limits.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Josie McElroy **Reviewed By:** Shelby Green

Signature:  

Date: August 11, 2020 August 31, 2020

Stage 4 Data Validation Checklist for Metals Sample Analysis

Site: West Side Soils Operable Unit
Case No: 10524722
Laboratory: Pace Analytical
Project: WSSOU RI Sampling - 2020
Sample Matrix: Soil
Analyses: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury
Sample Date(s): 7/2/2020, 7/6/2020, 7/8/2020, 7/9/2020
Analysis Date(s): 7/22/2020
Data Validator: J. McElroy
Validation Date(s): 8/11/2020, 8/12/2020

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	7/2/2020, 7/6/2020, 7/8/2020, 7/9/2020	686859, 686862	7/22/2020	Y	N
Hg			EPA 7471B	28 days		686864, 686865	7/22/2020	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature as reported by the laboratory was 5.5°C. The samples were shipped on ice and reported as properly preserved. No qualifications are necessary.

2. Instrument Calibration

Was the Tune analysis performed?	Y	[ ]	N	[ ]	N/A	[X]
Was the peak widths and resolution of the masses within the required control limits?	Y	[ ]	N	[ ]	N/A	[X]
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y	[ ]	N	[ ]	N/A	[X]
Was Instrument successfully calibrated at the correct frequency?	Y	[X]	N	[ ]		
Was Instrument calibrated with appropriate standards and blanks?	Y	[X]	N	[ ]		
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	[X]	N	[ ]		
Were ICV and CCV results within the control window?	Y	[X]	N	[ ]		
Were any data flagged because of calibration problems?	Y	[ ]	N	[X]		

Describe Any Actions Taken: None required

Comments: All %Rs for the ICV and CCV samples were within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	[X]	N	[ ]
Were ICBs and CCBs within the control window?	Y	[X]	N	[ ]
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	[X]	N	[ ]
Were MBs within the control window?	Y	[X]	N	[ ]
Were any data flagged because of blank problems?	Y	[ ]	N	[X]

Describe Any Actions Taken: None required

Comments: On 7/22/2020, there was a detection of Molybdenum that was less than 2 times the MDL. No qualifications are required.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y	[ ]	N	[X]
Were any data flagged because of ICS problems?	Y	[ ]	N	[X]

Describe Any Actions Take: None required

Comments: On 7/22/2020, the opening and closing ICS solution A had detections of Cobalt, Arsenic, and Beryllium were greater than the MDL and negative Molybdenum detections with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries of the interference check samples (Solutions A and AB) were within the control limits.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs for the LCS samples were within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: The LDS results were within control limits. The following table lists the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each EPA 6010D and EPA 7471B batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
686864	3673059MS	3673060MSD	20WS-0179-SO5952-0.2-0.7-N-070820	EPA 7471B
686865	3673063MS	3673064MSD	20WS-0315-SO5960-4.3-4.7-N-070920	EPA 7471B
686859	3673039MS	3673040MSD	20WS-0179-SO5952-0.2-0.7-N-070820	EPA 6010D
686862	3673051MS	3673052MSD	20WS-0315-SO5960-4.3-4.7-N-070920	EPA 6010D

For the Percent Moisture, the LDS were created from 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, and three samples not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Antimony	MS	32%	83.2%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
	MSD	40%				
Calcium	MS	134%	96.3%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
Copper	MS	142%	100.4%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
Lead	MS	32%	94.2%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
	MSD	46%				
Magnesium	MS	186%	96.2%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
Manganese	MS	189%	86.9%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
Silver	MS	22%	91.2%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
	MSD	21%				
Zinc	MS	57%	80.4%	J	686859	20WS-0179-SO5952-0.2-0.7-N-070820
Antimony	MS	57%	88.8%	UJ	686862	20WS-0315-SO5960-4.3-4.7-N-070820
	MSD	67%				
Aluminum	MS	324%	91.9%	J	686862	20WS-0315-SO5960-4.3-4.7-N-070920
	MSD	168%				
Iron	MS	135%	73.3%	J	686862	20WS-0315-SO5960-4.3-4.7-N-070920
	MSD	49%				
Manganese	MSD	71%	86.9%	J	686862	20WS-0315-SO5960-4.3-4.7-N-070920
Mercury	MS	73%	N/A	J	686864	20WS-0179-SO5952-0.2-0.7-N-070820
	MSD	145%				

For Mercury, the LMS (73%) indicated a low bias and the LMSD (145%) indicated a high bias; therefore, the final qualification was "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 686859, the LMS and LMSD %R for Aluminum (350% and 267% respectively), Iron (453% and 56% respectively), and Potassium (133% and 70% respectively) were outside the control limit (75%- 125%). Per the NFG *"spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria."* (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 686862, the LMS and LMSD %R for Calcium (-58% and -302% respectively) were outside the control limit (75%- 125%). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For batch 686859, the serial dilution for sample 20WS-0179-SO5952-0.2-0.7-N-070820 had a detection for Zinc (11.5%) that had a %D greater than 10%, an original sample concentration greater than 50 times the MDL, and an SD concentration greater than the project-specific RL. Therefore, 20WS-0179-SO5952-0.2-0.7-N-070820 is qualified "J" for these analytes.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 686859, there were also detections for Cadmium (23.0%), Cobalt (11.9%), Molybdenum (31.5%), and Selenium (167.4%) that had %D greater than 10%; however, the sample concentrations was less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

For batch 686862, there were detections for Lead (27.7%) and Zinc (26.1%) that had %D greater than 10%; however, the sample concentrations was less than 50 times MDL and/or the SD concentrations were less than the project-specific RL. No qualifications were required.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standards used for WO 10524722 was Y. In the analytical run the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 83.4% to 117.9%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: Two field duplicate pairs were included on this WO. The field duplicate pair, 20WS-0179-SO5954-4.3-4.9-D-070820 and 20WS-0179-SO5954-4.3-4.9-N-070820, had an RPD for Copper (39%) was outside the control limit (35%); therefore, this field duplicate pair has been qualified "J" for Copper.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The second field duplicate pair on this WO was 20WS-0288-SO5942-0.9-1.3-D-070220 and 20WS-0288-SO5942-0.9-1.3-N-070220. The results were within the control limit and therefore required no qualifications.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: On this WO 10524722, the following qualifications were made:
One (1) Aluminum result was qualified "J" due to high percent recovery of the matrix spike and post-digestion spike.
One (1) Antimony result was qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Antimony result was qualified "UJ" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Calcium result was qualified "J" due to high percent recovery of the matrix spike and post-digestion spike.
One (1) Copper result was qualified "J" due to high percent recovery of the matrix spike and post-digestion spike.
Two (2) Copper results were qualified "J" due to Field Duplicate results outside the control limits.
One (1) Iron result was qualified "J" due to high percent recovery of the matrix spike and post-digestion spike.
One (1) Lead result was qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Magnesium result was qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
Two (2) Manganese results were qualified "J" due to poor percent recovery of the matrix spike and post-digestion spike.
One (1) Silver result was qualified "J" due to low percent recovery of the matrix spike and post-digestion spike.
One (1) Zinc result was qualified "J" due to Serial Dilution and low percent recovery of the matrix spike and post-digestion spike.
One (1) Mercury result was qualified "J" due to Matrix Spike being outside the control limits.

Comments:

13. Authorization of Data Validation

Data Validator

Name: Josie McElroy **Reviewed By:** Shelby Green

Signature: Josie McElroy Shelby Green

Date: August 12, 2020 September 1, 2020

Attachment B
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: West Side Soils Operable Unit (WSSOU), Multiple Mining Claims
Project: WSSOU Remedial Investigation Sampling 2020
Client: Atlantic Richfield
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable
2. Level A
3. Level B 10518864, 10519814, 10520797, 10521603, 10521670, 10521754, 10522826, 10523409, 10523968, and 10524722

I. **Level A**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Sampling date	Yes	
2. Sampling team or leader	Yes	
3. Physical description of sampling location	Yes	
4. Sample depth (soils)	Yes	
5. Sample collection technique	Yes	
6. Field preparation technique	Yes	
7. Sample preservation technique	N/A	
8. Sample shipping records	Yes	

II**. Level B**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Field instrumentation methods and standardization complete	Yes	
2. Sample container preparation	Yes	
3. Collection of field replicates (1/20 minimum)	Yes	
4. Proper and decontaminated sampling equipment	Yes	
6. Field custody documentation	Yes	
7. Shipping custody documentation	Yes	
8. Traceable sample designation number	Yes	The Field Sample IDs which included a depth interval exceeded the laboratory maximum character limit and were reduced to 30 characters in the laboratory reports. Table 3 includes the full and reduced Field Sample IDs.
9. Field notebook(s), custody records in secure repository	Yes	
10. Completed field forms	Yes	

Attachment C
Data Validation Quality Control Criteria

EPA 6010D and EPA 6010C (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	180 Days	Hold Time > 180 Days	Professional Judgement J-	Professional Judgement UJ or R	H	NFG (EPA, 2017)
Preservation	Every sample	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	Samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ or R	Pres	WSSOU RI QAPP, (CDM Smith, 2019)
			Samples received > 6ºC	Professional Judgement J-	Professional Judgement UJ or R		
Calibration	Daily	Mid-level standard and a blank -OR- Three-point curve and a blank with lowest non-zero standard at or below RL with correlation coefficient ≥0.998	Calibration validity tested by ICV and LLICV	See ICV and LLICV	See ICV and LLICV	N/A	BP LaMP, NFG (EPA, 2017)
			If 3-point curve used: correlation coefficient < 0.998	J	UJ	CC	
Linear Range	Linear Range standard(s) analyzed for each calibration run	Linear Range standard %D ± 10%	Linear Range standard %D > 10%	Use highest passing standard as LDR	N/A	CL	Method EPA 6010D, BP LaMP
		Sample raw results ≤ 90% LDR	Sample raw result > 90% LDR	J	N/A		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 90-110%	%R < 75%	Professional Judgement J- or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			%R 75-89%	J-	UJ		
			%R 90-110%	No Qualification	No Qualification		
			%R 111-125%	J+	No Qualification		
			%R > 125%	Professional Judgement J+ or R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	MB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Low Limit Initial Calibration Verification (LLICV)/ CRDL Check Sample	After the ICV and ICB	%R 70-130%	%R < 70%	J-	UJ	CS	BP LaMP
			%R 70-130%	No Qualification	No Qualification		
			%R > 130%	J+	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

Data Validation QC Criteria

EPA 6010D and EPA 6010C (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Interference Check Samples (ICS)	At the beginning of each analytical sequence	%R 80-120% -OR- ± 2x the project-specific RL (whichever is greater) for analytes and interferents present in ICSA and ICSAB Sample results < MDL for analytes not present in ICSA	ICS not analyzed or not analyzed in proper sequence	Professional Judgement R if not analyzed	Professional Judgement R if not analyzed	ICS	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			ICSAB %R<50%	J-*	R*		
			%R 50-79% -OR- < -2x project-specific RL (whichever is greater)	J-*	UJ*		
			%R 80-120% -OR- within ± 2x project-specific RL (whichever is greater)	No Qualification	No Qualification		
			%R >120% -OR- > 2x project-specific RL (whichever is greater)	J+*	No Qualification		
			%R >150%	Professional Judgement	Professional Judgement		
			Sample results for analytes not present in ICSA ≥ MDL	J+*	No Qualification		
			Negative sample results for analytes not present in the ICS solution A with an absolute value ≥ MDL	J- *	UJ*		
			Note: Associated samples will be qualified if interferents are within 10% or are higher than interferent concentration in the ICS -AND- for detections of analytes not present, if sample results are < 10 times the ICS detection.				
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x project-specific RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x project-specific RL (including non-detects), then difference between sample and duplicate ≤ project-specific RL (water) or ≤ 2x project-specific RL (soil)	Both original and duplicate sample results ≥ 5x project-specific RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2017)
			Both original and duplicate sample results ≥ 5x project-specific RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x project-specific RL and difference between the sample and duplicate results is > project-specific RL (water) or > 2x project-specific RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x project-specific RL and difference between the sample and duplicate results is ≤ project-specific RL (water) or ≤ 2x project-specific RL (soil)	No Qualification	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 6010D and EPA 6010C (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria.	Matrix Spike %R < 30% Post-digestion spike %R < 75%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Matrix Spike %R < 30% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R 30-74% Post-digestion Spike %R < 75%	J-*	UJ*		
			Matrix Spike %R 30-74% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R > 125% Post-digestion spike %R > 125%	J+*	No Qualification		
			Matrix Spike %R > 125% Post-digestion spike %R ≤ 125%	J*	No Qualification		
			Matrix Spike %R < 30% No post-digestion spike performed	J-*	R*		
			Matrix Spike %R 30-74% No post-digestion spike performed	J-*	UJ*		
			Matrix Spike %R 75-125% No post-digestion spike is required	No Qualification	No Qualification		
			Matrix Spike %R > 125% No post-digestion spike performed	J+*	No Qualification		
			Sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		
Post-digestion Spike (PDS)	When matrix spike %R does not meet acceptance criteria	%R 75-125%	See Matrix Spike	See Matrix Spike	See Matrix Spike	N/A	BP LaMP, NFG (EPA, 2017)
Serial Dilution (SD)	Each analytical batch of samples	%D ≤ 10% if sample concentration is sufficiently high	Sample >50x MDL and SD ≥project-specific RL and %D ≥ 10%	J*	UJ*	SD	NFG (EPA, 2017)
			Sample >50x MDL and SD ≥project-specific RL and %D ≥ 100%	Professional Judgement	Professional Judgement		
			Sample > 5x project-specific RL and SD <project-specific RL	No Qualification	No Qualification		
			Interferences present	Professional Judgement	Professional Judgement		
Internal Standards	Optional If used, every analysis	%R 60-125%	%R 60-125%	No Qualification	No Qualification	CS	BP LaMP
			%R < 60% or > 125% and original sample reanalyzed at 2-fold dilution	J	UJ		
			%R < 60% or > 125% and original sample not reanalyzed at 2-fold dilution	Professional Judgement J or R	Professional Judgement UJ or R		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 7470A and EPA 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	28 Days	Hold Time > 28 Days	Professional Judgement J-	Professional Judgement UJ/R	H	NFG (EPA, 2017)
Preservation	Every sample	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	Samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ/R	Pres	NFG (EPA, 2017)
			Samples received > 6ºC but ≤ 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
			Samples received > 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
Calibration	Daily	A blank and at least five calibration standards shall be used to establish the calibration curve. At least one of the calibration standards shall be at or below project-specific RL but above the MDL. Correlation coefficient ≥0.995 %D ± 30% for all non-zero standards.	Calibration not performed	R	R	Cal	NFG (EPA, 2017)
			Calibration incomplete	Professional Judgement J or R	Professional Judgement UJ or R		
			%D outside ±30%	J	UJ		
			Correlation coefficient < 0.995	J	UJ	CC	
Liner Range	Every sample	The sample instrument level of mercury must be within the calibration range.	Raw result > calibration range	J	N/A	CL	BP LaMP
Low Limit Initial Calibration Verification (LLICV)/ CRDL Check Sample	After the ICV and ICB	%R 70-130%	%R < 70%	J-	UJ	CS	BP LaMP
			%R 70-130%	No Qualification	No Qualification		
			%R > 130%	J+	No Qualification		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 80-120%	%R < 70%	Professional Judgement J or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			%R 70-79%	J	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R 120-130%	J+	No Qualification		
			%R > 130%	Professional Judgement J+ or R	No Qualification		
			%R > 165%	R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		

* Qualifications apply only to sample used to generate QC sample(s).

EPA 7470A and EPA 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x project-specific RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x project-specific RL (including non-detects), then difference between sample and duplicate ≤ project-specific RL (water) or ≤ 2x project-specific RL (soil)	Both original and duplicate sample results ≥ 5x project-specific RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2017)
			Both original and duplicate sample results ≥ 5x project-specific RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x project-specific RL and difference between the sample and duplicate results is > project-specific RL (water) or > 2x project-specific RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x project-specific RL and difference between the sample and duplicate results is ≤ project-specific RL (water) or ≤ 2x project-specific RL (soil)	No Qualification	No Qualification		
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria.	Matrix Spike %R < 30%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2017)
			Matrix Spike %R 30-74%	J-*	UJ*		
			Matrix Spike %R 75-125%	No Qualification	No Qualification		
			Matrix Spike %R > 125%	J+*	No Qualification		
			Sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

Modified Sobek 3.2 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time / Preservation	N/A						WSSOU RI QAPP (CDM Smith, 2019)
Neutralization Potential							
Calibration	Prior to sample analysis	Correlation coefficient ≥ 0.995	Correlation coefficient < 0.995	J	UJ	CC	ENV-SOP-BILL-0012 (Pace, 2019)
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - following each calibration CCV - 1 per 10 sample analyses and following last sample analysis	%R 98-102%	%R < 98%	J-	UJ	ICV CCV	ENV-SOP-BILL-0012 (Pace, 2019)
			%R >102%	J+	No Qualification		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received.	Blank result ≤ 2x MDL	Blank result > 2x MDL.	Results < 5x the blank detection - U	No Qualification	MB	CFRSSI QAPP (ARCO, 1992)
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2x CRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is > CRQL (water) or > 2x CRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x CRQL and difference between the sample and duplicate results is ≤ CRQL (water) or ≤ 2x CRQL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	Varies as SRM changes Use lower control limit (LCL) and upper control limit (UCL) presented in laboratory report.	%R < LCL%	J-	UJ	L%	ENV-SOP-BILL-0012 (Pace, 2019)
			%R > UCL%	J+	N/A		

* Qualifications apply only to sample used to generate QC sample(s).

Modified Sobek 3.2 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Total and Extractable Sulfur							
Calibration	Prior to sample analysis	Correlation coefficient ≥ 0.99	Correlation coefficient < 0.99	J	UJ	CC	ENV-SOP-BILL-0012 (Pace, 2019)
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - following each calibration CCV - 1 per 10 sample analyses and follow last sample analysis	%R 90-110%	%R < 90%	J-	UJ	ICV CCV	ENV-SOP-BILL-0012 (Pace, 2019)
			%R > 110%	J+	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992) NFG (EPA, 2017)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992) NFG (EPA, 2017)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x the CRQL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result < 5x the CRQL (including non-detects), then difference between sample and duplicate ≤ CRQL (water) or ≤ 2xCRQL (soil)	Both original and duplicate sample results ≥ 5x CRQL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x CRQL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x the CRQL and difference between the sample and duplicate > CRQL (water) or > 2xCRQL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x the CRQL and difference between the sample and duplicate ≤ CRQL (water) or ≤ 2xCRQL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 90-110%	%R < 90%	J-	UJ	L%	ENV-SOP-BILL-0012 (Pace, 2019)
			%R > 110%	J+	N/A		

Notes:

Acid Potential is calculated from Sulfur, HCl Extractable; Sulfur, HNO3; and Sulfur, Residual and will therefore receive the same qualifications as these analytes.

Acid/Base Potential is calculated from Acid Potential and Neutralization Potential and will therefore receive the same qualifications as these analytes.

* Qualifications apply only to sample used to generate QC sample(s).

In Vitro Bioaccessibility Assay (IVBA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Reagent Blank	Each analytical batch of samples for every 20 (or fewer) samples received.	Blank result ≤ lower limit of quantitation (LLOQ)	Blank result > LLOQ	Results < 5x the blank detection - U	No Qualification	RB	OLEM 9200.2-164 (EPA, 2017)
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received.	Blank result ≤ LLOQ	Blank result > LLOQ	Results < 5x the blank detection - U	No Qualification	MB	OLEM 9200.2-164 (EPA, 2017)
Laboratory Control Sample (LCS) and Standard Reference Material (SRM)	Each analytical batch of samples for every 20 (or fewer) samples received	LCS: spike at 10 mg/L %R 85–115% recovery SRM: Lead: NIST SRM 2710a %R 60.7–74.2% or NIST SRM 2711a %R 75.2–96.2% Arsenic: NIST 2710a %R 32.9–49.1%	%R < LCL%	J-	UJ	L%	OLEM 9200.2-164 (EPA, 2017)
			%R > UCL%	J+	N/A		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	RPD ≤ 20%	RPD > 20%	J*	UJ*	D%	OLEM 9200.2-164 (EPA, 2017)
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	Spike 10mg/L %R 75-125%	Matrix Spike %R <75%	J-*	UJ*	S%	OLEM 9200.2-164 (EPA, 2017)
			Matrix Spike %R 75-125%	No Qualification	No Qualification		
			Matrix Spike %R > 125%	J+*	No Qualification		

Notes:

IVBA is calculated from the IVBA leachate and total recoverable fratction results and will therefore receive the same qualifications as these analytes.

* Qualifications apply only to sample used to generate QC sample(s).

Data Validation QC Criteria

Field Quality Control Samples							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Field Blank/ Equipment Rinsate Blank	Not required						WSSOU RI QAPP (CDM Smith, 2019)
Field Duplicate	One per 20 samples	1. If both original sample and duplicate sample results are ≥ 5x project-specific RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x project-specific RL (including non-detects), then difference between sample and duplicate ≤ project-specific RL (water) or ≤ 2x project-specific RL (soil)	Both original and duplicate sample results ≥ 5x project-specific RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	FD	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2017)
			Both original and duplicate sample results ≥ 5x project-specific RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x project-specific RL and difference between the sample and duplicate results is > project-specific RL (water) or > 2x project-specific RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x project-specific RL and difference between the sample and duplicate results is ≤ project-specific RL (water) or ≤ 2x project-specific RL (soil)	No Qualification	No Qualification		

* Qualifications apply only to sample used to generate QC sample(s).

Appendix B-3

2019-2020 Remedial Investigation Sampling Field-Portable X-Ray Fluorescence Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2019-2020 Remedial Investigation Sampling Field-Portable X-Ray Fluorescence Data Validation Report

Atlantic Richfield Company

July 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2019-2020 Remedial Investigation Sampling Field-Portable X-Ray Fluorescence Data Validation Report

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LIST OF ATTACHMENTS

Attachment A Data Validation Checklists
Attachment A-1. Analytical Run Summary
Attachment A-2. Sio_2 Standard Exceedance Summary Table
Attachment A-3. CCS Exceedance Summary Table
Attachment A-4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples
Attachment B Level A/B Assessment Checklist
Attachment C Data Validation QC Criteria

REVISION SUMMARY

Revision No.	Author	Version	Description	Date
Rev 0	L. Moon	Draft	Issued for Internal Review	5/18/2022
Rev 0	Josie McElroy	Draft Final	Issued for Internal Review	7/5/2022

1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes data validation (DV) conducted on the field-portable X-ray fluorescence (FPXRF) analyses for samples collected as specified in the Final Quality Assurance Project Plan (QAPP) for West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) sampling (CDM Smith, 2019) (referred to as WSSOU RI QAPP) and the WSSOU Final RI Data Collection Work Plan (Atlantic Richfield Company, 2019) (referred to as WSSOU Final RI Work Plan).

All data have undergone Stage 2B DV as defined in *U.S. Environmental Protection Agency* (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009).

The DV was conducted in accordance with the WSSOU RI QAPP, the *Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation Plan* (DM/DV) (ARCO, 1992a), the CFRSSI DM/DV addendum (AERL, 2000), and the CFRSSI QAPP (ARCO, 1992b). This report details the evaluation of FPXRF data for the purpose of usability.

This document refers to the tables and attachments below.

- Table 1 contains the FPXRF natural sample results with enforcement/screening classifications, DV qualifiers, and DV reason codes.
- Table 2 contains the FPXRF Silicon Dioxide (SiO_2) Standard results.
- Table 3 contains the FPXRF Calibration Check Standard (CCS) results.
- Table 4 contains the FPXRF duplicate, FPXRF replicate, and field duplicate sample results.
- Table 5 contains the FPXRF sample identification information including the field sample name, sample date, and analysis date.
- Attachment A contains the DV Checklist.
- Attachment A-1 contains the Analytical Run Summary Table.
- Attachment A-2 contains the Sio_2 Standard Exceedance Summary Table.
- Attachment A-3 contains the CCS Exceedance Summary Table.
- Attachment A-4 contains the FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples.
- Attachment B contains the Level A/B Assessment Checklist.
- Attachment C contains the QC criteria used in the DV process.

The instrument output for FPXRF data, produced by Pioneer Technical Services, Inc. (Pioneer), was used to perform Stage 2B DV.

All samples associated with the FPXRF data produced by Pioneer met Level A and Level B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan (ARCO, 1992a), the quality of the data is ranked as enforcement quality, screening quality, or it is rejected.

Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A and B criteria (Attachment B) and are not qualified as estimated or rejected after the validation process.

Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, RI/feasibility study, evaluation of alternatives, confirmational purposes, risk assessments, and engineering design. All data that met the Level A and B documentation criteria and results that were not qualified as estimated or rejected during the DV process were considered "enforcement" quality data and were assigned an "E" in Table 1.

Screening quality data, as defined in the CFRSSI DM/DV Plan (ARCO, 1992a), are data from those samples that do not meet the Level B criteria and/or were qualified J, J+, J-, or UJ during the DV process. Potential uses of screening quality data, depending on their quality, include site characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. Data that met the Level A criteria, but not Level B criteria, and/or results that were qualified as estimated during the validation process were considered "screening" quality data and were assigned an "S" in Table 1.

Data rejected during DV cannot be used for any Superfund activities. No results were rejected during the DV process.

Investigative soil samples were collected between October 2019 and July 2020 by Pioneer in accordance with the WSSOU RI QAPP. The FPXRF analyses were performed in Butte, Montana, by Pioneer. Table 5 lists the sample identification, sample date, and analysis date for each natural sample.

Field quality control (QC) samples results were used to assess the data quality of natural samples. Please note that the enforcement and screening quality summaries and the precision and accuracy assessment summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summaries.

There were 327 natural surface soil samples and 77 subsurface natural samples analyzed by FPXRF for 15 analytes. In total, 404 natural samples were analyzed, and 6,060 data points were generated. A summary is shown below:

Summary of Enforcement and Screening Quality Data Points

Analysis Group	Natural Samples	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
FPXRF Surface	327	4,905	2,888 (59%)	2,017 (41%)	0 (0%)
FPXRF Subsurface	77	1,155	0 (0%)	1,155 (100%)	0 (0%)
Total	**404**	**6,060**	**2,888 (48%)**	**3,172 (52%)**	**0 (0%)**

Refer to Section 4.7 for details on the major reasons natural data points are considered screening quality.

2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW OF INORGANIC DATA

The QC criteria used during the DV process are discussed in Section 2.3 and are listed in Attachment C. The QC criteria were derived from the WSSOU RI QAPP, the CFRSSI DM/DV Plan (ARCO, 1992a), CFRSSI DM/DV addendum (AERL, 2000), the CFRSSI QAPP (ARCO, 1992b), the Niton XL3 Mining QC Sheet (ThermoFisher Scientific, 2014), and the Pioneer Standard Operating Procedure (SOP) for operating the XL3 FPXRF analyzer (SOP-SFM-02) (refer to Appendix A of the WSSOU Final RI Work Plan).

A DV checklist derived from the CFRSSI DM/DV Plan Addendum (AERL, 2000) was completed (Attachment A). The Laboratory DV Checklist for Metals Analysis by Spectrace FPXRF was modified to more accurately reflect the DV performed.

2.1 Field-Portable X-Ray Fluorescence Analysis Run ID

All samples analyzed by FPXRF including natural and QC samples were assigned an Analysis Run ID following the convention of "P_YYYYMMDD_FPXRFID#_Run#" where:

- "P" = Pioneer
- YYYMMDD = date of analysis
- FPXRFID# = ID number of FPXRF unit used
- Run# = Run number generated sequentially by the FPXRF unit

For example, an Analysis Run ID of "P_20191023_92951_140" indicates the sample was analyzed October 23, 2019, with XRF unit #92951 and had a run number of 140.

The Analysis Run IDs and Sample IDs are included in Table 1, Table 2, Table 3, Table 4, and Table 5 to provide the date of analysis and XRF unit ID for each sample.

2.2 Reporting Limits

The reporting limits (RLs) for each analyte was calculated for each FPXRF instrument used. The standard errors output by the FPXRF instruments for site soil samples (natural, field duplicate, FPXRF duplicate, and FPXRF replicate samples) were used in the calculations. For analytes that had non-detect sample results, the RL was calculated as 3 times the average standard errors for the non-detect results. For analytes that did not have any non-detect sample results, the RL was calculated as 3 times the average of the bottom 10% of the standard errors.

The RLs for each analyte for each FPXRF unit used are listed below:

Analyte	Units	Reporting Limits	
		FPXRF Unit: 92950	FPXRF Unit: 92951
Antimony	mg/kg	47	37
Arsenic	mg/kg	76	84
Barium	mg/kg	199	129
Cadmium	mg/kg	30	23
Cobalt	mg/kg	556	364
Copper	mg/kg	238	70
Iron	mg/kg	737	382
Lead	mg/kg	38	17
Manganese	mg/kg	365	147
Mercury	mg/kg	81	24
Molybdenum	mg/kg	34	14
Nickel	mg/kg	394	80
Selenium	mg/kg	38	15
Silver	mg/kg	21	18
Zinc	mg/kg	73	111

mg/kg = milligrams per kilogram.

In Table 1, non-detect results are reported as "<" with the RL and assigned a qualification of "U." Detected results less than the RL were assigned a qualification of "J." Results that were qualified "U" for being a non-detect result (Reason Code = ND) or qualified "J" for being a detected result less than the RL (Reason Code = <RL) are considered enforcement quality data if the Level A/B criteria was met and if no other qualifications were made.

2.3 Quality Control Samples

This section summarizes the QC samples evaluated during the Stage 2B DV of the FPXRF data.

The Pioneer SOP for operating XL3 FPXRF analyzer (SOP-SFM-02) (refer to Appendix A of the WSSOU Final RI Work Plan) was followed for FPXRF data produced by Pioneer. This SOP specifies the requirements for the FPXRF QC samples in the following sections. The QC criteria used during DV to evaluate the QC samples is listed in Attachment C.

2.3.1 Energy Calibration Check

The energy calibration check (system check) determines whether the characteristic X-ray lines are shifting, which would indicate drift within the instrument. The requirements set forth in SOP-SFM-02 are to run a system check each time the instrument is turned on for sample analysis, and the resolution parameter of the system check must be under 195. The system check was performed at the beginning of each working day, and the resolution parameter was under 195 for each system check. The requirements were met.

2.3.2 Silicon Dioxide Standard

The SiO_2 standard, as provided by Niton, is a "clean" quartz or SiO_2 matrix that contains concentrations of selected analytes near or below the machine's lower limit of detection. Analysis results with the FPXRF instrument of the SiO_2 standard are used to monitor for cross contamination.

The frequency requirement for analyzing the SiO_2 standard set forth in SOP-SFM-02 is to analyze the SiO_2 sample at the beginning of each day and once per every 20 samples, and to analyze the SiO_2 standard or a CCS at the end of each day's analysis.

The SiO_2 standard was analyzed at the beginning of each analytical run. There were 34 analyses of the SiO_2 standard for the 404 natural samples (8%). The frequency requirement for the SiO_2 standard was met.

There were 4 analytical runs (June 1, 2020, June 24, 2020, June 29, 2020, and July 9, 2020) that did not have a closing QC sample (SiO_2 standard or a CCS). The natural data points in those analytical runs that were not bracketed by QC samples were qualified for the lack of a closing QC standard. These qualifications are listed in Table 1 and Attachment A-1.

Table 2 lists the results for all SiO_2 standard samples. The control limit was a non-detect result for all SiO_2 standard sample results. If a SiO_2 standard sample had a detected result, the natural sample results analyzed in the same analytical run were qualified "J+" if the natural sample result was a detected result less than 10 times the SiO_2 standard sample result (Reason Code = B).

Qualifications made due to detections in the SiO_2 standard samples are discussed in Section 4.2 and are listed in Table 1 and Attachment A-2.

2.3.3 Calibration Check Standard

The CCS helps check the accuracy of the FPXRF instrument and assess the stability and consistency of the analysis for the analytes of interest. Three Niton-provided Standard Reference Materials were used for the CCS: NIST 2709a- Joaquin Soil (NIST 2709a) sample, a U.S. Geological Survey (USGS) SdAR-M2 sample, and a Resource Conservation and Recovery Act (RCRA) sample.

The frequency requirement to analyze the CCS samples set forth in SOP-SFM-02 is to analyze 1 to 3 of the CCS samples at the start of each day and once per every 20 samples, and to analyze the SiO_2 standard or a CCS at the end of each day's analysis.

A CCS sample was analyzed at the beginning of each run. There were 57 analyses of the CCS samples for the 404 natural samples (14%). The frequency requirements for the CCS samples were met.

As discussed in Section 2.3.2, there were 4 analytical runs (June 1, 2020, June 24, 2020, June 29, 2020, and July 9, 2020) that did not have a closing QC sample (SiO_2 standard or a CCS). The natural data points in those analytical runs that were not bracketed by QC samples were qualified for the lack of a closing QC standard. These qualifications are listed in Table 1 and Attachment A-1.

The true values for each analyte in each CCS were used to calculate percent recovery (%R). If the true value of the analyte in the CCS was not available or was significantly lower than the calculated RL, it was not included in the CCS %R assessment. The true values for each analyte in each CCS are listed below:

Analyte	NIST 2709a (mg/kg)	USGS SdAR-M2 (mg/kg)	RCRA (mg/kg)
Antimony	*1.55*	**107**	NA
Arsenic	*10.5*	NA	**500**
Barium	**979**	**990**	NA
Cadmium	*0.371*	*5.1*	**500**
Cobalt	*12.8*	*12.4*	NA
Copper	*33.9*	**236**	NA
Iron	**33,600**	NA	NA
Lead	**17.3**	**808**	**500**
Manganese	**529**	NA	NA
Mercury	*0.9*	*1.44*	NA
Molybdenum	NA	**13.3**	NA
Nickel	**85**	*48.8*	NA
Selenium	*1.5*	*2.7*	**500**
Silver	NA	NA	**500**
Zinc	**103**	**760**	NA

Italics = not used in assessment.
Bold = used in assessment.
NA = not available. USGS = U.S. Geological Survey.

There was no CCS result that had a detectable amount of cobalt or mercury. All cobalt and mercury results were non-detect and have therefore been qualified "UJ" for the lack of an appropriate CCS.

Table 3 lists the results and the %R for each CCS. The control limit was a %R between 80% and 120%. If the CCS result %R was outside the control limit (80% to 120%), the natural sample results in the same analytical run were qualified as "J" for detected results or "UJ" for non-detect results, except if there was another CCS with results within the control limit in the same analytical run, then, applying professional judgement, only the sample results that were within 10 times the failing CCS were qualified as "J" for detected results or "UJ" for non-detect results (Reason Code = C%).

Qualifications made due to CCS %R outside the control limit are discussed in Section 4.2 and are listed in Table 1 and Attachment A-3.

2.3.4 FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Samples

The FPXRF duplicate samples are analyzed to assess reproducibility of field procedures and soil heterogeneity. To run a duplicate sample on the Niton XL3, the sample bag is removed from the analytical stand, kneaded once or twice, and replaced in the stand to be analyzed a second time.

The FPXRF replicate samples help assess the stability and consistency of the FPXRF analysis. To run a replicate sample on the Niton XL3, once the primary sample analysis has been completed, the same sample is analyzed a second time with the same soil in the XRF aperture.

The frequency requirement for FPXRF duplicate and FPXRF replicate samples set forth in SOP-SFM-02 is to analyze a FPXRF duplicate sample and a FPXRF replicate sample once per every 20 samples (5%).

For the total of 404 natural samples, 24 FPXRF duplicate samples (6%) and 25 replicate samples (6%) were analyzed. The frequency requirement for FPXRF duplicate and FPXRF replicate samples was met.

The SOP-SFM-02 does not require field duplicate samples for FPXRF analysis, but samples were generated when a field duplicate was collected to meet the laboratory sample field duplicate requirement and these samples were included in the precision assessment (Section 4.1).

Table 4 contains the FPXRF duplicate, FPXRF replicate, and field duplicate sample results with the parent sample results and the relative percent difference (RPD). The control limit was an RPD less than or equal to 35%. If an RPD was outside the control limit, the parent sample and samples considered sufficiently similar to the parent sample were qualified. No natural samples were considered sufficiently similar enough to each other to require additional qualifications based on the variability of soil matrices. If the parent sample was a duplicate sample, the duplicate sample's parent sample was considered sufficiently similar and was qualified when applicable.

Qualification due to duplicate and replicate sample results outside the control limit are discussed in Section 4.1 and are listed in Table 1 and Attachment A-4.

3.0 LEVEL A/B ASSESSMENT

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality data.

Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet Level A or B criteria are designated as unusable.

One Level A/B Assessment Checklist for FPXRF data is included in Attachment B. Sample collection information, including sample collection date, location, and collection method, was recorded in the field logbook. This information was reviewed for Level A/B assessment.

All FPXRF samples met the Level A and B criteria.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, COMPLETENESS, AND SENSITIVITY DATA SUMMARY

This section provides the Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity assessment for the FPXRF data generated as part of the investigation that underwent Stage 2B DV.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. The precision control limit used for FPXRF soil samples was a RPD less than 35% when both sample results were detections. For FPXRF data, the precision assessment is based on FPXRF duplicate, FPXRF replicate, and field duplicate sample pair RPDs. If an RPD was outside the control limit, the parent sample and samples considered sufficiently similar to the parent sample were qualified. No natural samples were considered sufficiently similar enough to each other to require additional qualifications based on the variability of soil matrices. If the parent sample was a duplicate sample, the duplicate sample's parent sample was considered sufficiently similar and was qualified when applicable.

Attachment A-4 lists the FPXRF duplicate, FPXRF replicate, and field duplicate samples with an RPD that exceeded the control limit (35%) and the affected natural samples that were qualified. There were 49 instances of an RPD exceedance (30 FPXRF duplicate, 13 FPXRF replicate, and 6 field duplicate samples). This led to the qualification of 46 natural data points because 3 natural data points were qualified for both FPXRF duplicate and FPXRF replicate RPD exceedances.

This resulted in 46 (1%) of the 6,060 natural data points that did not meet the precision requirements and 6,014 (99%) of the 6,060 natural data points that did meet the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. For the FPXRF data, the Sio_2 standard and CCS samples are used to assess accuracy.

If a Sio_2 standard sample had a detected result, the natural sample results analyzed in the same analytical run were qualified "J+" if the natural sample result was a detected result less than 10 times the Sio_2 standard sample result.

Attachment A-2 lists the detected Sio_2 standard sample results and the affected natural samples that were qualified. There were 129 Sio_2 standard sample results that exceeded the control limit, and 86 of these results led to qualifications of natural samples. The remaining 43 exceedances of the Sio_2 standard samples did not lead to qualifications of natural samples because the affected natural sample results were either non-detect or were greater than 10 times the Sio_2 standard sample result.

Of the 6,060 natural data points, 840 were qualified because of a Sio_2 standard sample result exceedance. The majority of qualifications were made to antimony, barium, and cadmium. The total number of natural data points and the number of data points qualified because of a Sio_2 standard sample result exceedance are summarized below:

Analyte	Total Natural Data Points	Natural Data Points Qualified for SiO_2 Standard Exceedance	% of total
Antimony	404	302	75%
Arsenic	404	5	1%
Barium	404	345	85%
Cadmium	404	122	30%
Cobalt	404	0	0%
Copper	404	0	0%
Iron	404	0	0%
Lead	404	0	0%
Manganese	404	12	3%
Mercury	404	0	0%
Molybdenum	404	0	0%
Nickel	404	0	0%
Selenium	404	0	0%
Silver	404	53	13%
Zinc	404	1	0%
Total	**6,060**	**840**	**14%**

SiO_2 = silicon dioxide.

If the CCS result %R was outside the control limit (80% to 120%), the natural sample results in the same analytical run were qualified as "J" for detected results or "UJ" for non-detect results, except if there was another CCS sample with results within the control limit in the same analytical run, then, applying professional judgement, only the sample results that were less than 10 times the true value of the failing CCS were qualified as "J" for detected results or "UJ" for non-detect results (Reason Code = C%).

Attachment A-3 lists the CCS results that exceeded the control limit and the affected natural samples that were qualified. There were 57 CCS %R results that exceeded the control limit, and 55 of these results led to qualifications of natural samples. The remaining 2 exceedances of the CCS %R result did not lead to qualifications of natural data points because there was another CCS in the analytical run that was within the control limits, and the affected natural data points were greater than 10 times the true value of the CCS result with the %R exceedance.

Of the 6,060 natural data points, 731 were qualified because of a CCS %R exceedance. The majority of qualifications were made to molybdenum and nickel. The total number of natural

data points and the number of data points qualified because of CCS %R exceedance are summarized below:

Analyte	Total Natural Data Points	Natural Data Points Qualified for CCS %R Exceedance	% of total
Antimony	404	23	6%
Arsenic	404	0	0%
Barium	404	36	9%
Cadmium	404	0	0%
Cobalt	404	0	0%
Copper	404	41	10%
Iron	404	20	5%
Lead	404	36	9%
Manganese	404	43	11%
Mercury	404	0	0%
Molybdenum	404	268	66%
Nickel	404	263	65%
Selenium	404	0	0%
Silver	404	0	0%
Zinc	404	1	0%
Total	**6,060**	**731**	**12%**

CCS = Calibration Check Standard. %R = percent recover.

In summary, 840 natural data points were qualified for a Sio_2 standard exceedance and 731 natural data points were qualified for a CCS %R exceedance; however, 35 natural data points were qualified for both a Sio_2 standard sample result exceedance and a CCS %R exceedance, therefore, a total of1,536 were qualified due to poor accuracy.

This resulted in 1,536 (25%) of the 6,060 natural data points associated with the natural samples collected that did not meet the accuracy requirements, and 4,524 (75%) of the 6,060 natural data points that did meet the accuracy requirements. The majority of natural data points that did not meet accuracy requirements were antimony, barium, cadmium, molybdenum, and nickel results as shown below:

Analyte	Total Natural Data Points	Natural Data Points Qualified for Poor Accuracy	% of total
Antimony	404	325	80%
Arsenic	404	5	1%
Barium	404	346	86%
Cadmium	404	122	30%
Cobalt	404	0	0%
Copper	404	41	10%
Iron	404	20	5%
Lead	404	36	9%
Manganese	404	55	14%
Mercury	404	0	0%
Molybdenum	404	268	66%
Nickel	404	263	65%
Selenium	404	0	0%
Silver	404	53	13%
Zinc	404	2	0%
Total	**6,060**	**1,536**	**25%**

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper sampling program design. Samples for FPXRF analysis were collected in accordance with the WSSOU RI QAPP. The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report include soil samples collected and analyzed by Pioneer using FPXRF.

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and FPXRF methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in using the SOPs and equipment. Proper sample handling was observed during sample collection and analysis.

All surface samples underwent the “Simple Sieve” preparation method as defined in the WSSOU RI QAPP. All subsurface samples underwent the “Sample Bag” preparation method as defined in the WSSOU RI QAPP. Subsurface samples were not sieved because all subsurface samples were sent to the analytical laboratory after being analyzed by FPXRF. The “Sample Bag” preparation method does not meet the WSSOU RI QAPP requirement of sieving samples prior to FPXRF analysis; therefore, for all subsurface samples, detected results have been qualified “J” and non-detect results have been qualified “UJ” and are designated as screening quality.

Consequently, data from future soil sampling events at WSSOU using comparable sampling and FPXRF analysis may be used in concert with the surface sample data. The subsurface sample data are considered usable with the recognition that they are considered screening quality due to the lack of sieving prior to FPXRF analysis.

4.5 Completeness

Completeness is assessed to determine if enough valid data have been collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 90% or greater as designated in the WSSOU RI QAPP.

The WSSOU RI QAPP includes the planned soil sample locations and lists the planned analytical techniques including FPXRF analysis. The FPXRF analyses were performed at all locations indicated. Therefore, completeness for FPXRF data based on sample location was 100%, and the completeness goal was met.

A total of 6,060 FPXRF data points was generated by the sampling events. All data points are considered usable because no results were rejected. All 404 FPXRF samples were analyzed by FPXRF for 15 analytes (antimony, arsenic, barium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc). Therefore, the completeness for FPXRF data based on sample analysis was 100% and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the detection limits of non-detect results to the project-specific sensitivity requirements. The WSSOU RI QAPP does not specify sensitivity requirements for FPXRF analyses; therefore, the inductively coupled plasma atomic emission spectroscopy (ICP-AES) RLs in Table B-5 of the WSSOU RI QAPP were used to evaluate sensitivity for each analyte.

For FPXRF analyses, the non-detect results were reported as "<RL", where the RL was calculated for each FPXRF unit as described in Section 2.2. The calculated RL for all non-detect results were greater than the ICP-AES RL listed in Table B-5 of the WSSOU RI QAPP. The list below shows the results.

FPXRF Analyte	Non-Detect Results (<RL)		ICP-AES RL in Table B-5, WSSOU RI QAPP
	FPXRF Unit: 92950	FPXRF Unit: 92951	
Antimony	<40 mg/kg	<37 mg/kg	6 mg/kg
Arsenic	<77 mg/kg	<82 mg/kg	1 mg/kg
Barium	N/A	<129 mg/kg	20 mg/kg
Cadmium	<24 mg/kg	<23 mg/kg	0.5 mg/kg
Cobalt	<556 mg/kg	<362 mg/kg	5 mg/kg
Copper	<239 mg/kg	<70 mg/kg	2.5 mg/kg
Iron	N/A	N/A	10 mg/kg
Lead	N/A	N/A	1 mg/kg
Manganese	N/A	N/A	1.5 mg/kg
Mercury	<81 mg/kg	<24 mg/kg	0.1 mg/kg
Molybdenum	<34 mg/kg	<14 mg/kg	5 mg/kg
Nickel	<392 mg/kg	<80 mg/kg	4 mg/kg
Selenium	<38 mg/kg	<15 mg/kg	3.5 mg/kg
Silver	<18 mg/kg	<18 mg/kg	1 mg/kg
Zinc	N/A	<111 mg/kg	6 mg/kg

mg/kg = milligrams per kilogram. N/A = no non-detect results.

These data points are considered usable with the recognition that the detection limits are higher than the ICP-AES RL listed in Table B-5 of the WSSOU RI QAPP.

4.7 Overall Data Summary

During the WSSOU RI sampling events, the 404 natural samples collected and analyzed by Pioneer generated 6,060 FPXRF data points. Data were also evaluated using the Level A/B Checklist (Attachment B). All samples met the Level A and Level B criteria defined in the CFRSSI DM/DV Plan (ARCO, 1992a) and CFRSSI DM/DV addendum (AERL, 2000).

Natural data points that were qualified as estimated (J, J+, or UJ) with the following reason codes are considered screening quality data as defined in the CFRSSI DM/DV Plan (ARCO, 1992a).

- Prep = sample preparation requirement not met.
- CCS = lack of appropriate CCS.
- CX = QC standard frequency not met.
- C% = %R exceedance in an associated CCS.
- B = detection in associated Sio_2 standard.
- FD = RPD exceedance in field duplicate.
- D% = RPD exceedance in FPXRF duplicate.
- R% = RPD exceedance in FPXRF replicate.

Based on the qualifications assigned during the DV process and the results of the Level A/B assessment, 2,888 (48%) natural data points were classified as enforcement quality, 3,172 (52%) natural data points were classified as screening quality, and no natural data points were rejected.

4.7.1 Surface Samples

For natural data points derived from surface samples, the number of instances that each analyte was qualified for each reason code, the total natural data points, and the number of natural data points designated as enforcement and screening quality are summarized below:

Surface Samples	Reason Codes								Data Points	Data Quality	
Analyte	Prep	CCS	CX	C%	B	FD	D%	R%	Total	Enforcement	Screening
Antimony	0	0	4	0	273	0	7	4	327	53 (16%)	274 (84%)
Arsenic	0	0	4	0	0	0	4	1	327	318 (97%)	9 (3%)
Barium	0	0	4	36	315	1	1	0	327	10 (3%)	317 (97%)
Cadmium	0	0	4	0	96	1	0	2	327	227 (69%)	100 (31%)
Cobalt	0	327	0	0	0	0	0	0	327	0 (0%)	327 (100%)
Copper	0	0	4	41	0	1	1	2	327	280 (86%)	47 (14%)
Iron	0	0	4	1	0	0	0	1	327	321 (98%)	6 (2%)
Lead	0	0	4	22	0	0	2	1	327	299 (91%)	28 (9%)
Manganese	0	0	4	24	12	0	1	1	327	285 (87%)	42 (13%)
Mercury	0	327	0	0	0	0	0	0	327	0 (0%)	327 (100%)
Molybdenum	0	0	4	244	0	0	0	0	327	83 (25%)	244 (75%)
Nickel	0	0	4	244	0	0	0	0	327	79 (24%)	248 (76%)
Selenium	0	0	4	0	0	0	0	0	327	323 (99%)	4 (1%)
Silver	0	0	4	0	29	0	3	0	327	291 (89%)	36 (11%)
Zinc	0	0	4	1	0	0	2	1	327	319 (98%)	8 (2%)
Total Surface	0	654	52	613	725	3	21	13	4905	2888 (59%)	2017 (41%)

Note that the total number of screening quality data points is not a sum of the number of instances the analytes were qualified for each reason code because multiple reason codes can be assigned to one data point.

For the 4,905 natural data points derived from the natural surface samples:

- 725 (36%) were qualified due to a detection in an associated Sio_2 standard (Reason Code = B).
    - 315 (43%) of Sio_2 standard qualifications were made to barium.
    - 273 (38%) of Sio_2 standard qualifications were made to antimony.
    - 96 (13%) of Sio_2 standard qualifications were made to cadmium.
- 654 (32%) were qualified due to a lack of an appropriate CCS (Reason Code = CCS).
    - all cobalt and nickel data points were qualified for lack of an appropriate CCS.
- 613 (30%) were qualified due to a %R exceedance in an associated CCS (Reason Code = C%).
    - 244 (40%) of CCS %R qualifications were made to molybdenum.
    - 244 (40%) of CCS %R qualifications were made to nickel.

Qualifications made to antimony, barium, cobalt, cadmium, mercury, molybdenum, and nickel accounted for 91% of the screening quality data points for surface samples.

4.7.2 Subsurface Samples

For natural data points derived from subsurface samples, the number of instances that each analyte was qualified for each reason code, the total natural data points, and the number of natural data points designated as enforcement and screening quality are summarized below:

Subsurface Samples	Reason Codes								Data Points	Data Quality	
Analyte	**Prep**	**CCS**	**CX**	**C%**	**B**	**FD**	**D%**	**R%**	**Total**	**Enforcement**	**Screening**
Antimony	77	0	25	23	29	0	1	0	77	0 (0%)	77 (100%)
Arsenic	77	0	25	0	5	0	1	0	77	0 (0%)	77 (100%)
Barium	77	0	25	0	30	0	1	0	77	0 (0%)	77 (100%)
Cadmium	77	0	25	0	26	1	1	0	77	0 (0%)	77 (100%)
Cobalt	77	77	0	0	0	0	0	0	77	0 (0%)	77 (100%)
Copper	77	0	25	0	0	0	1	0	77	0 (0%)	77 (100%)
Iron	77	0	25	19	0	0	0	0	77	0 (0%)	77 (100%)
Lead	77	0	25	14	0	2	1	0	77	0 (0%)	77 (100%)
Manganese	77	0	25	19	0	0	2	0	77	0 (0%)	77 (100%)
Mercury	77	77	0	0	0	0	0	0	77	0 (0%)	77 (100%)
Molybdenum	77	0	25	24	0	0	0	0	77	0 (0%)	77 (100%)
Nickel	77	0	25	19	0	0	0	0	77	0 (0%)	77 (100%)
Selenium	77	0	25	0	0	0	0	0	77	0 (0%)	77 (100%)
Silver	77	0	25	0	24	0	1	0	77	0 (0%)	77 (100%)
Zinc	77	0	25	0	1	0	0	0	77	0 (0%)	77 (100%)
Total Subsurface	1,155	154	325	118	115	3	9	0	1,155	0 (0%)	1,155 (100%)

Note that the total number of screening quality data points is not a sum of the number of instances the analytes were qualified for each reason code because multiple reason codes can be assigned to one data point.

For the 1,155 natural data points derived from the natural subsurface samples:

- 1,155 (100%) were qualified because the sample preparation requirement was not met (Reason Code = Prep).
- 325 (28%) were qualified due to a lack of a closing QC standard (Reason Code = CX).
- 154 (13%) were qualified due to a lack of an appropriate CCS (Reason Code = CCS).

All subsurface samples are considered screening quality data because subsurface samples were not sieved prior to FPXRF analysis. Refer to Section 4.4 for further discussion.

5.0 REFERENCES

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TABLES

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Table 2. FPXRF SiO_2 Standard Results

Table 3. FPXRF Calibration Check Standards Results

Table 4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results

Table 5. FPXRF Natural Sample Identification

Table 1
FPXRF Natural Sample Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Notes:

< - Not detected at reporting limit

Abbreviations:

mg/kg - milligram per kilogram

Enforcement/Screening Quality (E/S)

E = Enforcement quality.

S = Screening quality.

Data Validation Qualifiers (DV Qual)

U = The result is not detected at the reporting limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ = The result is an estimated quantity, but the result may be biased high.

UJ = The result is not detected at the reporting limit. The reporting limit is approximate and may be inaccurate or imprecise.

Data Validation Reason Codes (Reason Code)

ND = not detected result

<RL = detected result less than the reporting limit

Prep = sample preparation requirement not met

B = detection in associated SiO2 standard

C% = Percent recovery exceedance in an associated CCS

CCS = lack of approriate CCS

CX = QC standard frequency not met

FD = relative percent difference exceedance in field duplicate

D% = relative percent difference exceedance in FRXRF duplicate

R% = relative percent difference exceedance in FPXRF replicate

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191023_92951_135	WS19-1045-SO5027-N-102319	26.36	S	J	<RL, B	257.15	E			584.77	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_136	WS19-1045-SO5028-N-102319	21	S	J	<RL, B	196.95	E			598.75	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_137	WS19-1045-SO5009-N-102319	<37	E	U	ND	187.02	E			414.95	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_138	WS19-1045-SO5030-N-102319	<37	E	U	ND	66.4	E	J	<RL	524.55	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_139	WS19-0003-SO5031-N-102319	22.52	S	J	<RL, B	68.66	E	J	<RL	617.57	S	J+	B	9.24	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191023_92951_140	WS19-0003-SO5032-N-102319	30.84	S	J	<RL, B, D%	12.72	S	J	<RL, D%	781.56	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_147	WS19-0003-SO5036-N-102319	20.82	S	J	<RL, B	102.24	E			577.09	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_148	WS19-0003-SO5037-N-102319	<37	E	U	ND	48.09	E	J	<RL	532.29	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_149	WS19-0003-SO5038-N-102319	<37	E	U	ND	56.52	E	J	<RL	585.26	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_151	WS19-0003-SO5040-N-102319	14.53	S	J	<RL, B	19.94	E	J	<RL	710.31	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_152	WS19-0003-SO5042-N-102319	27.66	S	J	<RL, B	63.06	E	J	<RL	568.71	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191023_92951_153	WS19-0003-SO5043-N-102319	33.64	S	J	<RL, B	89.67	E			559.84	S	J+	B	9.9	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191024_92951_158	WS19-0003-SO5048-N-102419	31.49	S	J	<RL, B	98.66	E			650.19	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191024_92951_159	WS19-0003-SO5049-N-102419	23.29	S	J	<RL, B	93.72	E			527.11	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191024_92951_160	WS19-0003-SO5051-N-102419	21.88	S	J	<RL, B	210.5	E			605.31	S	J+	B	8.24	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191024_92951_161	WS19-0003-SO5052-N-102419	33.12	S	J	<RL, B	263.84	E			636.47	S	J+	B	10.04	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191024_92951_166	WS19-0040-SO5053-N-102419	29.82	S	J	<RL, B	154.44	E			569	S	J+	B	12.32	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191024_92951_167	WS19-0040-SO5055-N-102419	28.44	S	J	<RL, B	114.61	E			555.05	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191024_92951_168	WS19-0040-SO5059-N-102419	37.67	S	J+	B	156.03	E			572.4	S	J+	B	11.92	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191024_92951_169	WS19-0040-SO5060-N-102419	24.41	S	J	<RL, B	109.1	E			528.93	S	J+	B	9.82	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191024_92951_170	WS19-0040-SO5061-N-102419	40.94	S	J+	B	318.03	E			609.84	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191024_92951_171	WS19-0040-SO5062-N-102419	29.29	S	J	<RL, B, D%	124.57	E			538.57	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_178	WS19-0040-SO5064-N-102519	23.43	S	J	<RL, B	163.83	E			519.38	S	J+	B	11.33	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_179	WS19-0040-SO5069-N-102519	38.51	S	J+	B	179.54	E			524.11	S	J+	B	13.41	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_180	WS19-0040-SO5072-N-102519	45.2	S	J+	B	252.88	E			416.89	S	J+	B	12.75	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_181	WS19-0040-SO5074-N-102519	58.46	S	J+	B	361.47	E			344.05	S	J+	B	10.74	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_183	WS19-0040-SO5076-N-102519	50.19	S	J+	B	175.1	E			517.63	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_184	WS19-0040-SO5080-N-102519	29.29	S	J	<RL, B	75.6	E	J	<RL	632.07	S	J+	B	14.95	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_185	WS19-0043-SO5081-N-102519	46.71	S	J+	B	145.38	E			616.62	S	J+	B	11.35	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_186	WS19-0043-SO5083-N-102519	22.33	S	J	<RL, B	64.65	E	J	<RL	460.51	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_187	WS19-0043-SO5085-N-102519	34.54	S	J	<RL, B	168.36	E			557.06	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_188	WS19-0043-SO5086-N-102519	16.06	S	J	<RL, B	54.12	E	J	<RL	449.2	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_189	WS19-0043-SO5087-N-102519	25.21	S	J	<RL, B	224.73	E			618.6	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_190	WS19-0005-SO5011-N-102519	12.66	S	J	<RL, B	74.18	E	J	<RL	563.08	S	J+	B	8.41	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_192	WS19-0005-SO5088-N-102519	<37	E	U	ND	178.76	E			487.39	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_193	WS19-0040-SO5073-N-102519	41.65	S	J+	B	179.23	E			603.81	S	J+	B	13.89	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191028_92951_194	WS19-0005-SO5090-N-102519	31.74	S	J	<RL, B	248.64	E			548.22	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_195	WS19-0006-SO5093-N-102519	16.24	S	J	<RL, B	96.44	E			551.33	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191028_92951_196	WS19-0043-SO5094-N-102819	26.6	S	J	<RL, B	66.87	E	J	<RL	578.93	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191101_92951_307	WS19-0040-SO5101-N-103119	35.18	S	J	<RL, B	188.11	E			616.33	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191101_92951_308	WS19-0040-SO5102-N-103119	29.75	S	J	<RL, B	132.76	E			656.52	S	J+	B	10.37	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191101_92951_309	WS19-0040-SO5105-N-103119	30.52	S	J	<RL, B	140.69	E			668.47	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191023_92951_135	WS19-1045-SO5027-N-102319	28.6	E	J	<RL	32748.41	E			472.77	E			2750.15	E			<24	S	UJ	ND, CCS
P_20191023_92951_136	WS19-1045-SO5028-N-102319	104.71	E			33247.66	E			397.31	E			6182.99	E			<24	S	UJ	ND, CCS
P_20191023_92951_137	WS19-1045-SO5009-N-102319	55.33	E	J	<RL	45502.34	E			595.75	E			57508.16	E			<24	S	UJ	ND, CCS
P_20191023_92951_138	WS19-1045-SO5030-N-102319	371.77	E			26925.34	E			274.19	E			1344.87	E			<24	S	UJ	ND, CCS
P_20191023_92951_139	WS19-0003-SO5031-N-102319	59.13	E	J	<RL	33361.86	E			573.15	E			60090	E			<24	S	UJ	ND, CCS
P_20191023_92951_140	WS19-0003-SO5032-N-102319	57.22	E	J	<RL	13731.89	E			61.88	S	J	C%	1327.8	E			<24	S	UJ	ND, CCS
P_20191023_92951_147	WS19-0003-SO5036-N-102319	108.91	E			32446.87	E			228.2	E			28016.27	E			<24	S	UJ	ND, CCS
P_20191023_92951_148	WS19-0003-SO5037-N-102319	55.21	E	J	<RL	20412.5	E			116.44	E			8582.38	E			<24	S	UJ	ND, CCS
P_20191023_92951_149	WS19-0003-SO5038-N-102319	152.3	E			28472.18	E			234.25	E			6022.44	E			<24	S	UJ	ND, CCS
P_20191023_92951_151	WS19-0003-SO5040-N-102319	56.19	E	J	<RL	32305.37	E			56.52	E			2957.03	E			<24	S	UJ	ND, CCS
P_20191023_92951_152	WS19-0003-SO5042-N-102319	39.8	E	J	<RL	19113.4	E			980.52	E			31833.07	E			<24	S	UJ	ND, CCS
P_20191023_92951_153	WS19-0003-SO5043-N-102319	135.1	E			36835.12	E			521.91	E			23648.76	E			<24	S	UJ	ND, CCS
P_20191024_92951_158	WS19-0003-SO5048-N-102419	144.51	E			34609.6	E			400.99	E			24017.85	E			<24	S	UJ	ND, CCS
P_20191024_92951_159	WS19-0003-SO5049-N-102419	111.53	E			37667.91	E			291.77	E			11367.19	E			<24	S	UJ	ND, CCS
P_20191024_92951_160	WS19-0003-SO5051-N-102419	76.78	E			33317.57	E			188.91	E			12171.14	E			<24	S	UJ	ND, CCS
P_20191024_92951_161	WS19-0003-SO5052-N-102419	57.44	E	J	<RL	38933.6	E			267.95	E			43102.16	E			<24	S	UJ	ND, CCS
P_20191024_92951_166	WS19-0040-SO5053-N-102419	144.7	E			33815.88	E			1220.33	E			28770.81	E			<24	S	UJ	ND, CCS
P_20191024_92951_167	WS19-0040-SO5055-N-102419	136.65	E			34884.5	E			1186.49	E			46848.94	E			<24	S	UJ	ND, CCS
P_20191024_92951_168	WS19-0040-SO5059-N-102419	197.89	E			42469.8	E			1193.11	E			42786.32	E			<24	S	UJ	ND, CCS
P_20191024_92951_169	WS19-0040-SO5060-N-102419	87.33	E			45019.78	E			604.25	E			19644.35	E			<24	S	UJ	ND, CCS
P_20191024_92951_170	WS19-0040-SO5061-N-102419	146.15	E			60468.5	E			1319.65	E			28076.87	E			<24	S	UJ	ND, CCS
P_20191024_92951_171	WS19-0040-SO5062-N-102419	92.21	E			43310.85	E			825.34	E			27301.57	E			<24	S	UJ	ND, CCS
P_20191028_92951_178	WS19-0040-SO5064-N-102519	264.66	E			28607.47	E			1425.09	E			11654.78	E			<24	S	UJ	ND, CCS
P_20191028_92951_179	WS19-0040-SO5069-N-102519	282.33	E			41086.53	E			1907.97	E			22077.27	E			<24	S	UJ	ND, CCS
P_20191028_92951_180	WS19-0040-SO5072-N-102519	403.19	E			75775.71	E			1408.65	E			111676.45	E			<24	S	UJ	ND, CCS
P_20191028_92951_181	WS19-0040-SO5074-N-102519	245.86	E			44920.12	E			1970.6	E			16963.49	E			<24	S	UJ	ND, CCS
P_20191028_92951_183	WS19-0040-SO5076-N-102519	195.4	E			37199.26	E			719.01	E			50088.85	E			<24	S	UJ	ND, CCS
P_20191028_92951_184	WS19-0040-SO5080-N-102519	97.37	E			43082.34	E			902.8	E			27946.76	E			<24	S	UJ	ND, CCS
P_20191028_92951_185	WS19-0043-SO5081-N-102519	148.24	E			29475.23	E			767.63	E			46512.33	E			<24	S	UJ	ND, CCS
P_20191028_92951_186	WS19-0043-SO5083-N-102519	156.96	E			37555.84	E			419.41	E			45695.06	E			<24	S	UJ	ND, CCS
P_20191028_92951_187	WS19-0043-SO5085-N-102519	394.03	E			36660.08	E			842.2	E			37302.1	E			<24	S	UJ	ND, CCS
P_20191028_92951_188	WS19-0043-SO5086-N-102519	93.9	E			35484.41	E			401.03	E			41227.2	E			<24	S	UJ	ND, CCS
P_20191028_92951_189	WS19-0043-SO5087-N-102519	472.41	E			38191.82	E			716.31	E			45014.96	E			<24	S	UJ	ND, CCS
P_20191028_92951_190	WS19-0005-SO5011-N-102519	123.75	E			29114.06	E			69.64	S	J	C%	5980.98	E			<24	S	UJ	ND, CCS
P_20191028_92951_192	WS19-0005-SO5088-N-102519	124.19	E			53006.38	E			194.18	E			40138.48	E			<24	S	UJ	ND, CCS
P_20191028_92951_193	WS19-0040-SO5073-N-102519	112.58	E			40733.77	E			3625.92	E			7304.74	E			<24	S	UJ	ND, CCS
P_20191028_92951_194	WS19-0005-SO5090-N-102519	93.79	E			40564.39	E			114.26	S	J	C%	5913.88	E			<24	S	UJ	ND, CCS
P_20191028_92951_195	WS19-0006-SO5093-N-102519	94.82	E			30549.95	E			261.71	E			8254.81	E			<24	S	UJ	ND, CCS
P_20191028_92951_196	WS19-0043-SO5094-N-102819	101.29	E			33088.44	E			268.41	E			21981.76	E			<24	S	UJ	ND, CCS
P_20191101_92951_307	WS19-0040-SO5101-N-103119	211.59	E			37160.98	E			948.14	E			16479.71	E			<24	S	UJ	ND, CCS
P_20191101_92951_308	WS19-0040-SO5102-N-103119	109.49	E			40766.6	E			494.57	E			16513.13	E			<24	S	UJ	ND, CCS
P_20191101_92951_309	WS19-0040-SO5105-N-103119	222.15	E			23208.1	E			402.91	E			7920.74	E			<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191023_92951_135	WS19-1045-SO5027-N-102319	4.95	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	9.04	E	J	<RL	171.99	E		
P_20191023_92951_136	WS19-1045-SO5028-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	29.36	E			366.44	E		
P_20191023_92951_137	WS19-1045-SO5009-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	99.3	E			749.35	E		
P_20191023_92951_138	WS19-1045-SO5030-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	485.33	E		
P_20191023_92951_139	WS19-0003-SO5031-N-102319	<14	S	UJ	ND, C%	45.72	S	J	<RL, C%	<15	E	U	ND	<18	E	U	ND	2385.78	E		
P_20191023_92951_140	WS19-0003-SO5032-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	110.48	E	J	<RL
P_20191023_92951_147	WS19-0003-SO5036-N-102319	<14	S	UJ	ND, C%	31.79	S	J	<RL, C%	<15	E	U	ND	42.18	E			420	E		
P_20191023_92951_148	WS19-0003-SO5037-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	250.73	E		
P_20191023_92951_149	WS19-0003-SO5038-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	7.17	E	J	<RL	334.68	E		
P_20191023_92951_151	WS19-0003-SO5040-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	155.55	E		
P_20191023_92951_152	WS19-0003-SO5042-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	2205.81	E		
P_20191023_92951_153	WS19-0003-SO5043-N-102319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	68.02	E			849.83	E		
P_20191024_92951_158	WS19-0003-SO5048-N-102419	<14	S	UJ	ND, C%	44.92	S	J	<RL, C%	<15	E	U	ND	56.35	E			756.97	E		
P_20191024_92951_159	WS19-0003-SO5049-N-102419	<14	S	UJ	ND, C%	28.65	S	J	<RL, C%	<15	E	U	ND	71.35	E			644.77	E		
P_20191024_92951_160	WS19-0003-SO5051-N-102419	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	700.73	E		
P_20191024_92951_161	WS19-0003-SO5052-N-102419	<14	S	UJ	ND, C%	46.84	S	J	<RL, C%	<15	E	U	ND	9.95	E	J	<RL	608.29	E		
P_20191024_92951_166	WS19-0040-SO5053-N-102419	5.77	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	83.14	E			1202.57	E		
P_20191024_92951_167	WS19-0040-SO5055-N-102419	<14	S	UJ	ND, C%	43.14	S	J	<RL, C%	<15	E	U	ND	44.21	E			2159.75	E		
P_20191024_92951_168	WS19-0040-SO5059-N-102419	<14	S	UJ	ND, C%	61.98	S	J	<RL, C%	<15	E	U	ND	54.02	E			2184.2	E		
P_20191024_92951_169	WS19-0040-SO5060-N-102419	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	30.25	E			1256.09	E		
P_20191024_92951_170	WS19-0040-SO5061-N-102419	<14	S	UJ	ND, C%	46.76	S	J	<RL, C%	<15	E	U	ND	45.54	E			692.7	E		
P_20191024_92951_171	WS19-0040-SO5062-N-102419	<14	S	UJ	ND, C%	46.09	S	J	<RL, C%	<15	E	U	ND	33.19	E			1356.95	S	J	D%
P_20191028_92951_178	WS19-0040-SO5064-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	1052.01	E			814.98	E		
P_20191028_92951_179	WS19-0040-SO5069-N-102519	6.86	S	J	<RL, C%	43.86	S	J	<RL, C%	<15	E	U	ND	85.57	E			1472.29	E		
P_20191028_92951_180	WS19-0040-SO5072-N-102519	14.68	S	J	C%	120.53	S	J	C%	<15	E	U	ND	187.56	E			2383.28	E		
P_20191028_92951_181	WS19-0040-SO5074-N-102519	<14	S	UJ	ND, C%	48.7	S	J	<RL, C%	<15	E	U	ND	105.61	E			691.39	E		
P_20191028_92951_183	WS19-0040-SO5076-N-102519	<14	S	UJ	ND, C%	55.09	S	J	<RL, C%	<15	E	U	ND	44.27	S	J+	B	850.5	E		
P_20191028_92951_184	WS19-0040-SO5080-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	39.03	S	J+	B	2714.94	E		
P_20191028_92951_185	WS19-0043-SO5081-N-102519	<14	S	UJ	ND, C%	37.71	S	J	<RL, C%	<15	E	U	ND	108.96	E			864.94	E		
P_20191028_92951_186	WS19-0043-SO5083-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	49.85	S	J+	B	965.13	E		
P_20191028_92951_187	WS19-0043-SO5085-N-102519	<14	S	UJ	ND, C%	39.26	S	J	<RL, C%	<15	E	U	ND	67.66	S	J+	B	1394.43	E		
P_20191028_92951_188	WS19-0043-SO5086-N-102519	<14	S	UJ	ND, C%	41.21	S	J	<RL, C%	<15	E	U	ND	54.26	S	J+	B	1555.12	E		
P_20191028_92951_189	WS19-0043-SO5087-N-102519	<14	S	UJ	ND, C%	47.69	S	J	<RL, C%	<15	E	U	ND	59.56	S	J+	B	1059.65	E		
P_20191028_92951_190	WS19-0005-SO5011-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	210.94	E		
P_20191028_92951_192	WS19-0005-SO5088-N-102519	10.1	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	487.38	E		
P_20191028_92951_193	WS19-0040-SO5073-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	55.83	S	J+	B	1228.86	E		
P_20191028_92951_194	WS19-0005-SO5090-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	6.42	S	J	<RL, B	219.51	E		
P_20191028_92951_195	WS19-0006-SO5093-N-102519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	24.9	S	J+	B	754.16	E		
P_20191028_92951_196	WS19-0043-SO5094-N-102819	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	38.06	S	J+	B	600.03	E		
P_20191101_92951_307	WS19-0040-SO5101-N-103119	<14	S	UJ	ND, C%	33.15	S	J	<RL, C%	<15	E	U	ND	84.72	E			1036.67	E		
P_20191101_92951_308	WS19-0040-SO5102-N-103119	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	35.17	E			1591.76	E		
P_20191101_92951_309	WS19-0040-SO5105-N-103119	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	17.27	E	J	<RL	453.74	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191101_92951_310	WS19-0040-SO5106-N-103119	33.56	S	J	<RL, B	212.77	E			676.38	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191101_92951_311	WS19-0040-SO5107-N-103119	36.68	S	J	<RL, B	138.21	E			630.58	S	J+	B	8.49	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191101_92951_312	WS19-0040-SO5109-N-103119	27.74	S	J	<RL, B	126.16	E			592.91	S	J+	B	10.4	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191101_92951_313	WS19-0038-SO5111-N-103119	15.93	S	J	<RL, B	114.33	E			444.71	S	J+	B	9.3	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191101_92951_314	WS19-0041-SO5116-N-103119	30.71	S	J	<RL, B	61.92	E	J	<RL	612.83	S	J+	B	13.32	S	J	<RL, B, R%	<362	S	UJ	ND, CCS
P_20191105_92951_321	WS19-0006-SO5014-N-110419	14.67	S	J	<RL, B	91.92	E			539.52	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191105_92951_322	WS19-0006-SO5015-N-110419	23.76	S	J	<RL, B	141.05	E			786.83	S	J	C%, B	8.69	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191105_92951_323	WS19-0006-SO5122-N-110419	46.15	S	J+	B	109.98	E			639.61	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191105_92951_324	WS19-0006-SO5123-N-110419	43.48	S	J+	B	80.04	E	J	<RL	550.18	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191105_92951_325	WS19-0006-SO5125-N-110419	27.19	S	J	<RL, B	86.79	E			681.61	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191105_92951_326	WS19-0006-SO5128-N-110419	50.28	S	J+	B	167.94	E			572.19	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191105_92951_327	WS19-0006-SO5131-N-110419	12.62	S	J	<RL, B	89.87	E			510.05	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191105_92951_328	WS19-0007-SO5132-N-110419	22.06	S	J	<RL, B	63.42	E	J	<RL	624.37	S	J	C%, B	8.71	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191105_92951_329	WS19-0037-SO5136-N-110419	18.46	S	J	<RL, B	188.73	E			651.17	S	J	C%, B	10.15	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191105_92951_330	WS19-0037-SO5138-N-110419	20.36	S	J	<RL, B	98.48	S	J	D%	749.9	S	J	C%, B	9.17	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191106_92951_337	WS19-0037-SO5140-N-110519	27.28	S	J	<RL, B	272.19	E			515.28	S	J+	B	23.59	S	J+	B	<362	S	UJ	ND, CCS
P_20191106_92951_338	WS19-0038-SO5143-N-110519	37.33	S	J+	B	289.79	E			512.47	S	J+	B	12.81	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191106_92951_339	WS19-0038-SO5147-N-110519	14.26	S	J	<RL, B	131.96	E			651.83	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191106_92951_340	WS19-0038-SO5153-N-110519	17.25	S	J	<RL, B	75.18	E	J	<RL	569.21	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191106_92951_341	WS19-0037-SO5155-N-110519	19.03	S	J	<RL, B	97.24	E			274.71	S	J+	B	11.07	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191106_92951_342	WS19-0037-SO5158-N-110519	13.67	S	J	<RL, B	141.08	E			528.79	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191106_92951_343	WS19-0010-SO5160-N-110519	16.64	S	J	<RL, B	86.64	E			616.76	S	J+	B	11.42	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191106_92951_344	WS19-0010-SO5162-N-110519	26.83	S	J	<RL, B	153.44	E			729.86	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191106_92951_345	WS19-0010-SO5164-N-110519	22.48	S	J	<RL, B	55.68	E	J	<RL	893.98	S	J+	B	14.18	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191106_92951_346	WS19-0010-SO5170-N-110519	27.26	S	J	<RL, B	155.49	E			576.36	S	J+	B	8.44	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191106_92951_347	WS19-0010-SO5171-N-110519	16.69	S	J	<RL, B, D%	113.83	E			666.5	S	J+	B	17.33	S	J	<RL, B, R%	<362	S	UJ	ND, CCS
P_20191108_92951_354	WS19-0315-SO5021-N-110719	22.01	S	J	<RL, B	57.57	E	J	<RL	522.14	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191108_92951_355	WS19-0315-SO5024-N-110719	<37	E	U	ND	23.18	E	J	<RL	304.07	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191108_92951_356	WS19-0010-SO5172-N-110719	<37	E	U	ND	149.33	E			331.12	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191108_92951_357	WS19-0010-SO5173-N-110719	31.92	S	J	<RL, B	<82	E	U	ND	673.71	S	J+	B	11.32	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191108_92951_358	WS19-0010-SO5174-N-110719	27.97	S	J	<RL, B	301.67	E			458.51	S	J	B, FD	34.67	S	J	B, FD	<362	S	UJ	ND, CCS
P_20191108_92951_360	WS19-0010-SO5176-N-110719	<37	E	U	ND	17.4	E	J	<RL	508.52	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191108_92951_361	WS19-0010-SO5177-N-110719	32.64	S	J	<RL, B	104.24	E			874.04	S	J+	B	12.71	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191108_92951_362	WS19-0313-SO5180-N-110719	26.26	S	J	<RL, B	144.85	E			459.82	S	J+	B	12.23	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191108_92951_363	WS19-0015-SO5182-N-110719	15.76	S	J	<RL, B	90.03	E			282.76	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191108_92951_364	WS19-0015-SO5183-N-110719	26.07	S	J	<RL, B	175.89	E			556.35	S	J+	B	13.46	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191108_92951_365	WS19-0010-SO5185-N-110719	21.7	S	J	<RL, B, R%	126.29	E			560.85	S	J+	B	11.4	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_373	WS19-0021-SO5001-N-110819	18.98	S	J	<RL, B	22.01	E	J	<RL	276.76	S	J+	B	8.55	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_374	WS19-0017-SO5005-N-110819	44.79	S	J+	B	430.4	E			632.9	S	J+	B	16.52	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_375	WS19-0010-SO5026-N-110819	34.5	S	J	<RL, B	277.35	E			647.38	S	J+	B	10.39	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_376	WS19-0010-SO5187-N-110819	21.42	S	J	<RL, B	196.41	E			553.7	S	J+	B	11.33	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_377	WS19-0019-SO5192-N-110819	33.55	S	J	<RL, B	117.46	E			654.18	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191101_92951_310	WS19-0040-SO5106-N-103119	282.51	E			33478.02	E			825	E			13749.36	E			<24	S	UJ	ND, CCS
P_20191101_92951_311	WS19-0040-SO5107-N-103119	155.78	E			34438.53	E			850.87	E			8805.34	E			<24	S	UJ	ND, CCS
P_20191101_92951_312	WS19-0040-SO5109-N-103119	253.99	E			32481.19	E			588.61	E			9695.09	E			<24	S	UJ	ND, CCS
P_20191101_92951_313	WS19-0038-SO5111-N-103119	85.24	E			32590.59	E			446.38	E			13778.7	E			<24	S	UJ	ND, CCS
P_20191101_92951_314	WS19-0041-SO5116-N-103119	21.96	S	J	<RL, D%, R%	29755.43	E			359.15	E			33685.67	E			<24	S	UJ	ND, CCS
P_20191105_92951_321	WS19-0006-SO5014-N-110419	151.7	E			27560.6	E			94.41	E			9811.78	E			<24	S	UJ	ND, CCS
P_20191105_92951_322	WS19-0006-SO5015-N-110419	238.43	E			34571.02	E			187.02	E			14138.99	E			<24	S	UJ	ND, CCS
P_20191105_92951_323	WS19-0006-SO5122-N-110419	88.86	E			43836.24	E			434.99	E			7463.25	E			<24	S	UJ	ND, CCS
P_20191105_92951_324	WS19-0006-SO5123-N-110419	132.8	E			24007.17	E			344.88	E			10017.45	E			<24	S	UJ	ND, CCS
P_20191105_92951_325	WS19-0006-SO5125-N-110419	142.88	E			41076.86	E			256.68	E			9222.86	E			<24	S	UJ	ND, CCS
P_20191105_92951_326	WS19-0006-SO5128-N-110419	215.19	E			33973.78	E			512.98	E			9617.12	E			<24	S	UJ	ND, CCS
P_20191105_92951_327	WS19-0006-SO5131-N-110419	38.65	E	J	<RL	23794.53	E			160.39	E			12371.26	E			<24	S	UJ	ND, CCS
P_20191105_92951_328	WS19-0007-SO5132-N-110419	102.25	E			35445.8	E			84.78	E			15455.09	E			<24	S	UJ	ND, CCS
P_20191105_92951_329	WS19-0037-SO5136-N-110419	205.77	E			34957.32	E			958.03	E			27269.26	E			<24	S	UJ	ND, CCS
P_20191105_92951_330	WS19-0037-SO5138-N-110419	<70	E	U	ND	35257.91	E			688.91	E			32641.65	E			<24	S	UJ	ND, CCS
P_20191106_92951_337	WS19-0037-SO5140-N-110519	183.53	S	J	C%	43509.86	E			1207.56	E			45349.42	E			<24	S	UJ	ND, CCS
P_20191106_92951_338	WS19-0038-SO5143-N-110519	72.61	S	J	C%	45063.23	E			4406.16	E			7767.29	E			<24	S	UJ	ND, CCS
P_20191106_92951_339	WS19-0038-SO5147-N-110519	52.48	S	J	<RL, C%	39295.74	E			553.41	E			30251.92	E			<24	S	UJ	ND, CCS
P_20191106_92951_340	WS19-0038-SO5153-N-110519	958.4	S	J	C%	28295.94	E			188.59	E			1501.61	E			<24	S	UJ	ND, CCS
P_20191106_92951_341	WS19-0037-SO5155-N-110519	41.03	S	J	<RL, C%	6757.26	E			1150.58	E			10658.59	E			<24	S	UJ	ND, CCS
P_20191106_92951_342	WS19-0037-SO5158-N-110519	36.72	S	J	<RL, C%	38686.64	E			230.54	E			13647.03	E			<24	S	UJ	ND, CCS
P_20191106_92951_343	WS19-0010-SO5160-N-110519	97.41	S	J	C%	35690.12	E			358.84	E			6796.18	E			<24	S	UJ	ND, CCS
P_20191106_92951_344	WS19-0010-SO5162-N-110519	160.5	S	J	C%	26012.38	E			336.24	E			5743.92	E			<24	S	UJ	ND, CCS
P_20191106_92951_345	WS19-0010-SO5164-N-110519	44.52	S	J	<RL, C%	24793.07	E			1097.99	E			15686.64	E			<24	S	UJ	ND, CCS
P_20191106_92951_346	WS19-0010-SO5170-N-110519	98.85	S	J	C%	30877.32	E			2188.27	E			5864.4	E			<24	S	UJ	ND, CCS
P_20191106_92951_347	WS19-0010-SO5171-N-110519	170.81	S	J	C%	40580.63	E			2089.88	E			25012.1	E			<24	S	UJ	ND, CCS
P_20191108_92951_354	WS19-0315-SO5021-N-110719	55.48	S	J	<RL, C%	34031.89	E			380.77	E			20731.74	E			<24	S	UJ	ND, CCS
P_20191108_92951_355	WS19-0315-SO5024-N-110719	87.68	S	J	C%	12566.39	E			13.12	E	J	<RL	520.74	E			<24	S	UJ	ND, CCS
P_20191108_92951_356	WS19-0010-SO5172-N-110719	55.07	S	J	<RL, C%	27254.3	E			2630.19	E			55466.86	E			<24	S	UJ	ND, CCS
P_20191108_92951_357	WS19-0010-SO5173-N-110719	26.25	S	J	<RL, C%	18464.87	E			178.89	E			4950.36	E			<24	S	UJ	ND, CCS
P_20191108_92951_358	WS19-0010-SO5174-N-110719	76.21	S	J	C%, FD	57102.39	E			5536.26	E			80283.64	E			<24	S	UJ	ND, CCS
P_20191108_92951_360	WS19-0010-SO5176-N-110719	30.13	S	J	<RL, C%	15650.11	E			153.48	E			836.22	E			<24	S	UJ	ND, CCS
P_20191108_92951_361	WS19-0010-SO5177-N-110719	36.59	S	J	<RL, C%	32940.76	E			1713.67	E			20713.77	E			<24	S	UJ	ND, CCS
P_20191108_92951_362	WS19-0313-SO5180-N-110719	42.99	S	J	<RL, C%	37143.09	E			1708.87	E			57086.31	E			<24	S	UJ	ND, CCS
P_20191108_92951_363	WS19-0015-SO5182-N-110719	463.56	S	J	C%	13390.73	E			233.22	E			272.11	E			<24	S	UJ	ND, CCS
P_20191108_92951_364	WS19-0015-SO5183-N-110719	173.67	S	J	C%	19401.64	E			3972.74	E			3259.37	E			<24	S	UJ	ND, CCS
P_20191108_92951_365	WS19-0010-SO5185-N-110719	45.37	S	J	<RL, C%	39139.91	E			748.49	E			11890.6	E			<24	S	UJ	ND, CCS
P_20191111_92951_373	WS19-0021-SO5001-N-110819	60.55	E	J	<RL	5879.58	E			37.4	E			1521.68	E			<24	S	UJ	ND, CCS
P_20191111_92951_374	WS19-0017-SO5005-N-110819	91.68	E			51114.8	E			2335.88	E			12780.33	E			<24	S	UJ	ND, CCS
P_20191111_92951_375	WS19-0010-SO5026-N-110819	243.11	E			68017.8	E			4760.07	E			5344.08	E			<24	S	UJ	ND, CCS
P_20191111_92951_376	WS19-0010-SO5187-N-110819	66.13	E	J	<RL	36243.11	E			1466.24	E			3443.4	E			<24	S	UJ	ND, CCS
P_20191111_92951_377	WS19-0019-SO5192-N-110819	35.76	E	J	<RL	42245.11	E			484.72	E			5911.05	E			<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191101_92951_310	WS19-0040-SO5106-N-103119	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	72.38	E			1010.08	E		
P_20191101_92951_311	WS19-0040-SO5107-N-103119	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	65.29	E			713.45	E		
P_20191101_92951_312	WS19-0040-SO5109-N-103119	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	95.57	E			1146.87	E		
P_20191101_92951_313	WS19-0038-SO5111-N-103119	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	13.44	E	J	<RL	1557.47	E		
P_20191101_92951_314	WS19-0041-SO5116-N-103119	<14	S	UJ	ND, C%	42.07	S	J	<RL, C%	<15	E	U	ND	<18	E	U	ND	1247.54	E		
P_20191105_92951_321	WS19-0006-SO5014-N-110419	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	235.56	E		
P_20191105_92951_322	WS19-0006-SO5015-N-110419	6.81	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	22.5	E			276.34	E		
P_20191105_92951_323	WS19-0006-SO5122-N-110419	<14	E	U	ND	32.33	S	J	<RL, C%	<15	E	U	ND	36.19	E			538.58	E		
P_20191105_92951_324	WS19-0006-SO5123-N-110419	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	53.92	E			423.23	E		
P_20191105_92951_325	WS19-0006-SO5125-N-110419	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	42.5	E			363.99	E		
P_20191105_92951_326	WS19-0006-SO5128-N-110419	7.38	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	43.33	E			1223.05	E		
P_20191105_92951_327	WS19-0006-SO5131-N-110419	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	266.54	E		
P_20191105_92951_328	WS19-0007-SO5132-N-110419	5	E	J	<RL	33.31	S	J	<RL, C%	<15	E	U	ND	<18	E	U	ND	209.5	E		
P_20191105_92951_329	WS19-0037-SO5136-N-110419	<14	E	U	ND	31.35	S	J	<RL, C%	<15	E	U	ND	79.6	E			1388.53	E		
P_20191105_92951_330	WS19-0037-SO5138-N-110419	<14	E	U	ND	43.68	S	J	<RL, C%	<15	E	U	ND	44.93	S	J	D%	803.42	E		
P_20191106_92951_337	WS19-0037-SO5140-N-110519	<14	S	UJ	ND, C%	37.42	S	J	<RL, C%	<15	E	U	ND	100.22	E			2246.68	E		
P_20191106_92951_338	WS19-0038-SO5143-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	21.25	E			2031.72	E		
P_20191106_92951_339	WS19-0038-SO5147-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	64.03	E			1126.51	E		
P_20191106_92951_340	WS19-0038-SO5153-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	2039.06	E		
P_20191106_92951_341	WS19-0037-SO5155-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	37.04	E			1571.08	E		
P_20191106_92951_342	WS19-0037-SO5158-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	10.09	E	J	<RL	471.38	E		
P_20191106_92951_343	WS19-0010-SO5160-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	36.16	E			1425.64	E		
P_20191106_92951_344	WS19-0010-SO5162-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	7.18	E	J	<RL	419.74	E		
P_20191106_92951_345	WS19-0010-SO5164-N-110519	<14	S	UJ	ND, C%	30.71	S	J	<RL, C%	<15	E	U	ND	60.84	E			2152.93	E		
P_20191106_92951_346	WS19-0010-SO5170-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	20.08	E			1268.91	E		
P_20191106_92951_347	WS19-0010-SO5171-N-110519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	36.15	S	J	D%	2488.73	E		
P_20191108_92951_354	WS19-0315-SO5021-N-110719	7.14	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	1051.93	E		
P_20191108_92951_355	WS19-0315-SO5024-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	61.15	E	J	<RL
P_20191108_92951_356	WS19-0010-SO5172-N-110719	<14	S	UJ	ND, C%	44.73	S	J	<RL, C%	<15	E	U	ND	54.65	E			7187.06	E		
P_20191108_92951_357	WS19-0010-SO5173-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	412.41	E		
P_20191108_92951_358	WS19-0010-SO5174-N-110719	15.6	S	J	C%	50.69	S	J	<RL, C%	<15	E	U	ND	21.69	E			7982.14	E		
P_20191108_92951_360	WS19-0010-SO5176-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	327.09	E		
P_20191108_92951_361	WS19-0010-SO5177-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	9.19	E	J	<RL	9071.74	E		
P_20191108_92951_362	WS19-0313-SO5180-N-110719	<14	S	UJ	ND, C%	58.6	S	J	<RL, C%	<15	E	U	ND	7.39	E	J	<RL	2861.55	E		
P_20191108_92951_363	WS19-0015-SO5182-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	474.42	E		
P_20191108_92951_364	WS19-0015-SO5183-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	53.21	E			2903.52	E		
P_20191108_92951_365	WS19-0010-SO5185-N-110719	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	23.03	E			663.26	E		
P_20191111_92951_373	WS19-0021-SO5001-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	58.41	E	J	<RL
P_20191111_92951_374	WS19-0017-SO5005-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	25.52	E			2270.97	E		
P_20191111_92951_375	WS19-0010-SO5026-N-110819	6.5	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	134.12	E			1420.6	E		
P_20191111_92951_376	WS19-0010-SO5187-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	39.73	E			556.1	E		
P_20191111_92951_377	WS19-0019-SO5192-N-110819	<14	E	U	ND	29.86	S	J	<RL, C%	<15	E	U	ND	17.64	E	J	<RL	205.42	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191111_92951_378	WS19-0019-SO5193-N-110819	20.62	S	J	<RL, B	93.5	E			629.68	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191111_92951_379	WS19-0017-SO5194-N-110819	15.4	S	J	<RL, B	66.37	E	J	<RL	400.09	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191111_92951_380	WS19-0015-SO5197-N-110819	28.92	S	J	<RL, B	158	E			489.51	S	J+	B	18.32	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_381	WS19-0015-SO5200-N-110819	30.14	S	J	<RL, B	158.77	E			574.19	S	J+	B	17.53	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191111_92951_382	WS19-0015-SO5204-N-110819	27.29	S	J	<RL, B, R%	141.51	E			691.54	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_389	WS19-0289-SO5007-N-111319	31.53	S	J	<RL, B	85.67	E			339.08	S	J+	B	13.18	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_390	WS19-0289-SO5012-N-111319	32.43	S	J	<RL, B	196.97	E			269	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_391	WS19-0290-SO5018-N-111319	42.02	S	J+	B	163.8	E			347.31	S	J+	B	15.59	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_392	WS19-0290-SO5019-N-111319	34.12	S	J	<RL, B	137.53	E			379.91	S	J+	B	17.28	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_393	WS19-0290-SO5206-N-111319	41.27	S	J+	B	229.23	E			458.37	S	J+	B	15.83	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_394	WS19-0292-SO5211-N-111319	22.09	S	J	<RL, B	145.82	E			506.53	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_395	WS19-0292-SO5214-N-111319	12.87	S	J	<RL, B, D%	15.4	E	J	<RL	825.53	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_402	WS19-0288-SO5215-N-111519	22.28	S	J	<RL, B	51.67	E	J	<RL	293.13	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_403	WS19-0288-SO5217-N-111519	25.13	S	J	<RL, B	131.83	E			253.58	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_404	WS19-0297-SO5218-N-111519	29.18	S	J	<RL, B	140.68	E			345.21	S	J+	B	22.77	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_405	WS19-0297-SO5220-N-111519	24.1	S	J	<RL, B	117.42	E			308.92	S	J+	B	12.58	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_406	WS19-0297-SO5221-N-111519	27.98	S	J	<RL, B	60.58	E	J	<RL	368.67	S	J+	B	12.87	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_407	WS19-0288-SO5223-N-111519	31.09	S	J	<RL, B	299.49	E			329.5	S	J+	B	9.28	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_408	WS19-0288-SO5224-N-111519	22.74	S	J	<RL, B	115.94	E			255.48	S	J+	B	8.96	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_409	WS19-0288-SO5226-N-111519	28.23	S	J	<RL, B	16.02	E	J	<RL	308.24	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_410	WS19-0288-SO5227-N-111519	24.71	S	J	<RL, B	46.99	E	J	<RL	287.48	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_411	WS19-0288-SO5231-N-111519	31.98	S	J	<RL, B	111.88	E			305.52	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20191115_92951_412	WS19-0288-SO5234-N-111519	48.85	S	J+	B	572.34	E			322.55	S	J+	B	8.31	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20191115_92951_413	WS19-0286-SO5236-N-111519	27.69	S	J	<RL, B	28.59	E	J	<RL	500.43	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200512_92951_513	20WS-0288-SO5238-N-051220	21.14	S	J	<RL, B	117.81	E			294.62	S	J+	B	9.06	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200512_92951_514	20WS-0297-SO5240-N-051220	24.8	S	J	<RL, B	33.53	E	J	<RL	258.85	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200512_92951_515	20WS-0297-SO5241-N-051220	47.73	S	J+	B	359.84	E			337.32	S	J+	B	10.38	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200512_92951_516	20WS-0297-SO5242-N-051220	36.72	S	J	<RL, B	60.02	E	J	<RL	327.87	S	J+	B	8.25	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200512_92951_517	20WS-0297-SO5243-N-051220	27.36	S	J	<RL, B	307.52	E			292.69	S	J+	B	18	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200512_92951_518	20WS-0297-SO5244-N-051220	27.05	S	J	<RL, B, D%	49.16	E	J	<RL	290.44	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_525	20WS-0288-SO5274-N-051320	22.25	S	J	<RL, B	34.5	E	J	<RL	237.38	S	J+	B	13.77	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_526	20WS-0288-SO5276-N-051320	20.28	S	J	<RL, B	117.21	E			359.87	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_527	20WS-0288-SO5278-N-051320	23.04	S	J	<RL, B	100.6	E			334.77	S	J+	B	14.58	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_528	20WS-0288-SO5280-N-051320	23.25	S	J	<RL, B	38.12	E	J	<RL	255.51	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_529	20WS-0288-SO5281-N-051320	25.85	S	J	<RL, B	115.24	E			383.2	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_530	20WS-0297-SO5247-N-051220	39.3	S	J+	B	122.76	E			337.67	S	J+	B	12.69	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_531	20WS-0297-SO5248-N-051220	26.01	S	J	<RL, B	95.2	E			331.97	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_532	20WS-0297-SO5251-N-051220	24.71	S	J	<RL, B	129.5	E			338.52	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_533	20WS-0297-SO5255-N-051220	31.6	S	J	<RL, B	194.77	E			350.43	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_534	20WS-0297-SO5257-N-051220	30.86	S	J	<RL, B	84.3	E			497.31	S	J+	B	9.11	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_535	20WS-0297-SO5260-N-051220	24.47	S	J	<RL, B	111.16	E			375.94	S	J+	B	19.1	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_536	20WS-0300-SO5263-N-051220	45.89	S	J+	B	196.9	E			348.29	S	J+	B	12.2	S	J	<RL, B	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191111_92951_378	WS19-0019-SO5193-N-110819	33.46	E	J	<RL	24002.54	E			288.82	E			4592.27	E			<24	S	UJ	ND, CCS
P_20191111_92951_379	WS19-0017-SO5194-N-110819	93.42	E			7456.15	E			113.16	E			1533.31	E			<24	S	UJ	ND, CCS
P_20191111_92951_380	WS19-0015-SO5197-N-110819	168.88	E			40635.52	E			4792.17	E			9385.09	E			<24	S	UJ	ND, CCS
P_20191111_92951_381	WS19-0015-SO5200-N-110819	42.62	E	J	<RL	34598.35	E			4794.08	E			5031.58	E			<24	S	UJ	ND, CCS
P_20191111_92951_382	WS19-0015-SO5204-N-110819	57.28	E	J	<RL	28266.7	E			3648.92	E			2333.1	E			<24	S	UJ	ND, CCS
P_20191115_92951_389	WS19-0289-SO5007-N-111319	49.16	S	J	<RL, C%	12358.82	E			2166.59	E			20121.16	E			<24	S	UJ	ND, CCS
P_20191115_92951_390	WS19-0289-SO5012-N-111319	<70	S	UJ	ND, C%	6371.09	E			454.9	E			1355.06	E			<24	S	UJ	ND, CCS
P_20191115_92951_391	WS19-0290-SO5018-N-111319	84.95	S	J	C%	15931.96	E			3294.62	E			594.64	E			<24	S	UJ	ND, CCS
P_20191115_92951_392	WS19-0290-SO5019-N-111319	73.82	S	J	C%	10585.25	E			2199.32	E			16726.51	E			<24	S	UJ	ND, CCS
P_20191115_92951_393	WS19-0290-SO5206-N-111319	67.63	S	J	<RL, C%	17548.8	E			3891.1	E			796.9	E			<24	S	UJ	ND, CCS
P_20191115_92951_394	WS19-0292-SO5211-N-111319	427.82	S	J	C%	88224.97	E			439.56	E			350.15	S	J+	B	<24	S	UJ	ND, CCS
P_20191115_92951_395	WS19-0292-SO5214-N-111319	72.05	S	J	C%	13525.83	E			82.63	E			350.87	S	J+	B	<24	S	UJ	ND, CCS
P_20191115_92951_402	WS19-0288-SO5215-N-111519	<70	S	UJ	ND, C%	6151.44	E			877.74	E			19382.93	E			<24	S	UJ	ND, CCS
P_20191115_92951_403	WS19-0288-SO5217-N-111519	31.92	S	J	<RL, C%	9581.51	E			2888.17	E			337.48	S	J+	B	<24	S	UJ	ND, CCS
P_20191115_92951_404	WS19-0297-SO5218-N-111519	79.88	S	J	C%	12909.03	E			3680.88	E			13274.58	E			<24	S	UJ	ND, CCS
P_20191115_92951_405	WS19-0297-SO5220-N-111519	52.62	S	J	<RL, C%	8661.75	E			2258.81	E			9283.12	E			<24	S	UJ	ND, CCS
P_20191115_92951_406	WS19-0297-SO5221-N-111519	19.62	S	J	<RL, C%	11062.8	E			59.62	S	J	C%	1846.26	E			<24	S	UJ	ND, CCS
P_20191115_92951_407	WS19-0288-SO5223-N-111519	37.59	S	J	<RL, C%	12213.47	E			436.35	E			2623.72	E			<24	S	UJ	ND, CCS
P_20191115_92951_408	WS19-0288-SO5224-N-111519	120.82	S	J	C%	14562	E			2796.46	E			3753.96	E			<24	S	UJ	ND, CCS
P_20191115_92951_409	WS19-0288-SO5226-N-111519	<70	S	UJ	ND, C%	3765.94	E			24.66	S	J	C%	480.17	E			<24	S	UJ	ND, CCS
P_20191115_92951_410	WS19-0288-SO5227-N-111519	24.65	S	J	<RL, C%	6546.31	E			99.83	S	J	C%	748.09	E			<24	S	UJ	ND, CCS
P_20191115_92951_411	WS19-0288-SO5231-N-111519	<70	S	UJ	ND, C%	6158.33	E			42.06	S	J	C%	1291.4	E			<24	S	UJ	ND, CCS
P_20191115_92951_412	WS19-0288-SO5234-N-111519	32	S	J	<RL, C%	10179.17	E			464.63	E			4847.23	E			<24	S	UJ	ND, CCS
P_20191115_92951_413	WS19-0286-SO5236-N-111519	<70	S	UJ	ND, C%	41016.53	E			15.91	S	J	<RL, C%	1790.25	E			<24	S	UJ	ND, CCS
P_20200512_92951_513	20WS-0288-SO5238-N-051220	60.53	E	J	<RL	9371.37	E			1577.86	E			3904.39	S	J	C%	<24	S	UJ	ND, CCS
P_20200512_92951_514	20WS-0297-SO5240-N-051220	26.56	E	J	<RL	7922.04	E			76.84	S	J	C%	516.79	S	J	C%	<24	S	UJ	ND, CCS
P_20200512_92951_515	20WS-0297-SO5241-N-051220	72.62	E			27345.14	E			2477.41	E			398.55	S	J	C%	<24	S	UJ	ND, CCS
P_20200512_92951_516	20WS-0297-SO5242-N-051220	25.64	E	J	<RL	6644.95	E			323.49	E			834.79	S	J	C%	<24	S	UJ	ND, CCS
P_20200512_92951_517	20WS-0297-SO5243-N-051220	86.2	E			24493.97	E			4498.13	E			41112.39	S	J	C%	<24	S	UJ	ND, CCS
P_20200512_92951_518	20WS-0297-SO5244-N-051220	28.98	E	J	<RL	9301.93	E			1614.9	E			5381.2	S	J	C%	<24	S	UJ	ND, CCS
P_20200513_92951_525	20WS-0288-SO5274-N-051320	76.51	E			7345.92	E			1232.02	E			3616.29	E			<24	S	UJ	ND, CCS
P_20200513_92951_526	20WS-0288-SO5276-N-051320	113.5	E			9287.89	E			1461.56	E			3798.73	E			<24	S	UJ	ND, CCS
P_20200513_92951_527	20WS-0288-SO5278-N-051320	99.42	E			8572.28	E			462.6	E			3084.06	E			<24	S	UJ	ND, CCS
P_20200513_92951_528	20WS-0288-SO5280-N-051320	50.21	E	J	<RL	4744.02	E			164.95	E			4162.9	E			<24	S	UJ	ND, CCS
P_20200513_92951_529	20WS-0288-SO5281-N-051320	116.86	E			12858.58	E			418.91	E			6265.14	E			<24	S	UJ	ND, CCS
P_20200513_92951_530	20WS-0297-SO5247-N-051220	49.86	E	J	<RL	5352.6	E			1033.74	E			1492.42	E			<24	S	UJ	ND, CCS
P_20200513_92951_531	20WS-0297-SO5248-N-051220	67.13	E	J	<RL	7711.71	E			1955.42	E			1267.68	E			<24	S	UJ	ND, CCS
P_20200513_92951_532	20WS-0297-SO5251-N-051220	67.54	E	J	<RL	11201.33	E			1942.33	E			2947.91	E			<24	S	UJ	ND, CCS
P_20200513_92951_533	20WS-0297-SO5255-N-051220	46.94	E	J	<RL	9833.35	E			2194.84	E			360.89	S	J+	B	<24	S	UJ	ND, CCS
P_20200513_92951_534	20WS-0297-SO5257-N-051220	127.46	E			17087.79	E			2656.51	E			1145.44	E			<24	S	UJ	ND, CCS
P_20200513_92951_535	20WS-0297-SO5260-N-051220	94	E			16465.9	E			3567.35	E			1402.56	E			<24	S	UJ	ND, CCS
P_20200513_92951_536	20WS-0300-SO5263-N-051220	27.87	E	J	<RL	7648.57	E			1264.78	E			1460.18	E			<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20191111_92951_378	WS19-0019-SO5193-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	12.57	E	J	<RL	242.24	E		
P_20191111_92951_379	WS19-0017-SO5194-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	247.36	E		
P_20191111_92951_380	WS19-0015-SO5197-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	22.99	E			6071.37	E		
P_20191111_92951_381	WS19-0015-SO5200-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	19.68	E			3448.22	E		
P_20191111_92951_382	WS19-0015-SO5204-N-110819	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	21	E			2656.48	E		
P_20191115_92951_389	WS19-0289-SO5007-N-111319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	52.49	S	J+	B	2839.41	E		
P_20191115_92951_390	WS19-0289-SO5012-N-111319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	13.41	S	J	<RL, B	528.51	E		
P_20191115_92951_391	WS19-0290-SO5018-N-111319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	76.65	E			2344.57	E		
P_20191115_92951_392	WS19-0290-SO5019-N-111319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	49.86	S	J+	B	3565.89	E		
P_20191115_92951_393	WS19-0290-SO5206-N-111319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	42	S	J+	B	1645.63	E		
P_20191115_92951_394	WS19-0292-SO5211-N-111319	23.1	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	23.75	S	J+	B	184.99	E		
P_20191115_92951_395	WS19-0292-SO5214-N-111319	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	85.56	E	J	<RL
P_20191115_92951_402	WS19-0288-SO5215-N-111519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	39.51	S	J+	B	1707.2	E		
P_20191115_92951_403	WS19-0288-SO5217-N-111519	6.2	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	209.41	E			625.85	E		
P_20191115_92951_404	WS19-0297-SO5218-N-111519	<14	S	UJ	ND, C%	30.08	S	J	<RL, C%	<15	E	U	ND	124.61	E			4764.71	E		
P_20191115_92951_405	WS19-0297-SO5220-N-111519	9.8	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	58.29	E			1834.78	E		
P_20191115_92951_406	WS19-0297-SO5221-N-111519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	10.46	S	J	<RL, B	869.81	E		
P_20191115_92951_407	WS19-0288-SO5223-N-111519	8.33	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	35.92	S	J+	B	354.83	E		
P_20191115_92951_408	WS19-0288-SO5224-N-111519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	103.63	E			1677.17	E		
P_20191115_92951_409	WS19-0288-SO5226-N-111519	11.02	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	44.46	E	J	<RL
P_20191115_92951_410	WS19-0288-SO5227-N-111519	7.22	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	6.08	S	J	<RL, B	86.18	E	J	<RL
P_20191115_92951_411	WS19-0288-SO5231-N-111519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	142.66	E		
P_20191115_92951_412	WS19-0288-SO5234-N-111519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	19.02	S	J+	B	333.51	E		
P_20191115_92951_413	WS19-0286-SO5236-N-111519	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	95.17	E	J	<RL
P_20200512_92951_513	20WS-0288-SO5238-N-051220	22.23	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	40.66	E			1250.02	E		
P_20200512_92951_514	20WS-0297-SO5240-N-051220	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	942.84	E		
P_20200512_92951_515	20WS-0297-SO5241-N-051220	13.71	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	27.5	E			2131.72	E		
P_20200512_92951_516	20WS-0297-SO5242-N-051220	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	30.93	E			1027.54	E		
P_20200512_92951_517	20WS-0297-SO5243-N-051220	7.47	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	39.88	E			4857.02	E		
P_20200512_92951_518	20WS-0297-SO5244-N-051220	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	49.62	E			3225.87	E		
P_20200513_92951_525	20WS-0288-SO5274-N-051320	6.68	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	19.56	E			603.36	E		
P_20200513_92951_526	20WS-0288-SO5276-N-051320	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	15.85	E	J	<RL	437.26	E		
P_20200513_92951_527	20WS-0288-SO5278-N-051320	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	19.36	E			415.52	E		
P_20200513_92951_528	20WS-0288-SO5280-N-051320	5.51	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	523.3	E		
P_20200513_92951_529	20WS-0288-SO5281-N-051320	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	7.9	E	J	<RL	533.48	E		
P_20200513_92951_530	20WS-0297-SO5247-N-051220	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	28.11	E			695.15	E		
P_20200513_92951_531	20WS-0297-SO5248-N-051220	9.47	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	60.27	E			1330.59	E		
P_20200513_92951_532	20WS-0297-SO5251-N-051220	6.43	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	44.72	E			1752.66	E		
P_20200513_92951_533	20WS-0297-SO5255-N-051220	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	67.92	E			961.27	E		
P_20200513_92951_534	20WS-0297-SO5257-N-051220	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	43.66	E			880.35	E		
P_20200513_92951_535	20WS-0297-SO5260-N-051220	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	62.2	E			2633.94	E		
P_20200513_92951_536	20WS-0300-SO5263-N-051220	12.84	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	29.08	E			592.36	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200513_92951_537	20WS-0300-SO5264-N-051220	35.73	S	J	<RL, B	733.04	E			305.37	S	J+	B	9.51	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_538	20WS-0300-SO5265-N-051220	27.2	S	J	<RL, B	556.39	E			260.46	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_540	20WS-0300-SO5266-N-051220	32.33	S	J	<RL, B	205.36	E			285.91	S	J+	B	13.48	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200513_92951_542	20WS-0299-SO5282-N-051320	14.75	S	J	<RL, B	126.39	E			184.72	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200513_92951_543	20WS-0300-SO5285-N-051320	22.51	S	J	<RL, B	276.32	E			215.44	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_548	20WS-0300-SO5288-N-051320	20.4	S	J	<RL, B	144.03	E			214.88	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_549	20WS-0300-SO5290-N-051320	16.45	S	J	<RL, B	48.67	E	J	<RL	226.1	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_550	20WS-0298-SO5292-N-051320	<37	E	U	ND	121.97	E			400.9	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_551	20WS-0298-SO5293-N-051320	16.65	S	J	<RL, B	122.55	E			281.03	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_552	20WS-0298-SO5295-N-051320	24.39	S	J	<RL, B	218.56	E			430.06	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_553	20WS-0299-SO5299-N-051320	17.14	S	J	<RL, B	108.76	E			252.64	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_554	20WS-0299-SO5301-N-051320	42.88	S	J+	B	265.03	E			294.32	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_555	20WS-0285-SO5305-N-051420	33.55	S	J	<RL, B	231.12	E			251.36	S	J+	B	10.57	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200514_92951_556	20WS-0285-SO5308-N-051420	16.89	S	J	<RL, B	185.97	E			243.7	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_557	20WS-0285-SO5311-N-051420	39.3	S	J+	B	117.08	E			355.35	S	J+	B	9.23	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200514_92951_558	20WS-0285-SO5312-N-051420	<37	E	U	ND	36.75	E	J	<RL	229.19	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_559	20WS-0285-SO5314-N-051420	23.87	S	J	<RL, B	96.76	E			295.79	S	J+	B	7.8	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200514_92951_560	20WS-0285-SO5316-N-051420	16.59	S	J	<RL, B	236.18	E			183.34	S	J+	B	8.52	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200514_92951_561	20WS-0285-SO5318-N-051420	23.26	S	J	<RL, B	222.13	E			239.59	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_562	20WS-0285-SO5319-N-051420	19.27	S	J	<RL, B	80.83	E	J	<RL	286.69	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_563	20WS-0285-SO5321-N-051420	<37	E	U	ND	204.01	E			158.89	S	J+	B	8.51	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200514_92951_564	20WS-0285-SO5322-N-051420	12.91	S	J	<RL, B	228.62	E			179.69	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_565	20WS-0285-SO5324-N-051420	15.76	S	J	<RL, B, D%, R%	496.41	E			160.1	S	J	B, D%	33.97	S	J+	B	<362	S	UJ	ND, CCS
P_20200514_92951_569	20WS-0285-SO5326-N-051420	20.72	S	J	<RL, B	129.63	E			275.57	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_570	20WS-0285-SO5329-N-051420	17.71	S	J	<RL, B	274.44	E			164.78	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200514_92951_571	20WS-0285-SO5333-N-051420	<37	E	U	ND	513.57	E			215.18	S	J+	B	32.89	S	J+	B	<362	S	UJ	ND, CCS
P_20200514_92951_572	20WS-0285-SO5334-N-051420	29.45	S	J	<RL, B	247.51	E			389.46	S	J+	B	14.67	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_577	20WS-0285-SO5336-N-051420	21.6	S	J	<RL, B	264.66	E			178.68	S	J+	B	13.55	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_578	20WS-0285-SO5337-N-051420	15.98	S	J	<RL, B	110.18	E			447.38	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_579	20WS-0285-SO5340-N-051420	30.75	S	J	<RL, B	33.34	E	J	<RL	372.45	S	J+	B	9.32	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_580	20WS-0299-SO5342-N-051820	21.14	S	J	<RL, B	99.99	E			250.59	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_581	20WS-0285-SO5345-N-051820	20.73	S	J	<RL, B	40.88	E	J	<RL	231.42	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_582	20WS-0285-SO5349-N-051820	46.03	S	J+	B	90.96	E			386.87	S	J+	B	26.52	S	J+	B	<362	S	UJ	ND, CCS
P_20200519_92951_583	20WS-0285-SO5354-N-051820	11.79	S	J	<RL, B	37.3	E	J	<RL	321.27	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_584	20WS-0285-SO5355-N-051820	52.75	S	J+	B	177.09	E			468.34	S	J+	B	15.8	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_585	20WS-0285-SO5357-N-051820	52.37	S	J+	B	119.03	E			431.43	S	J+	B	18.94	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_586	20WS-0285-SO5361-N-051820	27.36	S	J	<RL, B	116.1	E			236.18	S	J+	B	21.67	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_587	20WS-0285-SO5369-N-051820	14.85	S	J	<RL, B	27.43	E	J	<RL	321.26	S	J+	B	8.48	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200519_92951_588	20WS-0246-SO5373-N-051820	<37	E	U	ND	<82	E	U	ND	<129	E	U	ND	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_589	20WS-0246-SO5372-N-051820	32.35	S	J	<RL, B	104.13	E			347.56	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_590	20WS-0246-SO5376-N-051820	<37	E	U	ND	20.06	E	J	<RL	<129	E	U	ND	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_591	20WS-0246-SO5377-N-051820	49.57	S	J+	B	90.23	E			314.52	S	J+	B	20.29	S	J	<RL, B	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

		Method	XRF				XRF				XRF				XRF				XRF			
		Analyte	Copper				Iron				Lead				Manganese				Mercury			
		Units	mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name		Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200513_92951_537	20WS-0300-SO5264-N-051220		<70	E	U	ND	12344.88	E			2199.91	E			9469.04	E			<24	S	UJ	ND, CCS
P_20200513_92951_538	20WS-0300-SO5265-N-051220		72.96	E			17059.76	E			1939.02	E			19590.51	E			<24	S	UJ	ND, CCS
P_20200513_92951_540	20WS-0300-SO5266-N-051220		51.86	E	J	<RL	7106.17	E			1780.17	E			1912.67	S	J	D%	<24	S	UJ	ND, CCS
P_20200513_92951_542	20WS-0299-SO5282-N-051320		<70	E	U	ND	6527.9	E			186.27	E			2567.6	E			<24	S	UJ	ND, CCS
P_20200513_92951_543	20WS-0300-SO5285-N-051320		30.04	E	J	<RL	12099.25	E			278.44	E			9580	E			<24	S	UJ	ND, CCS
P_20200514_92951_548	20WS-0300-SO5288-N-051320		<70	E	U	ND	7224.88	E			162.42	E			2828.23	E			<24	S	UJ	ND, CCS
P_20200514_92951_549	20WS-0300-SO5290-N-051320		25.91	E	J	<RL	4864.01	E			537.96	E			1282.59	E			<24	S	UJ	ND, CCS
P_20200514_92951_550	20WS-0298-SO5292-N-051320		43.34	E	J	<RL	32558.37	E			66.09	E			13985.29	E			<24	S	UJ	ND, CCS
P_20200514_92951_551	20WS-0298-SO5293-N-051320		21.98	E	J	<RL	7860.91	E			51	E			1816.45	E			<24	S	UJ	ND, CCS
P_20200514_92951_552	20WS-0298-SO5295-N-051320		29.74	E	J	<RL	20939.12	E			100.37	E			4211.99	E			<24	S	UJ	ND, CCS
P_20200514_92951_553	20WS-0299-SO5299-N-051320		<70	E	U	ND	7807.94	E			31.43	E			638.39	E			<24	S	UJ	ND, CCS
P_20200514_92951_554	20WS-0299-SO5301-N-051320		59.67	E	J	<RL	23920.44	E			156.72	E			45279.57	E			<24	S	UJ	ND, CCS
P_20200514_92951_555	20WS-0285-SO5305-N-051420		276.29	E			17262.42	E			12590.56	E			3845	E			<24	S	UJ	ND, CCS
P_20200514_92951_556	20WS-0285-SO5308-N-051420		194.98	E			12415.05	E			3727.29	E			787.65	E			<24	S	UJ	ND, CCS
P_20200514_92951_557	20WS-0285-SO5311-N-051420		148.73	E			10883.38	E			802.33	E			844.53	E			<24	S	UJ	ND, CCS
P_20200514_92951_558	20WS-0285-SO5312-N-051420		70.44	E			8353.8	E			66.52	E			470.43	E			<24	S	UJ	ND, CCS
P_20200514_92951_559	20WS-0285-SO5314-N-051420		133.76	E			10679.44	E			1747.24	E			2850.33	E			<24	S	UJ	ND, CCS
P_20200514_92951_560	20WS-0285-SO5316-N-051420		390.95	E			34074.55	E			6094.59	E			19877.82	E			<24	S	UJ	ND, CCS
P_20200514_92951_561	20WS-0285-SO5318-N-051420		208.58	E			21423.45	E			2517.28	E			5247.8	E			<24	S	UJ	ND, CCS
P_20200514_92951_562	20WS-0285-SO5319-N-051420		101.32	E			13273.87	E			801.82	E			3199.89	E			<24	S	UJ	ND, CCS
P_20200514_92951_563	20WS-0285-SO5321-N-051420		110.51	E			35599.17	E			2258.22	E			15672.53	E			<24	S	UJ	ND, CCS
P_20200514_92951_564	20WS-0285-SO5322-N-051420		118.6	E			25049.82	E			2549.02	E			4915.64	E			<24	S	UJ	ND, CCS
P_20200514_92951_565	20WS-0285-SO5324-N-051420		175.73	E			79174.59	E			11354.59	E			125012.48	E			<24	S	UJ	ND, CCS
P_20200514_92951_569	20WS-0285-SO5326-N-051420		98.86	E			11792.08	E			742.36	E			3276.56	E			<24	S	UJ	ND, CCS
P_20200514_92951_570	20WS-0285-SO5329-N-051420		251.95	E			48401.93	E			5570.67	E			24076.98	E			<24	S	UJ	ND, CCS
P_20200514_92951_571	20WS-0285-SO5333-N-051420		296.9	E			42295.03	E			13590.56	E			60850.59	E			<24	S	UJ	ND, CCS
P_20200514_92951_572	20WS-0285-SO5334-N-051420		240.8	E			37992.68	E			3318.11	E			14795.81	E			<24	S	UJ	ND, CCS
P_20200519_92951_577	20WS-0285-SO5336-N-051420		357.78	E			50849.26	E			7305.61	E			36470.64	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_578	20WS-0285-SO5337-N-051420		85.24	E			20488.01	E			436.42	E			5263.05	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_579	20WS-0285-SO5340-N-051420		63.03	E	J	<RL	9182.04	E			146.05	E			2355.29	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_580	20WS-0299-SO5342-N-051820		64.58	E	J	<RL	7947.26	E			181.66	E			5864.87	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_581	20WS-0285-SO5345-N-051820		67.49	E	J	<RL	7567.11	E			419.14	E			2009.47	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_582	20WS-0285-SO5349-N-051820		45.97	E	J	<RL	8518.03	E			773.1	E			3994.18	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_583	20WS-0285-SO5354-N-051820		52.75	E	J	<RL	17374.74	E			62.85	E			265.82	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_584	20WS-0285-SO5355-N-051820		118.62	E			20848.19	E			1388.33	E			12087.98	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_585	20WS-0285-SO5357-N-051820		114.74	E			16147.81	E			1067.04	E			2190.33	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_586	20WS-0285-SO5361-N-051820		93.71	E			20156.54	E			1550.9	E			14779.05	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_587	20WS-0285-SO5369-N-051820		44.07	E	J	<RL	10806.62	E			62.66	E			572.1	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_588	20WS-0246-SO5373-N-051820		<70	E	U	ND	1201.83	E			62.63	E			178.25	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_589	20WS-0246-SO5372-N-051820		106.6	E			21902.95	E			559.88	E			1554.19	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_590	20WS-0246-SO5376-N-051820		166.8	E			3387.7	E			78.38	E			926.06	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_591	20WS-0246-SO5377-N-051820		<70	E	U	ND	12682.1	E			606.02	E			481.46	S	J	C%	<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

	Method	XRF				XRF				XRF				XRF				XRF			
	Analyte	Molybdenum				Nickel				Selenium				Silver				Zinc			
	Units	mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200513_92951_537	20WS-0300-SO5264-N-051220	30.78	E			<80	S	UJ	ND, C%	17.28	E			27.98	E			798.27	E		
P_20200513_92951_538	20WS-0300-SO5265-N-051220	30.35	E			<80	S	UJ	ND, C%	7.48	E	J	<RL	79.54	E			854.59	E		
P_20200513_92951_540	20WS-0300-SO5266-N-051220	6.01	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	61.16	E			775.23	E		
P_20200513_92951_542	20WS-0299-SO5282-N-051320	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	9.71	E	J	<RL	383.3	E		
P_20200513_92951_543	20WS-0300-SO5285-N-051320	21.6	E			<80	S	UJ	ND, C%	<15	E	U	ND	24.31	E			670.53	E		
P_20200514_92951_548	20WS-0300-SO5288-N-051320	18.93	S	J	C%	<80	E	U	ND	<15	E	U	ND	16.8	S	J	<RL, B	407.63	E		
P_20200514_92951_549	20WS-0300-SO5290-N-051320	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	10	S	J	<RL, B	353.47	E		
P_20200514_92951_550	20WS-0298-SO5292-N-051320	19.21	S	J	C%	35.33	E	J	<RL	<15	E	U	ND	<18	E	U	ND	569.1	E		
P_20200514_92951_551	20WS-0298-SO5293-N-051320	10.84	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	7.09	S	J	<RL, B	59.66	E	J	<RL
P_20200514_92951_552	20WS-0298-SO5295-N-051320	12.69	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	19.17	S	J+	B	253.8	E		
P_20200514_92951_553	20WS-0299-SO5299-N-051320	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	7.38	S	J	<RL, B	70.07	E	J	<RL
P_20200514_92951_554	20WS-0299-SO5301-N-051320	41.49	S	J	C%	38.85	E	J	<RL	<15	E	U	ND	16.02	S	J	<RL, B	522.26	E		
P_20200514_92951_555	20WS-0285-SO5305-N-051420	5.75	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	173.46	E			876.36	E		
P_20200514_92951_556	20WS-0285-SO5308-N-051420	8.53	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	57.42	E			303.92	E		
P_20200514_92951_557	20WS-0285-SO5311-N-051420	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	20.08	S	J+	B	279.55	E		
P_20200514_92951_558	20WS-0285-SO5312-N-051420	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	78.51	E	J	<RL
P_20200514_92951_559	20WS-0285-SO5314-N-051420	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	56.16	E			264.98	E		
P_20200514_92951_560	20WS-0285-SO5316-N-051420	63.91	S	J	C%	<80	E	U	ND	18.48	E			83.6	E			2705.92	E		
P_20200514_92951_561	20WS-0285-SO5318-N-051420	26.4	S	J	C%	<80	E	U	ND	7.31	E	J	<RL	117.63	E			1228.19	E		
P_20200514_92951_562	20WS-0285-SO5319-N-051420	14.46	S	J	C%	<80	E	U	ND	<15	E	U	ND	29.98	S	J+	B	442.84	E		
P_20200514_92951_563	20WS-0285-SO5321-N-051420	48.21	S	J	C%	<80	E	U	ND	<15	E	U	ND	328.16	E			3077.48	E		
P_20200514_92951_564	20WS-0285-SO5322-N-051420	37.24	S	J	C%	<80	E	U	ND	11.35	E	J	<RL	81.83	E			943.25	E		
P_20200514_92951_565	20WS-0285-SO5324-N-051420	<14	S	UJ	ND, C%	170.75	E			<15	E	U	ND	108.4	E			17582.62	E		
P_20200514_92951_569	20WS-0285-SO5326-N-051420	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	17.55	S	J	<RL, B	496.63	E		
P_20200514_92951_570	20WS-0285-SO5329-N-051420	60.54	S	J	C%	<80	E	U	ND	<15	E	U	ND	102.3	E			1267.64	E		
P_20200514_92951_571	20WS-0285-SO5333-N-051420	12.81	S	J	<RL, C%	42.41	E	J	<RL	<15	E	U	ND	115.37	E			10435.61	E		
P_20200514_92951_572	20WS-0285-SO5334-N-051420	33.96	S	J	C%	<80	E	U	ND	<15	E	U	ND	93.75	E			1115.58	E		
P_20200519_92951_577	20WS-0285-SO5336-N-051420	43.29	S	J	C%	54.77	S	J	<RL, C%	<15	E	U	ND	90.37	E			5841.44	E		
P_20200519_92951_578	20WS-0285-SO5337-N-051420	10.84	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	13.07	E	J	<RL	886.56	E		
P_20200519_92951_579	20WS-0285-SO5340-N-051420	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	13.6	E	J	<RL	351.03	E		
P_20200519_92951_580	20WS-0299-SO5342-N-051820	13.64	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	26.62	E			527.76	E		
P_20200519_92951_581	20WS-0285-SO5345-N-051820	9.42	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	399.33	E		
P_20200519_92951_582	20WS-0285-SO5349-N-051820	23.32	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	89.93	E			802.12	E		
P_20200519_92951_583	20WS-0285-SO5354-N-051820	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	459.21	E		
P_20200519_92951_584	20WS-0285-SO5355-N-051820	92.25	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	254.64	E			1010.17	E		
P_20200519_92951_585	20WS-0285-SO5357-N-051820	31.53	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	69.89	E			364.4	E		
P_20200519_92951_586	20WS-0285-SO5361-N-051820	46.35	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	87.59	E			2160.24	E		
P_20200519_92951_587	20WS-0285-SO5369-N-051820	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	71.42	E	J	<RL
P_20200519_92951_588	20WS-0246-SO5373-N-051820	14.17	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	<111	E	U	ND
P_20200519_92951_589	20WS-0246-SO5372-N-051820	5.54	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	64.9	E			355.86	E		
P_20200519_92951_590	20WS-0246-SO5376-N-051820	22.39	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	102.18	E	J	<RL
P_20200519_92951_591	20WS-0246-SO5377-N-051820	28.85	S	J	C%	<80	S	UJ	ND, C%	9.43	E	J	<RL	46.87	E			315.1	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200519_92951_592	20WS-0246-SO5383-N-051820	22.39	S	J	<RL, B	61.52	E	J	<RL	334.34	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_593	20WS-0246-SO5384-N-051820	25.42	S	J	<RL, B	165.43	S	J	D%	564.21	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_600	20WS-0246-SO5386-N-051920	<37	E	U	ND	110.2	E			205.27	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_601	20WS-0246-SO5391-N-051920	11.82	S	J	<RL, B	123.06	E			389.67	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_602	20WS-0246-SO5396-N-051920	24.8	S	J	<RL, B	88.58	E			375.23	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_603	20WS-0246-SO5397-N-051920	23.62	S	J	<RL, B	31.34	E	J	<RL	353.14	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_604	20WS-0246-SO5400-N-051920	12.4	S	J	<RL, B	66.73	E	J	<RL	322.25	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200519_92951_605	20WS-0256-SO5402-N-051920	13.82	S	J	<RL, B	76.02	E	J	<RL	701.46	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_610	20WS-0315-SO5453-N-052620	19.79	S	J	<RL, B	<82	E	U	ND	229.66	S	J	C%, B	8.72	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_611	20WS-0315-SO5454-N-052620	20.58	S	J	<RL, B	46.47	E	J	<RL	202.77	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_612	20WS-0315-SO5459-N-052620	18.99	S	J	<RL, B	19.14	E	J	<RL	329.1	S	J	C%, B	9.95	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_613	20WS-0315-SO5460-N-052620	<37	E	U	ND	7.92	E	J	<RL	298.51	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_614	20WS-0315-SO5464-N-052620	58.62	S	J+	B	149.46	E			238.1	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_615	20WS-0315-SO5471-N-052620	35.87	S	J	<RL, B	114.01	E			364.09	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_616	20WS-0315-SO5474-N-052620	41.01	S	J+	B	42.95	E	J	<RL	384.91	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_617	20WS-0315-SO5479-N-052620	21.62	S	J	<RL, B	121.84	E			343.93	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_618	20WS-0315-SO5480-N-052620	<37	E	U	ND	29.98	E	J	<RL	375.95	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_620	20WS-0315-SO5484-N-052620	23.85	S	J	<RL, B	102.57	E			315.56	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_621	20WS-0249-SO5407-N-052020	24.11	S	J	<RL, B	46	E	J	<RL	277.5	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_622	20WS-0249-SO5411-N-052020	13.67	S	J	<RL, B	14.8	E	J	<RL	267.49	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_623	20WS-0249-SO5412-N-052020	16.28	S	J	<RL, B	33.07	E	J	<RL	279	S	J	C%, B	9.46	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_624	20WS-0249-SO5418-N-052020	11.86	S	J	<RL, B	46.24	E	J	<RL	337.16	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_625	20WS-0249-SO5419-N-052020	18.3	S	J	<RL, B	77	E	J	<RL	374.64	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_626	20WS-0306-SO5421-N-052020	11.49	S	J	<RL, B, R%	46.57	E	J	<RL	188.04	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_628	20WS-0306-SO5422-N-052020	18.44	S	J	<RL, B	456.4	E			219.85	S	J	C%, B	10.07	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_630	20WS-0016-SO5426-N-052120	49.85	S	J+	B	411.88	E			700.04	S	J	C%, B	15.61	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_632	20WS-0016-SO5428-N-052120	23.91	S	J	<RL, B	80.53	E	J	<RL	732.41	S	J	C%, B	9.74	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_633	20WS-0016-SO5430-N-052120	13.29	S	J	<RL, B	99.94	E			528.94	S	J	C%, B	14.39	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_634	20WS-0016-SO5437-N-052120	17.02	S	J	<RL, B	157.8	E			517.63	S	J	C%, B	20.05	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_635	20WS-0015-SO5438-N-052120	<37	E	U	ND	63.42	E	J	<RL	723.77	S	J	C%, B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200526_92951_636	20WS-0013-SO5439-N-052120	<37	E	U	ND	72.49	E	J	<RL	495.91	S	J	C%, B	10.37	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_637	20WS-0013-SO5443-N-052120	22	S	J	<RL, B	71.24	E	J	<RL	569.23	S	J	C%, B	15.96	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200526_92951_638	20WS-0013-SO5447-N-052120	37.86	S	J+	B	227.64	E			573.38	S	J	C%, B	8.48	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200528_92951_643	20WS-0315-SO5490-N-052720	<37	E	U	ND	111.22	E			209.43	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_644	20WS-0315-SO5495-N-052720	16.22	S	J	<RL, B	58.72	E	J	<RL	244	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_645	20WS-0315-SO5496-N-052720	51.17	S	J+	B	97.91	E			276.06	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_646	20WS-0315-SO5498-N-052720	18.36	S	J	<RL, B	47.77	E	J	<RL	328.66	S	J+	B	7.61	E	J	<RL	<362	S	UJ	ND, CCS
P_20200528_92951_647	20WS-0313-SO5505-N-052720	22.78	S	J	<RL, B	34.02	E	J	<RL	374.9	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_648	20WS-0315-SO5506-N-052720	25.84	S	J	<RL, B	59.48	E	J	<RL	352.73	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_649	20WS-0313-SO5511-N-052720	17.35	S	J	<RL, B	50.95	E	J	<RL	364.63	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_650	20WS-0315-SO5513-N-052720	15.82	S	J	<RL, B	90.83	E			260.39	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_651	20WS-0315-SO5516-N-052720	<37	E	U	ND	104.79	E			343.3	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200519_92951_592	20WS-0246-SO5383-N-051820	48.01	E	J	<RL	27840.75	E			211.34	E			3600.14	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_593	20WS-0246-SO5384-N-051820	39.08	E	J	<RL	39009.5	E			622.86	S	J	D%	16098.93	S	J	C%	<24	S	UJ	ND, CCS
P_20200519_92951_600	20WS-0246-SO5386-N-051920	71.59	E			22042.55	E			406.63	E			12868.73	E			<24	S	UJ	ND, CCS
P_20200519_92951_601	20WS-0246-SO5391-N-051920	93.74	E			11918.6	E			395.21	E			8414.93	E			<24	S	UJ	ND, CCS
P_20200519_92951_602	20WS-0246-SO5396-N-051920	159.98	E			16914.7	E			571.03	E			4921.06	E			<24	S	UJ	ND, CCS
P_20200519_92951_603	20WS-0246-SO5397-N-051920	24.7	E	J	<RL	8996.4	E			91.75	E			1201.79	E			<24	S	UJ	ND, CCS
P_20200519_92951_604	20WS-0246-SO5400-N-051920	26.14	E	J	<RL	18720.92	E			162.11	E			5759.81	E			<24	S	UJ	ND, CCS
P_20200519_92951_605	20WS-0256-SO5402-N-051920	50.64	E	J	<RL	31238.36	E			33.28	E			2639.58	E			<24	S	UJ	ND, CCS
P_20200526_92951_610	20WS-0315-SO5453-N-052620	23.25	E	J	<RL	6029.78	E			254.88	E			563.17	E			<24	S	UJ	ND, CCS
P_20200526_92951_611	20WS-0315-SO5454-N-052620	22.8	E	J	<RL	4489.36	E			41.18	S	J	C%	410.76	S	J+	B	<24	S	UJ	ND, CCS
P_20200526_92951_612	20WS-0315-SO5459-N-052620	19.9	E	J	<RL	6101.7	E			31.9	S	J	C%	1371.14	E			<24	S	UJ	ND, CCS
P_20200526_92951_613	20WS-0315-SO5460-N-052620	21.37	E	J	<RL	13290.26	E			36.2	S	J	C%	1003.25	E			<24	S	UJ	ND, CCS
P_20200526_92951_614	20WS-0315-SO5464-N-052620	208.42	E			21478.18	E			226.5	E			8201.75	E			<24	S	UJ	ND, CCS
P_20200526_92951_615	20WS-0315-SO5471-N-052620	176.78	E			9104.27	E			383.05	E			12176.18	E			<24	S	UJ	ND, CCS
P_20200526_92951_616	20WS-0315-SO5474-N-052620	58.2	E	J	<RL	7317.73	E			159.65	S	J	C%	10570.59	E			<24	S	UJ	ND, CCS
P_20200526_92951_617	20WS-0315-SO5479-N-052620	190.02	E			10013.64	E			130.87	S	J	C%	3504.66	E			<24	S	UJ	ND, CCS
P_20200526_92951_618	20WS-0315-SO5480-N-052620	74.74	E			10814.83	E			105.23	S	J	C%	2338.22	E			<24	S	UJ	ND, CCS
P_20200526_92951_620	20WS-0315-SO5484-N-052620	212.56	E			11999.61	E			132.98	S	J	C%	5179.61	E			<24	S	UJ	ND, CCS
P_20200526_92951_621	20WS-0249-SO5407-N-052020	347.36	E			5611.9	E			61	S	J	C%	3139.51	E			<24	S	UJ	ND, CCS
P_20200526_92951_622	20WS-0249-SO5411-N-052020	169.09	E			11856.88	E			32.34	S	J	C%	856.25	E			<24	S	UJ	ND, CCS
P_20200526_92951_623	20WS-0249-SO5412-N-052020	65.95	E	J	<RL	4285.75	E			73.73	S	J	C%	769.11	E			<24	S	UJ	ND, CCS
P_20200526_92951_624	20WS-0249-SO5418-N-052020	<70	E	U	ND	16275.24	E			14.79	S	J	<RL, C%	658.07	E			<24	S	UJ	ND, CCS
P_20200526_92951_625	20WS-0249-SO5419-N-052020	71.3	E			7418.9	E			64.53	S	J	C%	9652.23	E			<24	S	UJ	ND, CCS
P_20200526_92951_626	20WS-0306-SO5421-N-052020	62.4	E	J	<RL	4633.81	E			32.61	S	J	C%	331.92	S	J+	B	<24	S	UJ	ND, CCS
P_20200526_92951_628	20WS-0306-SO5422-N-052020	59	E	J	<RL	14274.98	E			443.71	E			16009.56	E			<24	S	UJ	ND, CCS
P_20200526_92951_630	20WS-0016-SO5426-N-052120	370.79	E			32065.85	E			17271.25	E			4437.81	E			<24	S	UJ	ND, CCS
P_20200526_92951_632	20WS-0016-SO5428-N-052120	132.82	E			26837.54	E			3031.11	E			2956.7	E			<24	S	UJ	ND, CCS
P_20200526_92951_633	20WS-0016-SO5430-N-052120	55.85	E	J	<RL	24148.7	E			1571.46	E			7503.03	E			<24	S	UJ	ND, CCS
P_20200526_92951_634	20WS-0016-SO5437-N-052120	98.44	E			28889.01	E			2513.94	E			11724.07	E			<24	S	UJ	ND, CCS
P_20200526_92951_635	20WS-0015-SO5438-N-052120	55.75	E	J	<RL	35089.55	E			422.95	E			2295.53	E			<24	S	UJ	ND, CCS
P_20200526_92951_636	20WS-0013-SO5439-N-052120	53.97	E	J	<RL	27584.83	E			1556.02	E			9480.88	E			<24	S	UJ	ND, CCS
P_20200526_92951_637	20WS-0013-SO5443-N-052120	36.34	E	J	<RL	37140.43	E			3372.96	E			11695.15	E			<24	S	UJ	ND, CCS
P_20200526_92951_638	20WS-0013-SO5447-N-052120	183.44	E			41243.51	E			1324.66	E			12826.66	E			<24	S	UJ	ND, CCS
P_20200528_92951_643	20WS-0315-SO5490-N-052720	180.49	E			7594.16	E			124.09	E			412.19	E			<24	S	UJ	ND, CCS
P_20200528_92951_644	20WS-0315-SO5495-N-052720	56.26	E	J	<RL	5689.52	E			60.94	E			247.64	E			<24	S	UJ	ND, CCS
P_20200528_92951_645	20WS-0315-SO5496-N-052720	95.88	E			9684.67	E			540.03	E			861.17	E			<24	S	UJ	ND, CCS
P_20200528_92951_646	20WS-0315-SO5498-N-052720	79.04	E			5055.85	E			70.44	E			446.09	E			<24	S	UJ	ND, CCS
P_20200528_92951_647	20WS-0313-SO5505-N-052720	81.13	E			6224.63	E			243.14	E			3732.38	E			<24	S	UJ	ND, CCS
P_20200528_92951_648	20WS-0315-SO5506-N-052720	86.95	E			9506.79	E			76.03	E			923.63	E			<24	S	UJ	ND, CCS
P_20200528_92951_649	20WS-0313-SO5511-N-052720	<70	E	U	ND	5808.81	E			28.42	E			1833.18	E			<24	S	UJ	ND, CCS
P_20200528_92951_650	20WS-0315-SO5513-N-052720	54.29	E	J	<RL	9656.06	E			52.21	E			2578.7	E			<24	S	UJ	ND, CCS
P_20200528_92951_651	20WS-0315-SO5516-N-052720	167.76	E			9462.75	E			158.85	E			7241.62	E			<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200519_92951_592	20WS-0246-SO5383-N-051820	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	17.15	E	J	<RL	207.47	E		
P_20200519_92951_593	20WS-0246-SO5384-N-051820	<14	S	UJ	ND, C%	38.19	S	J	<RL, C%	<15	E	U	ND	50.93	S	J	D%	663.97	E		
P_20200519_92951_600	20WS-0246-SO5386-N-051920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	47.59	E			363.02	E		
P_20200519_92951_601	20WS-0246-SO5391-N-051920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	46.27	E			608.68	E		
P_20200519_92951_602	20WS-0246-SO5396-N-051920	5.73	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	64.93	E			394.23	E		
P_20200519_92951_603	20WS-0246-SO5397-N-051920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	116.23	E		
P_20200519_92951_604	20WS-0246-SO5400-N-051920	5.76	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	12.4	E	J	<RL	459.1	E		
P_20200519_92951_605	20WS-0256-SO5402-N-051920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	6.54	E	J	<RL	174.52	E		
P_20200526_92951_610	20WS-0315-SO5453-N-052620	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	72.61	E	J	<RL
P_20200526_92951_611	20WS-0315-SO5454-N-052620	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	40.66	E	J	<RL
P_20200526_92951_612	20WS-0315-SO5459-N-052620	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	74.21	E	J	<RL
P_20200526_92951_613	20WS-0315-SO5460-N-052620	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	98.14	E	J	<RL
P_20200526_92951_614	20WS-0315-SO5464-N-052620	9.21	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	39.06	E			213.6	E		
P_20200526_92951_615	20WS-0315-SO5471-N-052620	10.91	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	92.61	E			165.34	E		
P_20200526_92951_616	20WS-0315-SO5474-N-052620	8.72	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	71.53	E			183.17	E		
P_20200526_92951_617	20WS-0315-SO5479-N-052620	5.56	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	19.11	E			153.3	E		
P_20200526_92951_618	20WS-0315-SO5480-N-052620	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	145.32	E		
P_20200526_92951_620	20WS-0315-SO5484-N-052620	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	8.88	E	J	<RL	159.49	E		
P_20200526_92951_621	20WS-0249-SO5407-N-052020	15.97	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	16.17	E	J	<RL	58.66	E	J	<RL
P_20200526_92951_622	20WS-0249-SO5411-N-052020	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	111.88	E		
P_20200526_92951_623	20WS-0249-SO5412-N-052020	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	5.89	E	J	<RL	81.23	E	J	<RL
P_20200526_92951_624	20WS-0249-SO5418-N-052020	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	48.7	E	J	<RL
P_20200526_92951_625	20WS-0249-SO5419-N-052020	9.76	S	J	<RL, C%	<80	S	UJ	ND, C%	<15	E	U	ND	15.72	E	J	<RL	102.31	E	J	<RL
P_20200526_92951_626	20WS-0306-SO5421-N-052020	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	44.92	E	J	<RL
P_20200526_92951_628	20WS-0306-SO5422-N-052020	45.64	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	29.71	E			521.45	E		
P_20200526_92951_630	20WS-0016-SO5426-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	52.96	E			1830.53	E		
P_20200526_92951_632	20WS-0016-SO5428-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	17.2	E	J	<RL	2506.17	E		
P_20200526_92951_633	20WS-0016-SO5430-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	9.19	E	J	<RL	5747.32	E		
P_20200526_92951_634	20WS-0016-SO5437-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	18.19	E			7861.16	E		
P_20200526_92951_635	20WS-0015-SO5438-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	1108.23	E		
P_20200526_92951_636	20WS-0013-SO5439-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	7.43	E	J	<RL	4425.32	E		
P_20200526_92951_637	20WS-0013-SO5443-N-052120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	11.67	E	J	<RL	7788.06	E		
P_20200526_92951_638	20WS-0013-SO5447-N-052120	<14	S	UJ	ND, C%	45.89	S	J	<RL, C%	<15	E	U	ND	111.85	E			1305.63	E		
P_20200528_92951_643	20WS-0315-SO5490-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	92.3	E	J	<RL
P_20200528_92951_644	20WS-0315-SO5495-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	109.14	E	J	<RL
P_20200528_92951_645	20WS-0315-SO5496-N-052720	13.38	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	16.62	E	J	<RL	171.31	E		
P_20200528_92951_646	20WS-0315-SO5498-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	74.28	E	J	<RL
P_20200528_92951_647	20WS-0313-SO5505-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	27.88	E			135.78	E		
P_20200528_92951_648	20WS-0315-SO5506-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	89.6	E	J	<RL
P_20200528_92951_649	20WS-0313-SO5511-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	6.65	E	J	<RL	49.66	E	J	<RL
P_20200528_92951_650	20WS-0315-SO5513-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	133.42	E		
P_20200528_92951_651	20WS-0315-SO5516-N-052720	9.59	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	47.69	E			156.9	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200528_92951_652	20WS-0320-SO5523-N-052720	32.69	S	J	<RL, B	64	E	J	<RL	288.21	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_653	20WS-0320-SO5524-N-052720	20.79	S	J	<RL, B	26.8	E	J	<RL	207.83	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200528_92951_654	20WS-0320-SO5527-N-052720	14.97	S	J	<RL, B	44.31	E	J	<RL	221.54	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_661	20WS-0321-SO5531-N-052820	15.02	E	J	<RL	31.75	E	J	<RL	334.08	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_662	20WS-0319-SO5535-N-052820	13.27	E	J	<RL	24.32	E	J	<RL	187.1	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_663	20WS-0319-SO5536-N-052820	22.26	E	J	<RL	97.35	E			207.73	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_664	20WS-0312-SO5542-N-052820	14.17	E	J	<RL	86.14	E			205.02	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_665	20WS-0312-SO5547-N-052820	13.12	E	J	<RL	31.71	E	J	<RL	265.74	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_666	20WS-0307-SO5548-N-052820	21.61	E	J	<RL	96.18	E			310.28	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_667	20WS-0313-SO5552-N-052820	<37	E	U	ND	131.13	E			943.81	E			<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_668	20WS-0313-SO5553-N-052820	24.61	E	J	<RL	160.28	E			400.35	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_669	20WS-0313-SO5556-N-052820	11.67	E	J	<RL	47.5	E	J	<RL	568.75	E			<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_670	20WS-0301-SO5557-N-052820	19.57	E	J	<RL	81.09	E	J	<RL	967.81	E			<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_671	20WS-0301-SO5559-N-052820	29.37	E	J	<RL	163.57	E			434.23	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_672	20WS-0301-SO5560-N-052820	20.66	E	J	<RL	139.76	E			962.9	E			<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200529_92951_673	20WS-0301-SO5566-N-052820	17.59	E	J	<RL	90.07	E			427.18	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_680	20WS-1150-SO5568-N-052920	19.17	S	J	<RL, B	<82	E	U	ND	324.64	S	J+	B	11.19	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_681	20WS-1150-SO5567-N-052920	23.91	S	J	<RL, B	94.69	E			346.95	S	J+	B	13.43	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_682	20WS-0301-SO5573-N-052920	<37	E	U	ND	39.42	E	J	<RL	395.52	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_683	20WS-1150-SO5574-N-052920	16.38	S	J	<RL, B	167.1	E			393.29	S	J+	B	15.13	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_684	20WS-1150-SO5576-N-052920	24.41	S	J	<RL, B	81.46	E	J	<RL	279.76	S	J+	B	13.81	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_685	20WS-1150-SO5577-N-052920	16.11	S	J	<RL, B	49.21	E	J	<RL	245.54	S	J+	B	9.96	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_686	20WS-0301-SO5579-N-052920	15.55	S	J	<RL, B	22.5	E	J	<RL	431.02	S	J+	B	8.2	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_689	20WS-0301-SO5584-N-052920	19.31	S	J	<RL, B	40.96	E	J	<RL	577.3	E			<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_690	20WS-0301-SO5585-N-052920	25.26	S	J	<RL, B	86.5	E			1462.81	E			<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_691	20WS-0300-SO5590-N-052920	43.25	S	J+	B	246.07	E			304.95	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_692	20WS-0300-SO5592-N-052920	13.83	S	J	<RL, B	118.68	E			342.1	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_693	20WS-0300-SO5593-N-052920	87	S	J+	B	212.55	E			425.32	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_694	20WS-0306-SO5597-N-052920	25.94	S	J	<RL, B	113.51	E			292.35	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_695	20WS-0013-SO5603-N-060120	28.45	S	J	<RL, B	192.13	E			405.23	S	J+	B	17.14	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_696	20WS-0013-SO5608-N-060120	<37	E	U	ND	161.85	E			742.28	E			11.8	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_697	20WS-0296-SO5614-N-060120	21.15	S	J	<RL, B	<82	E	U	ND	275.35	S	J+	B	14.03	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_698	20WS-0296-SO5615-N-060120	29.54	S	J	<RL, B	108.68	E			289.27	S	J+	B	12.95	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_699	20WS-0296-SO5618-N-060120	19.9	S	J	<RL, B	77.55	E	J	<RL	348.19	S	J+	B	10.65	E	J	<RL	<362	S	UJ	ND, CCS
P_20200601_92951_700	20WS-0296-SO5619-N-060120	30.12	S	J	<RL, B	94.03	E			411.65	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200601_92951_702	20WS-0311-SO5623-N-060120	14.05	S	J	<RL, CX, B	35.21	S	J	<RL, CX	217.64	S	J	CX, B	<23	S	UJ	ND, CX	<362	S	UJ	ND, CCS
P_20200601_92951_703	20WS-0003-SO5661-N-060120	16.13	S	J	<RL, CX, B	42.01	S	J	<RL, CX	544.32	S	J	CX	<23	S	UJ	ND, CX	<362	S	UJ	ND, CCS
P_20200601_92951_704	20WS-0038-SO5664-N-060120	32.13	S	J	<RL, CX, B	439.85	S	J	CX	501.21	S	J	CX, B	24.89	S	J	CX	<362	S	UJ	ND, CCS
P_20200601_92951_705	20WS-0317-SO5668-N-060120	<37	S	UJ	ND, CX	157.52	S	J	CX	280.93	S	J	CX, B	<23	S	UJ	ND, CX	<362	S	UJ	ND, CCS
P_20200603_92951_709	20WS-1143-SO5626-N-060220	17.09	S	J	<RL, B	51.69	E	J	<RL	694.63	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_710	20WS-1143-SO5627-N-060220	22.32	S	J	<RL, B	59.33	E	J	<RL	470.1	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_711	20WS-1142-SO5631-N-060220	<37	E	U	ND	110.98	E			449.57	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

		Method	XRF				XRF				XRF				XRF				XRF			
		Analyte	Copper				Iron				Lead				Manganese				Mercury			
		Units	mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name		Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200528_92951_652	20WS-0320-SO5523-N-052720		82.51	E			7076.69	E			65.01	E			823.94	E			<24	S	UJ	ND, CCS
P_20200528_92951_653	20WS-0320-SO5524-N-052720		49.7	E	J	<RL	4982.61	E			45.52	E			1464.54	E			<24	S	UJ	ND, CCS
P_20200528_92951_654	20WS-0320-SO5527-N-052720		61.05	E	J	<RL	5514.07	E			54.17	E			3903.43	E			<24	S	UJ	ND, CCS
P_20200529_92951_661	20WS-0321-SO5531-N-052820		72.67	E			5407.53	E			192.82	E			4918.04	E			<24	S	UJ	ND, CCS
P_20200529_92951_662	20WS-0319-SO5535-N-052820		27.56	E	J	<RL	4170.81	E			46.35	E			3738.24	E			<24	S	UJ	ND, CCS
P_20200529_92951_663	20WS-0319-SO5536-N-052820		91.72	E			4859.09	E			120.24	E			929.08	E			<24	S	UJ	ND, CCS
P_20200529_92951_664	20WS-0312-SO5542-N-052820		80.89	E			20041.64	E			76.1	E			1577.42	E			<24	S	UJ	ND, CCS
P_20200529_92951_665	20WS-0312-SO5547-N-052820		80.35	E			7445.55	E			64.44	E			757.06	E			<24	S	UJ	ND, CCS
P_20200529_92951_666	20WS-0307-SO5548-N-052820		143.56	E			9364.41	E			108.33	E			296.21	E			<24	S	UJ	ND, CCS
P_20200529_92951_667	20WS-0313-SO5552-N-052820		282.17	E			17018.44	E			141.27	E			10075.81	E			<24	S	UJ	ND, CCS
P_20200529_92951_668	20WS-0313-SO5553-N-052820		122.43	E			13537.65	E			71.44	E			4199.32	E			<24	S	UJ	ND, CCS
P_20200529_92951_669	20WS-0313-SO5556-N-052820		303.82	E			12282.45	E			31.03	E			3897.44	E			<24	S	UJ	ND, CCS
P_20200529_92951_670	20WS-0301-SO5557-N-052820		218.25	E			15915.56	E			147.93	E			19436.46	E			<24	S	UJ	ND, CCS
P_20200529_92951_671	20WS-0301-SO5559-N-052820		282.11	E			12564.58	E			146.79	E			908.6	E			<24	S	UJ	ND, CCS
P_20200529_92951_672	20WS-0301-SO5560-N-052820		174.05	E			13581.1	E			209.23	E			11372.1	E			<24	S	UJ	ND, CCS
P_20200529_92951_673	20WS-0301-SO5566-N-052820		231.38	E			11974.67	E			178.28	E			9711.05	E			<24	S	UJ	ND, CCS
P_20200601_92951_680	20WS-1150-SO5568-N-052920		100.99	E			11590.32	E			3560.61	E			4239.1	E			<24	S	UJ	ND, CCS
P_20200601_92951_681	20WS-1150-SO5567-N-052920		86.39	E			13290.04	E			3016.85	E			3839.49	E			<24	S	UJ	ND, CCS
P_20200601_92951_682	20WS-0301-SO5573-N-052920		52.5	E	J	<RL	15394.93	E			533.84	E			2595.41	E			<24	S	UJ	ND, CCS
P_20200601_92951_683	20WS-1150-SO5574-N-052920		85.05	E			13232.88	E			2546.21	E			4938.88	E			<24	S	UJ	ND, CCS
P_20200601_92951_684	20WS-1150-SO5576-N-052920		113.05	E			12714.04	E			2503.19	E			721.99	E			<24	S	UJ	ND, CCS
P_20200601_92951_685	20WS-1150-SO5577-N-052920		105.84	E			8695.66	E			2808.28	E			3173.62	E			<24	S	UJ	ND, CCS
P_20200601_92951_686	20WS-0301-SO5579-N-052920		35.32	E	J	<RL	16278.84	E			331.95	E			821.72	E			<24	S	UJ	ND, CCS
P_20200601_92951_689	20WS-0301-SO5584-N-052920		66.77	E	J	<RL	11813.21	E			222.45	E			3667.38	E			<24	S	UJ	ND, CCS
P_20200601_92951_690	20WS-0301-SO5585-N-052920		68.83	E	J	<RL	18162.31	E			132.15	E			41958.02	E			<24	S	UJ	ND, CCS
P_20200601_92951_691	20WS-0300-SO5590-N-052920		111.21	E			38608.79	E			198.21	E			27355.56	E			<24	S	UJ	ND, CCS
P_20200601_92951_692	20WS-0300-SO5592-N-052920		152.76	E			13907.39	E			207.66	E			45931.68	E			<24	S	UJ	ND, CCS
P_20200601_92951_693	20WS-0300-SO5593-N-052920		186.53	E			43270.7	E			546.95	E			123356.11	E			<24	S	UJ	ND, CCS
P_20200601_92951_694	20WS-0306-SO5597-N-052920		116.45	E			11666.18	E			130.16	E			344.62	E			<24	S	UJ	ND, CCS
P_20200601_92951_695	20WS-0013-SO5603-N-060120		105.96	E			30775.78	E			8277.4	E			4349.04	E			<24	S	UJ	ND, CCS
P_20200601_92951_696	20WS-0013-SO5608-N-060120		51.12	E	J	<RL	43250.71	E			2863.43	E			6484.31	E			<24	S	UJ	ND, CCS
P_20200601_92951_697	20WS-0296-SO5614-N-060120		58.54	E	J	<RL	7455.2	E			2523.11	E			28393.69	E			<24	S	UJ	ND, CCS
P_20200601_92951_698	20WS-0296-SO5615-N-060120		52.85	E	J	<RL	14077.66	E			3256.3	E			289.6	S	J+	B	<24	S	UJ	ND, CCS
P_20200601_92951_699	20WS-0296-SO5618-N-060120		42.17	E	J	<RL	10192.52	E			710.94	E			583.05	E			<24	S	UJ	ND, CCS
P_20200601_92951_700	20WS-0296-SO5619-N-060120		46.88	E	J	<RL	10183.69	E			777.91	E			5286.24	E			<24	S	UJ	ND, CCS
P_20200601_92951_702	20WS-0311-SO5623-N-060120		101.12	S	J	CX	13121.57	S	J	CX	51.46	S	J	CX	521.18	S	J	CX	<24	S	UJ	ND, CCS
P_20200601_92951_703	20WS-0003-SO5661-N-060120		32.41	S	J	<RL, CX	32804.62	S	J	CX	65.86	S	J	CX	3555.61	S	J	CX	<24	S	UJ	ND, CCS
P_20200601_92951_704	20WS-0038-SO5664-N-060120		161.18	S	J	CX	73814.02	S	J	CX	965.37	S	J	CX	39705.77	S	J	CX	<24	S	UJ	ND, CCS
P_20200601_92951_705	20WS-0317-SO5668-N-060120		235.16	S	J	CX	86197.57	S	J	CX	1637.13	S	J	CX	93843.36	S	J	CX	<24	S	UJ	ND, CCS
P_20200603_92951_709	20WS-1143-SO5626-N-060220		113.7	E			37847.14	E			14.48	E	J	<RL	3998.91	E			<24	S	UJ	ND, CCS
P_20200603_92951_710	20WS-1143-SO5627-N-060220		50.91	E	J	<RL	36732.55	E			43.42	E			689.97	E			<24	S	UJ	ND, CCS
P_20200603_92951_711	20WS-1142-SO5631-N-060220		170.35	E			37167.35	E			167.52	E			3505.13	E			<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200528_92951_652	20WS-0320-SO5523-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	13.77	E	J	<RL	168.79	E		
P_20200528_92951_653	20WS-0320-SO5524-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	6.11	E	J	<RL	167.21	E		
P_20200528_92951_654	20WS-0320-SO5527-N-052720	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	86.51	E	J	<RL
P_20200529_92951_661	20WS-0321-SO5531-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	6.03	E	J	<RL	136.06	E		
P_20200529_92951_662	20WS-0319-SO5535-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	8.96	E	J	<RL	150.55	E		
P_20200529_92951_663	20WS-0319-SO5536-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	5.87	E	J	<RL	86.91	E	J	<RL
P_20200529_92951_664	20WS-0312-SO5542-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	6.94	E	J	<RL	150.81	E		
P_20200529_92951_665	20WS-0312-SO5547-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	6.05	E	J	<RL	85.04	E	J	<RL
P_20200529_92951_666	20WS-0307-SO5548-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	7.09	E	J	<RL	94.74	E	J	<RL
P_20200529_92951_667	20WS-0313-SO5552-N-052820	10.18	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	23.51	E			346.9	E		
P_20200529_92951_668	20WS-0313-SO5553-N-052820	4.94	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	7.99	E	J	<RL	148.96	E		
P_20200529_92951_669	20WS-0313-SO5556-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	147.6	E		
P_20200529_92951_670	20WS-0301-SO5557-N-052820	9.96	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	32.43	E			888.52	E		
P_20200529_92951_671	20WS-0301-SO5559-N-052820	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	11.14	E	J	<RL	154.97	E		
P_20200529_92951_672	20WS-0301-SO5560-N-052820	13.66	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	31.41	E			526.52	E		
P_20200529_92951_673	20WS-0301-SO5566-N-052820	8.87	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	68.39	E			260.64	E		
P_20200601_92951_680	20WS-1150-SO5568-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	39.76	E			3498.15	E		
P_20200601_92951_681	20WS-1150-SO5567-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	34.69	E			3733.88	E		
P_20200601_92951_682	20WS-0301-SO5573-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	7.25	E	J	<RL	1113.06	E		
P_20200601_92951_683	20WS-1150-SO5574-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	32.87	E			3448.34	E		
P_20200601_92951_684	20WS-1150-SO5576-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	38.75	E			4564.03	E		
P_20200601_92951_685	20WS-1150-SO5577-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	57.65	E			3429	E		
P_20200601_92951_686	20WS-0301-SO5579-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	509.77	E		
P_20200601_92951_689	20WS-0301-SO5584-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	47.01	E			542.67	E		
P_20200601_92951_690	20WS-0301-SO5585-N-052920	24.06	S	J	C%	<80	S	UJ	ND, C%	<15	E	U	ND	23.43	E			446.62	E		
P_20200601_92951_691	20WS-0300-SO5590-N-052920	20.08	S	J	C%	47.58	S	J	<RL, C%	<15	E	U	ND	32.44	E			654.85	E		
P_20200601_92951_692	20WS-0300-SO5592-N-052920	12.5	S	J	<RL, C%	40.67	S	J	<RL, C%	<15	E	U	ND	69.09	E			187.08	E		
P_20200601_92951_693	20WS-0300-SO5593-N-052920	39.49	S	J	C%	90.13	S	J	C%	<15	E	U	ND	67.88	E			677.38	E		
P_20200601_92951_694	20WS-0306-SO5597-N-052920	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	132.5	E		
P_20200601_92951_695	20WS-0013-SO5603-N-060120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	38.3	E			8925.55	E		
P_20200601_92951_696	20WS-0013-SO5608-N-060120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	8.66	E	J	<RL	4656.31	E		
P_20200601_92951_697	20WS-0296-SO5614-N-060120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	27.8	E			5283.12	E		
P_20200601_92951_698	20WS-0296-SO5615-N-060120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	27.79	E			2387.28	E		
P_20200601_92951_699	20WS-0296-SO5618-N-060120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	10.37	E	J	<RL	735.32	E		
P_20200601_92951_700	20WS-0296-SO5619-N-060120	<14	S	UJ	ND, C%	<80	S	UJ	ND, C%	<15	E	U	ND	17.94	E	J	<RL	925.99	E		
P_20200601_92951_702	20WS-0311-SO5623-N-060120	<14	S	UJ	ND, CX, C%	<80	S	UJ	ND, CX	<15	S	UJ	ND, CX	<18	S	UJ	ND, CX	74.99	S	J	<RL, CX
P_20200601_92951_703	20WS-0003-SO5661-N-060120	<14	S	UJ	ND, CX, C%	<80	S	UJ	ND, CX	<15	S	UJ	ND, CX	<18	S	UJ	ND, CX	170.02	S	J	CX
P_20200601_92951_704	20WS-0038-SO5664-N-060120	8.1	S	J	<RL, CX, C%	70.35	S	J	<RL, CX	<15	S	UJ	ND, CX	46.17	S	J	CX	2793.81	S	J	CX
P_20200601_92951_705	20WS-0317-SO5668-N-060120	23.58	S	J	CX, C%	125.15	S	J	CX	<15	S	UJ	ND, CX	59.96	S	J	CX	1953.32	S	J	CX
P_20200603_92951_709	20WS-1143-SO5626-N-060220	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	74.45	E	J	<RL
P_20200603_92951_710	20WS-1143-SO5627-N-060220	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	17.86	E	J	<RL	83.86	E	J	<RL
P_20200603_92951_711	20WS-1142-SO5631-N-060220	<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	8.22	E	J	<RL	251.61	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200603_92951_712	20WS-0350-SO5633-N-060220	41.74	S	J+	B	272.55	E			495.99	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_713	20WS-0350-SO5637-N-060220	53.67	S	J+	B	923.37	E			571.68	S	J+	B	25.39	E			<362	S	UJ	ND, CCS
P_20200603_92951_714	20WS-0350-SO5640-N-060220	20.64	S	J	<RL, B	132.93	E			612.65	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_715	20WS-0350-SO5648-N-060220	15.01	S	J	<RL, B	276.26	E			572.45	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_716	20WS-0179-SO5672-N-060220	130.36	E			195.71	E			215.4	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_717	20WS-0179-SO5675-N-060220	81.17	S	J+	B	146.95	E			410.32	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_718	20WS-0179-SO5678-N-060220	73.38	S	J+	B	86.68	E			374.38	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_719	20WS-0179-SO5679-N-060220	34.59	S	J	<RL, B	102.95	E			595.88	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_720	20WS-0179-SO5684-N-060220	65.39	S	J+	B	45.82	E	J	<RL	514.64	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_721	20WS-0179-SO5685-N-060220	39.17	S	J+	B	72.79	E	J	<RL	587.77	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_722	20WS-0142-SO5688-N-060220	<37	E	U	ND	30.35	E	J	<RL	505.03	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_723	20WS-0142-SO5692-N-060220	30.56	S	J	<RL, B	126.67	E			690.87	S	J+	B	9.16	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_724	20WS-0138-SO5694-N-060220	59.9	S	J+	B	164.7	E			588.99	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_725	20WS-0138-SO5697-N-060220	98.63	S	J+	B	33.56	E	J	<RL	474.89	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_726	20WS-0130-SO5729-N-060220	27.9	S	J	<RL, B	123.18	E			562.83	S	J+	B	8.29	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_727	20WS-0130-SO5731-N-060220	<37	E	U	ND	22.93	S	J	<RL, R%	601.47	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_732	20WS-0162-SO5708-N-060320	12.59	S	J	<RL, B	48.19	E	J	<RL	554.77	S	J+	B	8.68	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_733	20WS-0162-SO5710-N-060320	<37	E	U	ND	<82	E	U	ND	480.59	S	J+	B	12.32	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_734	20WS-0162-SO5711-N-060320	35.28	S	J	<RL, B	100.54	E			482.59	S	J+	B	10.72	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_735	20WS-0162-SO5716-N-060320	<37	E	U	ND	70.36	E	J	<RL	457.01	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_736	20WS-0162-SO5719-N-060320	24.9	S	J	<RL, B	107.46	E			538.61	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_737	20WS-0162-SO5720-N-060320	14.02	S	J	<RL, B	21.69	E	J	<RL	653.81	S	J+	B	8.82	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_738	20WS-0138-SO5724-N-060320	25.17	S	J	<RL, B	85.65	E			600.4	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_740	20WS-0162-SO5734-N-060320	23.06	S	J	<RL, B	59.05	E	J	<RL	548.16	S	J+	B	10.4	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_741	20WS-0162-SO5736-N-060320	<37	E	U	ND	39.89	E	J	<RL	622.94	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_742	20WS-0160-SO5738-N-060320	13.21	S	J	<RL, B	40.44	E	J	<RL	577.46	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_743	20WS-0160-SO5739-N-060320	15.39	S	J	<RL, B	45.67	E	J	<RL	502.7	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_744	20WS-0158-SO5745-N-060320	17.73	S	J	<RL, B	23.6	E	J	<RL	463.57	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_745	20WS-0158-SO5748-N-060320	28.39	S	J	<RL, B	127.48	E			582.67	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_746	20WS-0153-SO5751-N-060320	36.3	S	J	<RL, B	127.04	E			814.8	E			17.82	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_747	20WS-0138-SO5752-N-060320	24.09	S	J	<RL, B	97.51	E			443.3	S	J+	B	9.23	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_748	20WS-0138-SO5754-N-060320	20.77	S	J	<RL, B	78.29	E	J	<RL	373.68	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_749	20WS-0138-SO5756-N-060320	29.72	S	J	<RL, B	70.08	E	J	<RL	425.18	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_751	20WS-0138-SO5757-N-060320	18.13	S	J	<RL, B, D%	120.42	E			542.28	S	J+	B	18.89	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_753	20WS-0138-SO5758-N-060320	24.69	S	J	<RL, B	118.93	E			542.04	S	J+	B	17.04	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_754	20WS-0138-SO5761-N-060320	35.36	S	J	<RL, B	126.13	E			500.22	S	J+	B	10.78	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_755	20WS-0138-SO5762-N-060320	71.73	S	J+	B	134.68	E			436.96	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_756	20WS-0138-SO5780-N-060320	<37	E	U	ND	10.28	E	J	<RL	301.91	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_757	20WS-0138-SO5781-N-060320	<37	E	U	ND	13.41	E	J	<RL	383.83	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200603_92951_758	20WS-0138-SO5783-N-060320	116.91	E			132.88	E			565.44	S	J+	B	16.33	E	J	<RL	<362	S	UJ	ND, CCS
P_20200603_92951_759	20WS-0138-SO5785-N-060320	24.84	S	J	<RL, B	69.28	E	J	<RL	398.89	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_765	20WS-0138-SO5776-N-060320	37.06	S	J+	B	64.25	E	J	<RL	641.13	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200603_92951_712	20WS-0350-SO5633-N-060220	402.96	E			71478.38	E			11866.57	E			5166.35	E			<24	S	UJ	ND, CCS
P_20200603_92951_713	20WS-0350-SO5637-N-060220	665.54	E			112499.55	E			25521.32	E			11633.24	E			<24	S	UJ	ND, CCS
P_20200603_92951_714	20WS-0350-SO5640-N-060220	307.9	E			43524.45	E			1088.51	E			3934.4	E			<24	S	UJ	ND, CCS
P_20200603_92951_715	20WS-0350-SO5648-N-060220	308.93	E			52587.57	E			204.89	E			1434.91	E			<24	S	UJ	ND, CCS
P_20200603_92951_716	20WS-0179-SO5672-N-060220	101.36	E			25053.84	E			292.87	E			122.59	S	J	<RL, B	<24	S	UJ	ND, CCS
P_20200603_92951_717	20WS-0179-SO5675-N-060220	109.56	E			32374.51	E			731.42	E			574.64	E			<24	S	UJ	ND, CCS
P_20200603_92951_718	20WS-0179-SO5678-N-060220	144.18	E			29692.22	E			676	E			700.32	E			<24	S	UJ	ND, CCS
P_20200603_92951_719	20WS-0179-SO5679-N-060220	57	E	J	<RL	32428.18	E			187.37	E			312.18	S	J+	B	<24	S	UJ	ND, CCS
P_20200603_92951_720	20WS-0179-SO5684-N-060220	38.51	E	J	<RL	17860.56	E			167.25	E			196.51	S	J+	B	<24	S	UJ	ND, CCS
P_20200603_92951_721	20WS-0179-SO5685-N-060220	143.29	E			57582.63	E			92.03	E			848.91	E			<24	S	UJ	ND, CCS
P_20200603_92951_722	20WS-0142-SO5688-N-060220	437.37	E			29220.19	E			496.76	E			4879.88	E			<24	S	UJ	ND, CCS
P_20200603_92951_723	20WS-0142-SO5692-N-060220	146.05	E			52184.82	E			963.98	E			4356.15	E			<24	S	UJ	ND, CCS
P_20200603_92951_724	20WS-0138-SO5694-N-060220	218.03	E			34368.53	E			607.9	E			10666.01	E			<24	S	UJ	ND, CCS
P_20200603_92951_725	20WS-0138-SO5697-N-060220	261.11	E			30948.18	E			492.39	E			17051.77	E			<24	S	UJ	ND, CCS
P_20200603_92951_726	20WS-0130-SO5729-N-060220	216.31	E			43589.8	E			1972.7	E			1205.53	E			<24	S	UJ	ND, CCS
P_20200603_92951_727	20WS-0130-SO5731-N-060220	458.65	S	J	R%	39643.02	S	J	R%	146.65	S	J	D%, R%	2069.37	S	J	R%	<24	S	UJ	ND, CCS
P_20200603_92951_732	20WS-0162-SO5708-N-060320	228.11	E			27699.39	E			1207.49	E			7045.22	E			<24	S	UJ	ND, CCS
P_20200603_92951_733	20WS-0162-SO5710-N-060320	187.09	E			28711.81	E			1899.03	E			11280.07	E			<24	S	UJ	ND, CCS
P_20200603_92951_734	20WS-0162-SO5711-N-060320	340.4	E			40276.25	E			1628.87	E			8217.43	E			<24	S	UJ	ND, CCS
P_20200603_92951_735	20WS-0162-SO5716-N-060320	110.97	E			41826.16	E			164.76	E			1632.24	E			<24	S	UJ	ND, CCS
P_20200603_92951_736	20WS-0162-SO5719-N-060320	66.87	E	J	<RL	49301.13	E			495.94	E			34103.18	E			<24	S	UJ	ND, CCS
P_20200603_92951_737	20WS-0162-SO5720-N-060320	82.75	E			51238.5	E			117.28	E			2353.26	E			<24	S	UJ	ND, CCS
P_20200603_92951_738	20WS-0138-SO5724-N-060320	192.49	E			36527.64	E			122.26	E			11200.41	E			<24	S	UJ	ND, CCS
P_20200603_92951_740	20WS-0162-SO5734-N-060320	128.64	E			35046.31	E			852.06	E			7525.52	E			<24	S	UJ	ND, CCS
P_20200603_92951_741	20WS-0162-SO5736-N-060320	229.98	E			24140.45	E			234.9	E			6660.19	E			<24	S	UJ	ND, CCS
P_20200603_92951_742	20WS-0160-SO5738-N-060320	100.84	E			41244.91	E			174.47	E			4384.83	E			<24	S	UJ	ND, CCS
P_20200603_92951_743	20WS-0160-SO5739-N-060320	98.36	E			26347.76	E			140.75	E			9351.03	E			<24	S	UJ	ND, CCS
P_20200603_92951_744	20WS-0158-SO5745-N-060320	38.89	E	J	<RL	20471.71	E			38.55	E			486.98	S	J+	B	<24	S	UJ	ND, CCS
P_20200603_92951_745	20WS-0158-SO5748-N-060320	46.77	E	J	<RL	28582.73	E			417.72	E			217.42	S	J+	B	<24	S	UJ	ND, CCS
P_20200603_92951_746	20WS-0153-SO5751-N-060320	157.67	E			48591.39	E			188.46	E			4200.07	E			<24	S	UJ	ND, CCS
P_20200603_92951_747	20WS-0138-SO5752-N-060320	100.86	E			26786.47	E			444.23	E			15342.55	E			<24	S	UJ	ND, CCS
P_20200603_92951_748	20WS-0138-SO5754-N-060320	89.46	E			40073.07	E			261.58	E			7776.96	E			<24	S	UJ	ND, CCS
P_20200603_92951_749	20WS-0138-SO5756-N-060320	107.39	E			42409.03	E			1489.82	E			40745.61	E			<24	S	UJ	ND, CCS
P_20200603_92951_751	20WS-0138-SO5757-N-060320	130.54	E			34137.82	E			1673.93	E			20130.93	E			<24	S	UJ	ND, CCS
P_20200603_92951_753	20WS-0138-SO5758-N-060320	154.7	E			45346.89	E			2858.2	E			36361.96	E			<24	S	UJ	ND, CCS
P_20200603_92951_754	20WS-0138-SO5761-N-060320	166.61	E			34462.79	E			666.87	E			22145.6	E			<24	S	UJ	ND, CCS
P_20200603_92951_755	20WS-0138-SO5762-N-060320	227.7	E			42346.46	E			1268.81	E			27442.1	E			<24	S	UJ	ND, CCS
P_20200603_92951_756	20WS-0138-SO5780-N-060320	26.26	E	J	<RL	20145.77	E			12.96	E	J	<RL	1471.38	E			<24	S	UJ	ND, CCS
P_20200603_92951_757	20WS-0138-SO5781-N-060320	4643.86	E			57595.02	E			23.14	E			2041.71	E			<24	S	UJ	ND, CCS
P_20200603_92951_758	20WS-0138-SO5783-N-060320	245.32	E			66715.15	E			1817.21	E			66326.42	E			<24	S	UJ	ND, CCS
P_20200603_92951_759	20WS-0138-SO5785-N-060320	93.12	E			52218.18	E			54.84	E			1049.79	E			<24	S	UJ	ND, CCS
P_20200604_92951_765	20WS-0138-SO5776-N-060320	165.08	E			49623.02	E			354.77	E			2999.03	E			<24	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

		Method	XRF				XRF				XRF				XRF				XRF			
		Analyte	Molybdenum				Nickel				Selenium				Silver				Zinc			
		Units	mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name		Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200603_92951_712	20WS-0350-SO5633-N-060220		17.14	S	J	C%	<80	E	U	ND	<15	E	U	ND	124.59	E			1060.44	E		
P_20200603_92951_713	20WS-0350-SO5637-N-060220		111.84	S	J	C%	<80	E	U	ND	<15	E	U	ND	66.91	E			4778.11	E		
P_20200603_92951_714	20WS-0350-SO5640-N-060220		13.23	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	72.28	E			1620.18	E		
P_20200603_92951_715	20WS-0350-SO5648-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	9	E	J	<RL	175.81	E		
P_20200603_92951_716	20WS-0179-SO5672-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	637.05	E			188.39	E		
P_20200603_92951_717	20WS-0179-SO5675-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	108.24	E			535.42	E		
P_20200603_92951_718	20WS-0179-SO5678-N-060220		5.99	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	83.04	E			360	E		
P_20200603_92951_719	20WS-0179-SO5679-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	21.37	E			109.04	E	J	<RL
P_20200603_92951_720	20WS-0179-SO5684-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	47.39	E			159.02	E		
P_20200603_92951_721	20WS-0179-SO5685-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	17.36	E	J	<RL	160.92	E		
P_20200603_92951_722	20WS-0142-SO5688-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	16.46	E	J	<RL	1443.02	E		
P_20200603_92951_723	20WS-0142-SO5692-N-060220		6.56	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	103	E			409.48	E		
P_20200603_92951_724	20WS-0138-SO5694-N-060220		7.46	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	78.26	E			688.09	E		
P_20200603_92951_725	20WS-0138-SO5697-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	100.06	E			888.86	E		
P_20200603_92951_726	20WS-0130-SO5729-N-060220		8.45	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	18.24	E			593.12	E		
P_20200603_92951_727	20WS-0130-SO5731-N-060220		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	264.36	S	J	R%
P_20200603_92951_732	20WS-0162-SO5708-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	60.48	E			2583.97	E		
P_20200603_92951_733	20WS-0162-SO5710-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	40.33	E			4057.49	E		
P_20200603_92951_734	20WS-0162-SO5711-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	217.71	E			3222.35	E		
P_20200603_92951_735	20WS-0162-SO5716-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	694.01	E		
P_20200603_92951_736	20WS-0162-SO5719-N-060320		<14	S	UJ	ND, C%	61.28	E	J	<RL	<15	E	U	ND	46.4	E			658.36	E		
P_20200603_92951_737	20WS-0162-SO5720-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	273.58	E		
P_20200603_92951_738	20WS-0138-SO5724-N-060320		5.76	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	26.31	E			511.36	E		
P_20200603_92951_740	20WS-0162-SO5734-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	17.22	E	J	<RL	1678.54	E		
P_20200603_92951_741	20WS-0162-SO5736-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	10.55	E	J	<RL	532.49	E		
P_20200603_92951_742	20WS-0160-SO5738-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	199.94	E		
P_20200603_92951_743	20WS-0160-SO5739-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	292.9	E		
P_20200603_92951_744	20WS-0158-SO5745-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	6.38	E	J	<RL	71.78	E	J	<RL
P_20200603_92951_745	20WS-0158-SO5748-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	25.44	E			66.37	E	J	<RL
P_20200603_92951_746	20WS-0153-SO5751-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	9.9	E	J	<RL	739.34	E		
P_20200603_92951_747	20WS-0138-SO5752-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	30.01	E			831.46	E		
P_20200603_92951_748	20WS-0138-SO5754-N-060320		7.14	S	J	<RL, C%	<80	E	U	ND	<15	E	U	ND	44.67	E			407.31	E		
P_20200603_92951_749	20WS-0138-SO5756-N-060320		<14	S	UJ	ND, C%	73.58	E	J	<RL	<15	E	U	ND	31.4	E			869.76	E		
P_20200603_92951_751	20WS-0138-SO5757-N-060320		<14	S	UJ	ND, C%	36.57	E	J	<RL	<15	E	U	ND	50.57	E			2234.4	E		
P_20200603_92951_753	20WS-0138-SO5758-N-060320		7.99	S	J	<RL, C%	51.4	E	J	<RL	<15	E	U	ND	107.41	E			3939.72	E		
P_20200603_92951_754	20WS-0138-SO5761-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	110.19	E			1385.74	E		
P_20200603_92951_755	20WS-0138-SO5762-N-060320		13.8	S	J	<RL, C%	30.34	E	J	<RL	<15	E	U	ND	106.39	E			1399.59	E		
P_20200603_92951_756	20WS-0138-SO5780-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	48.17	E	J	<RL
P_20200603_92951_757	20WS-0138-SO5781-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	<18	E	U	ND	154.65	E		
P_20200603_92951_758	20WS-0138-SO5783-N-060320		15.51	S	J	C%	110.28	E			<15	E	U	ND	237.05	E			2092.22	E		
P_20200603_92951_759	20WS-0138-SO5785-N-060320		<14	S	UJ	ND, C%	<80	E	U	ND	<15	E	U	ND	7.64	E	J	<RL	84.53	E	J	<RL
P_20200604_92951_765	20WS-0138-SO5776-N-060320		5.13	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	56.03	E			156.91	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200604_92951_766	20WS-0122-SO5765-N-060420	35.21	S	J	<RL, B	172.29	E			442.45	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_767	20WS-0122-SO5766-N-060420	14.18	S	J	<RL, B	16.04	E	J	<RL	373.93	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_768	20WS-0102-SO5770-N-060420	16.5	S	J	<RL, B	58.55	E	J	<RL	354.3	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_769	20WS-0122-SO5773-N-060420	51.07	S	J+	B	129.86	E			548.36	S	J+	B	8.86	E	J	<RL	<362	S	UJ	ND, CCS
P_20200604_92951_770	20WS-0123-SO5775-N-060420	31.84	S	J	<RL, B	118.21	E			426.59	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_771	20WS-0138-SO5790-N-060420	52.4	S	J+	B	213.44	E			518	S	J+	B	10.84	E	J	<RL	<362	S	UJ	ND, CCS
P_20200604_92951_772	20WS-0138-SO5793-N-060420	32.64	S	J	<RL, B	134.43	S	J	D%	398.66	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_774	20WS-0138-SO5796-N-060420	25.72	S	J	<RL, B	97.82	E			496.49	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_776	20WS-0121-SO5803-N-060420	21.55	S	J	<RL, B	85.61	E			502.16	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_777	20WS-0121-SO5804-N-060420	183.35	S	J+	B	127.81	E			401.49	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_778	20WS-0121-SO5809-N-060420	66.18	S	J+	B	83.4	E			400.01	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_779	20WS-0123-SO5827-N-060420	<37	E	U	ND	23.71	E	J	<RL	448.26	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_780	20WS-0122-SO5831-N-060420	106.41	S	J+	B	111.41	E			429.7	S	J+	B	24.92	E			<362	S	UJ	ND, CCS
P_20200604_92951_781	20WS-0122-SO5834-N-060420	74.84	S	J+	B	155.51	E			403.36	S	J+	B	18.54	E	J	<RL	<362	S	UJ	ND, CCS
P_20200604_92951_782	20WS-0122-SO5837-N-060420	23.43	S	J	<RL, B	131.14	E			635.57	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200604_92951_783	20WS-0122-SO5839-N-060420	20.5	S	J	<RL, B	83.22	E			531.84	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_789	20WS-1118-SO5815-N-060920	<37	E	U	ND	23.9	E	J	<RL	307.38	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_790	20WS-1116-SO5819-N-060920	15.47	S	J	<RL, B	<82	E	U	ND	633.49	S	J+	B	12.88	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200610_92951_791	20WS-1115-SO5846-N-060920	<37	E	U	ND	168.1	E			569	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_792	20WS-1115-SO5850-N-060920	17.55	S	J	<RL, B	121.27	E			708.27	S	J+	B	9.1	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200610_92951_793	20WS-1115-SO5851-N-060920	13.52	S	J	<RL, B	82.05	E			527.15	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_794	20WS-1115-SO5852-N-060920	<37	E	U	ND	58.99	E	J	<RL	511.82	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_795	20WS-1114-SO5853-N-060920	24.22	S	J	<RL, B	121.55	E			490.59	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_796	20WS-1113-SO5856-N-060920	19.6	S	J	<RL, B	111.56	E			527.75	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_797	20WS-1113-SO5857-N-060920	<37	E	U	ND	108	E			493.4	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_799	20WS-1113-SO5859-N-060920	52.27	S	J+	B	317.46	E			338.63	S	J+	B	13.13	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200610_92951_801	20WS-1112-SO5860-N-060920	31.44	S	J	<RL, B	76.45	E	J	<RL	727.21	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_802	20WS-1016-SO5863-N-060920	23.79	S	J	<RL, B	441.97	E			312.08	S	J+	B	12.74	S	J	<RL, B	<362	S	UJ	ND, CCS
P_20200610_92951_803	20WS-1007-SO5866-N-060920	25.5	S	J	<RL, B	73.84	E	J	<RL	746.91	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_804	20WS-1016-SO5870-N-061020	17.81	S	J	<RL, B	129.46	E			370.99	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_805	20WS-0607-SO5871-N-061020	<37	E	U	ND	86.39	E			589.02	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200610_92951_806	20WS-0607-SO5872-N-061020	19.9	S	J	<RL, B	179.8	E			571.22	S	J+	B	<23	E	U	ND	<362	S	UJ	ND, CCS
P_20200624_92950_18	20WS-0040-SO5885-5.6-6.2-N-061820	166.46	S	J	Prep	<77	S	UJ	ND, Prep	1811.61	S	J	Prep	65	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_19	20WS-0040-SO5886-5.6-10.0-N-061820	108.3	S	J	Prep	27.96	S	J	<RL, Prep	1346.31	S	J	Prep	49.89	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_20	20WS-0040-SO5887-6.0-6.5-N-061820	128.09	S	J	Prep	<77	S	UJ	ND, Prep	1355.18	S	J	Prep	54.81	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_21	20WS-0040-SO5888-5.6-6.0-N-061820	131.31	S	J	Prep	<77	S	UJ	ND, Prep	1582.75	S	J	Prep	54.01	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_22	20WS-0043-SO5889-5.8-6.2-N-061820	186.08	S	J	Prep	<77	S	UJ	ND, Prep	1609.33	S	J	Prep	58.68	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_23	20WS-0043-SO5890-6.2-6.4-N-061820	160.4	S	J	Prep	<77	S	UJ	ND, Prep	1666.43	S	J	Prep	80.79	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_24	20WS-0043-SO5891-10.3-10.9-N-061820	201.56	S	J	Prep	<77	S	UJ	ND, Prep	1926.55	S	J	Prep	64.99	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_25	20WS-0006-SO5892-5.7-6.0-N-061820	101.82	S	J	Prep	<77	S	UJ	ND, Prep	1026.35	S	J	Prep	47.08	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_26	20WS-0006-SO5893-10.4-10.7-N-061920	162.61	S	J	Prep	<77	S	UJ	ND, Prep	1660.37	S	J	Prep	71.3	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_27	20WS-0006-SO5894-11.1-11.4-N-061920	164.36	S	J	Prep	<77	S	UJ	ND, Prep	1619.72	S	J	Prep	72.75	S	J	Prep	<556	S	UJ	ND, Prep, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

		Method	XRF				XRF				XRF				XRF				XRF			
		Analyte	Copper				Iron				Lead				Manganese				Mercury			
		Units	mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name		Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200604_92951_766	20WS-0122-SO5765-N-060420		340.56	E			49094.9	E			1002.5	E			58547.45	E			<24	S	UJ	ND, CCS
P_20200604_92951_767	20WS-0122-SO5766-N-060420		46.18	E	J	<RL	34671.45	E			216.23	E			5552.12	E			<24	S	UJ	ND, CCS
P_20200604_92951_768	20WS-0102-SO5770-N-060420		169.77	E			16124.59	E			262.72	E			4683.49	E			<24	S	UJ	ND, CCS
P_20200604_92951_769	20WS-0122-SO5773-N-060420		170.35	E			44986.49	E			2126.48	E			1749.6	E			<24	S	UJ	ND, CCS
P_20200604_92951_770	20WS-0123-SO5775-N-060420		99.82	E			63402.61	E			491.54	E			15736.15	E			<24	S	UJ	ND, CCS
P_20200604_92951_771	20WS-0138-SO5790-N-060420		286.04	E			46400.14	E			1063.86	E			16638.46	E			<24	S	UJ	ND, CCS
P_20200604_92951_772	20WS-0138-SO5793-N-060420		159.73	E			40357.75	E			1016.21	E			23459.54	E			<24	S	UJ	ND, CCS
P_20200604_92951_774	20WS-0138-SO5796-N-060420		156.2	E			35899.89	E			748.37	E			14788.65	E			<24	S	UJ	ND, CCS
P_20200604_92951_776	20WS-0121-SO5803-N-060420		95.89	E			36400.42	E			117.17	E			4818.97	E			<24	S	UJ	ND, CCS
P_20200604_92951_777	20WS-0121-SO5804-N-060420		264.97	E			60106.02	E			1193.3	E			5972	E			<24	S	UJ	ND, CCS
P_20200604_92951_778	20WS-0121-SO5809-N-060420		109.15	E			23486.71	E			354.26	E			7149.47	E			<24	S	UJ	ND, CCS
P_20200604_92951_779	20WS-0123-SO5827-N-060420		44.1	E	J	<RL	28054.45	E			323.23	E			15232.55	E			<24	S	UJ	ND, CCS
P_20200604_92951_780	20WS-0122-SO5831-N-060420		311.07	E			29287.44	E			2430	E			40039.44	E			<24	S	UJ	ND, CCS
P_20200604_92951_781	20WS-0122-SO5834-N-060420		222	E			83084.3	E			1743.57	E			28558.33	E			<24	S	UJ	ND, CCS
P_20200604_92951_782	20WS-0122-SO5837-N-060420		595.79	E			49647.14	E			204.82	E			3543.19	E			<24	S	UJ	ND, CCS
P_20200604_92951_783	20WS-0122-SO5839-N-060420		116.74	E			41521.56	E			238.49	E			8286.76	E			<24	S	UJ	ND, CCS
P_20200610_92951_789	20WS-1118-SO5815-N-060920		285.35	E			23625.7	E			17.54	E			541.01	E			<24	S	UJ	ND, CCS
P_20200610_92951_790	20WS-1116-SO5819-N-060920		2814.96	E			45790.86	E			712.48	E			8691.48	E			<24	S	UJ	ND, CCS
P_20200610_92951_791	20WS-1115-SO5846-N-060920		49.3	E	J	<RL	26375.23	E			67.08	E			2336.89	E			<24	S	UJ	ND, CCS
P_20200610_92951_792	20WS-1115-SO5850-N-060920		43.18	E	J	<RL	21006.16	E			110.85	E			1905.35	E			<24	S	UJ	ND, CCS
P_20200610_92951_793	20WS-1115-SO5851-N-060920		35.93	E	J	<RL	34033.43	E			79.92	E			1753.28	E			<24	S	UJ	ND, CCS
P_20200610_92951_794	20WS-1115-SO5852-N-060920		130.15	E			53323.13	E			59.48	E			1155.66	E			<24	S	UJ	ND, CCS
P_20200610_92951_795	20WS-1114-SO5853-N-060920		68.91	E	J	<RL	42076.1	E			290.88	E			4125.01	E			<24	S	UJ	ND, CCS
P_20200610_92951_796	20WS-1113-SO5856-N-060920		251.82	E			41169.42	E			296.38	E			899.91	E			<24	S	UJ	ND, CCS
P_20200610_92951_797	20WS-1113-SO5857-N-060920		131.02	E			28073.63	E			208.24	E			3991.48	E			<24	S	UJ	ND, CCS
P_20200610_92951_799	20WS-1113-SO5859-N-060920		69.87	E	J	<RL	32710.88	E			11238.01	E			355.79	E			<24	S	UJ	ND, CCS
P_20200610_92951_801	20WS-1112-SO5860-N-060920		171.29	E			57700.78	E			143.57	E			1307.63	E			<24	S	UJ	ND, CCS
P_20200610_92951_802	20WS-1016-SO5863-N-060920		473.77	E			67255.23	E			2014.68	E			56529.29	E			<24	S	UJ	ND, CCS
P_20200610_92951_803	20WS-1007-SO5866-N-060920		87.11	E			36523.41	E			204.09	E			5368	E			<24	S	UJ	ND, CCS
P_20200610_92951_804	20WS-1016-SO5870-N-061020		313	E			21368.95	E			799.96	E			5813.6	E			<24	S	UJ	ND, CCS
P_20200610_92951_805	20WS-0607-SO5871-N-061020		108.1	E			27394.36	E			147.22	E			36599.95	E			<24	S	UJ	ND, CCS
P_20200610_92951_806	20WS-0607-SO5872-N-061020		375.91	E			36788.92	E			284.73	E			12923.08	E			<24	S	UJ	ND, CCS
P_20200624_92950_18	20WS-0040-SO5885-5.6-6.2-N-061820		<239	S	UJ	ND, Prep	9088.58	S	J	Prep	85.54	S	J	Prep	1170.88	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_19	20WS-0040-SO5886-5.6-10.0-N-061820		<239	S	UJ	ND, Prep	17592.07	S	J	Prep	64.05	S	J	Prep	3254.86	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_20	20WS-0040-SO5887-6.0-6.5-N-061820		<239	S	UJ	ND, Prep	12527.79	S	J	Prep	52.53	S	J	Prep	2060.84	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_21	20WS-0040-SO5888-5.6-6.0-N-061820		<239	S	UJ	ND, Prep	11570.1	S	J	Prep	55.38	S	J	Prep	1441.57	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_22	20WS-0043-SO5889-5.8-6.2-N-061820		97.28	S	J	<RL, Prep	18904.58	S	J	Prep	76.82	S	J	Prep	4408.52	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_23	20WS-0043-SO5890-6.2-6.4-N-061820		<239	S	UJ	ND, Prep	10524.85	S	J	Prep	48.09	S	J	Prep	1156.82	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_24	20WS-0043-SO5891-10.3-10.9-N-061820		114.51	S	J	<RL, Prep	11879.38	S	J	Prep	48.61	S	J	Prep	2563.61	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_25	20WS-0006-SO5892-5.7-6.0-N-061820		91.97	S	J	<RL, Prep	14530.83	S	J	Prep	69.44	S	J	Prep	4500.82	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_26	20WS-0006-SO5893-10.4-10.7-N-061920		<239	S	UJ	ND, Prep	13079.28	S	J	Prep	59.81	S	J	Prep	2811.36	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_27	20WS-0006-SO5894-11.1-11.4-N-061920		<239	S	UJ	ND, Prep	10907.96	S	J	Prep	154.31	S	J	Prep	1346.04	S	J	Prep	<81	S	UJ	ND, Prep, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200604_92951_766	20WS-0122-SO5765-N-060420	<14	E	U	ND	76.74	S	J	<RL, C%	<15	E	U	ND	82.96	E			1691.16	E		
P_20200604_92951_767	20WS-0122-SO5766-N-060420	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	10.6	E	J	<RL	230.07	E		
P_20200604_92951_768	20WS-0102-SO5770-N-060420	35.95	E			<80	S	UJ	ND, C%	<15	E	U	ND	10.16	E	J	<RL	262.68	E		
P_20200604_92951_769	20WS-0122-SO5773-N-060420	69.39	E			<80	S	UJ	ND, C%	<15	E	U	ND	72.82	E			1460.43	E		
P_20200604_92951_770	20WS-0123-SO5775-N-060420	<14	E	U	ND	46.76	S	J	<RL, C%	<15	E	U	ND	26.58	E			627.14	E		
P_20200604_92951_771	20WS-0138-SO5790-N-060420	5.36	E	J	<RL	38.91	S	J	<RL, C%	<15	E	U	ND	59.54	E			1133.19	E		
P_20200604_92951_772	20WS-0138-SO5793-N-060420	5.64	E	J	<RL	35.15	S	J	<RL, C%	<15	E	U	ND	52.11	E			1662.76	S	J	D%
P_20200604_92951_774	20WS-0138-SO5796-N-060420	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	28.25	E			1328.91	E		
P_20200604_92951_776	20WS-0121-SO5803-N-060420	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	10.3	E	J	<RL	288.51	E		
P_20200604_92951_777	20WS-0121-SO5804-N-060420	15.26	E			<80	S	UJ	ND, C%	<15	E	U	ND	265.99	E			784.75	E		
P_20200604_92951_778	20WS-0121-SO5809-N-060420	12.65	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	53.74	E			353.97	E		
P_20200604_92951_779	20WS-0123-SO5827-N-060420	<14	E	U	ND	30.15	S	J	<RL, C%	<15	E	U	ND	6.48	E	J	<RL	685.32	E		
P_20200604_92951_780	20WS-0122-SO5831-N-060420	267.7	E			35.8	S	J	<RL, C%	<15	E	U	ND	404.54	E			3206.18	E		
P_20200604_92951_781	20WS-0122-SO5834-N-060420	128.62	E			68.97	S	J	<RL, C%	<15	E	U	ND	84.71	E			2621.96	E		
P_20200604_92951_782	20WS-0122-SO5837-N-060420	24.56	E			<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	290.02	E		
P_20200604_92951_783	20WS-0122-SO5839-N-060420	12.98	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	8.55	E	J	<RL	322.7	E		
P_20200610_92951_789	20WS-1118-SO5815-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	78.22	E	J	<RL
P_20200610_92951_790	20WS-1116-SO5819-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	63.14	E			2453.28	E		
P_20200610_92951_791	20WS-1115-SO5846-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	231.45	E		
P_20200610_92951_792	20WS-1115-SO5850-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	310	E		
P_20200610_92951_793	20WS-1115-SO5851-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	252.53	E		
P_20200610_92951_794	20WS-1115-SO5852-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	145.14	E		
P_20200610_92951_795	20WS-1114-SO5853-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	15.35	E	J	<RL	295.97	E		
P_20200610_92951_796	20WS-1113-SO5856-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	6.83	E	J	<RL	269.74	E		
P_20200610_92951_797	20WS-1113-SO5857-N-060920	<14	E	U	ND	28.76	S	J	<RL, C%	<15	E	U	ND	<18	E	U	ND	213.41	E		
P_20200610_92951_799	20WS-1113-SO5859-N-060920	11.41	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	54.15	E			1143.58	E		
P_20200610_92951_801	20WS-1112-SO5860-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	155.47	E		
P_20200610_92951_802	20WS-1016-SO5863-N-060920	367.98	E			107.36	S	J	C%	<15	E	U	ND	10.03	E	J	<RL	1793.76	E		
P_20200610_92951_803	20WS-1007-SO5866-N-060920	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	132.43	E		
P_20200610_92951_804	20WS-1016-SO5870-N-061020	<14	E	U	ND	<80	S	UJ	ND, C%	<15	E	U	ND	19.8	E			760.78	E		
P_20200610_92951_805	20WS-0607-SO5871-N-061020	11.27	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	<18	E	U	ND	306.9	E		
P_20200610_92951_806	20WS-0607-SO5872-N-061020	6.62	E	J	<RL	<80	S	UJ	ND, C%	<15	E	U	ND	11.4	E	J	<RL	388.22	E		
P_20200624_92950_18	20WS-0040-SO5885-5.6-6.2-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	36.65	S	J	Prep	149.67	S	J	Prep
P_20200624_92950_19	20WS-0040-SO5886-5.6-10.0-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	33.61	S	J	Prep	288.91	S	J	Prep
P_20200624_92950_20	20WS-0040-SO5887-6.0-6.5-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	31.47	S	J	Prep	108.63	S	J	Prep
P_20200624_92950_21	20WS-0040-SO5888-5.6-6.0-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	38.24	S	J	Prep	180.51	S	J	Prep
P_20200624_92950_22	20WS-0043-SO5889-5.8-6.2-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	66.31	S	J	Prep	340.4	S	J	Prep
P_20200624_92950_23	20WS-0043-SO5890-6.2-6.4-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	21.5	S	J	Prep	171.37	S	J	Prep
P_20200624_92950_24	20WS-0043-SO5891-10.3-10.9-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	41.23	S	J	Prep	180.79	S	J	Prep
P_20200624_92950_25	20WS-0006-SO5892-5.7-6.0-N-061820	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	29.72	S	J	Prep	277.76	S	J	Prep
P_20200624_92950_26	20WS-0006-SO5893-10.4-10.7-N-061920	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	37.2	S	J	Prep	187.33	S	J	Prep
P_20200624_92950_27	20WS-0006-SO5894-11.1-11.4-N-061920	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	56.1	S	J	Prep	382.44	S	J	Prep

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200624_92950_28	20WS-0006-SO5895-5.4-5.7-N-061920	143.61	S	J	Prep	<77	S	UJ	ND, Prep	1389.96	S	J	Prep	66.27	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_29	20WS-0043-SO5896-5.9-6.5-N-061920	180.35	S	J	Prep	<77	S	UJ	ND, Prep	1564.64	S	J	Prep	57.65	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_33	20WS-0043-SO5897-7.3-7.7-N-061920	150.48	S	J	Prep	<77	S	UJ	ND, Prep	1568.58	S	J	Prep	48.55	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_34	20WS-0043-SO5898-10.8-11.2-N-061920	128.03	S	J	Prep	20.78	S	J	<RL, Prep	1329.88	S	J	Prep	58.9	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_35	20WS-0043-SO5899-16.0-16.3-N-061920	129.37	S	J	Prep	<77	S	UJ	ND, Prep	1386.04	S	J	Prep	55.13	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_36	20WS-0003-SO5900-1.0-1.5-N-062320	145.85	S	J	Prep	<77	S	UJ	ND, Prep	1507.85	S	J	Prep	51.83	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_37	20WS-0003-SO5901-4.4-4.7-N-062320	146.76	S	J	Prep	<77	S	UJ	ND, Prep	1290.84	S	J	Prep	52.58	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_40	20WS-0003-SO5902-8.6-9.0-N-062320	123.51	S	J	Prep, CX	<77	S	UJ	ND, Prep, CX	1285.76	S	J	Prep, CX	56.9	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_41	20WS-0003-SO5903-4.6-4.9-N-062320	138.08	S	J	Prep, CX	<77	S	UJ	ND, Prep, CX	1473.29	S	J	Prep, CX	59.64	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_42	20WS-0003-SO5904-12.6-13.0-N-062320	126.74	S	J	Prep, CX	<77	S	UJ	ND, Prep, CX	1510.59	S	J	Prep, CX	67.46	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_43	20WS-0010-SO5905-8.4-8.8-N-062320	154.03	S	J	Prep, CX	<77	S	UJ	ND, Prep, CX	1460.05	S	J	Prep, CX	61.44	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_44	20WS-0010-SO5906-13.0-13.5-N-062320	159.22	S	J	Prep, CX	36.01	S	J	<RL, Prep, CX	1673.83	S	J	Prep, CX	70.83	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_45	20WS-0010-SO5907-12.2-12.6-N-062320	169.95	S	J	Prep, CX	<77	S	UJ	ND, Prep, CX	1656.87	S	J	Prep, CX	76.6	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200624_92950_46	20WS-0010-SO5908-12.4-12.8-N-062320	178.21	S	J	Prep, CX	<77	S	UJ	ND, Prep, CX	1643.22	S	J	Prep, CX	74.09	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_50	20WS-0010-SO5909-8.2-8.5-N-062420	107.52	S	J	Prep, C%	25.29	S	J	<RL, Prep	1275.87	S	J	Prep	43.32	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_51	20WS-0010-SO5910-9.2-9.6-N-062420	111.72	S	J	Prep, C%	<77	S	UJ	ND, Prep	1240.35	S	J	Prep	50.79	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_52	20WS-0297-SO5911-12.7-13.0-N-062420	184.67	S	J	Prep, C%	94.34	S	J	Prep	1354.8	S	J	Prep	72.11	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_53	20WS-0297-SO5912-4.5-4.8-N-062420	162.92	S	J	Prep, C%	40.63	S	J	<RL, Prep	1136.93	S	J	Prep	56.53	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_54	20WS-0297-SO5913-0.2-0.8-N-062420	171.65	S	J	Prep, C%	<77	S	UJ	ND, Prep	1161.68	S	J	Prep	66.59	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_55	20WS-0297-SO5914-0.4-0.8-N-062420	161.85	S	J	Prep, C%	<77	S	UJ	ND, Prep	1207.2	S	J	Prep	85.54	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_56	20WS-0288-SO5915-4.6-5.0-N-062420	117.26	S	J	Prep, C%	<77	S	UJ	ND, Prep	699.17	S	J	Prep	51.61	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_57	20WS-0285-SO5916-4.4-4.5-N-062520	87.53	S	J	Prep, C%	<77	S	UJ	ND, Prep	516.17	S	J	Prep	33.29	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_58	20WS-0285-SO5917-8.4-8.7-N-062520	97.96	S	J	Prep, C%	134.91	S	J	Prep	3557.17	S	J	Prep	71.71	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_59	20WS-0285-SO5918-0.3-0.9-N-062520	114.44	S	J	Prep, C%	<77	S	UJ	ND, Prep	781.45	S	J	Prep	58.24	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_61	20WS-0285-SO5919-1.2-1.5-N-062520	140.91	S	J	Prep, C%	<77	S	UJ	ND, Prep	918.78	S	J	Prep	57.08	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_62	20WS-0285-SO5920-1.3-1.5-N-062520	165.4	S	J	Prep, C%	<77	S	UJ	ND, Prep	977.09	S	J	Prep	62.74	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_63	20WS-0246-SO5921-12.2-12.6-N-062520	153.75	S	J	Prep, C%	<77	S	UJ	ND, Prep	1272.58	S	J	Prep	62.21	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_64	20WS-0246-SO5922-8.8-9.2-N-062520	129.88	S	J	Prep, C%	<77	S	UJ	ND, Prep	974.59	S	J	Prep	48.52	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_65	20WS-0246-SO5923-4.8-5.1-N-062520	111.76	S	J	Prep, C%	21.01	S	J	<RL, Prep	868.34	S	J	Prep	39.78	S	J	Prep	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520	93.02	S	J	Prep, C%, D%	22.9	S	J	<RL, Prep, D%	804.13	S	J	Prep, D%	32.68	S	J	Prep, D%	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_72	20WS-0285-SO5925-1.0-1.4-N-062520	119.33	S	J	Prep, CX, C%	<77	S	UJ	ND, Prep, CX	1018.72	S	J	Prep, CX	44.99	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_73	20WS-1150-SO5926-20.5-20.8-N-062520	123.48	S	J	Prep, CX, C%	<77	S	UJ	ND, Prep, CX	933.2	S	J	Prep, CX	54.51	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_74	20WS-0015-SO5927-5.5-6.2-N-062620	136.71	S	J	Prep, CX, C%	<77	S	UJ	ND, Prep, CX	1313.01	S	J	Prep, CX	46.89	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_75	20WS-0015-SO5928-12.5-12.7-N-062620	133.97	S	J	Prep, CX, C%	<77	S	UJ	ND, Prep, CX	1276.19	S	J	Prep, CX	52.25	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_76	20WS-0015-SO5929-12.7-13.0-N-062620	125.34	S	J	Prep, CX, C%	<77	S	UJ	ND, Prep, CX	1478.21	S	J	Prep, CX	44.37	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_77	20WS-0015-SO5930-8.7-9.0-N-062620	149.99	S	J	Prep, CX, C%	<77	S	UJ	ND, Prep, CX	1541.88	S	J	Prep, CX	54.09	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200629_92950_78	20WS-0015-SO5931-9.2-9.5-N-062620	175.85	S	J	Prep, CX, C%	61.59	S	J	<RL, Prep, CX	1616.2	S	J	Prep, CX	62.37	S	J	Prep, CX	<556	S	UJ	ND, Prep, CCS
P_20200707_92951_06	20WS-0016-SO5932-4.8-5.2-N-070120	47.67	S	J	Prep, B	50.99	S	J	<RL, Prep	595.04	S	J	Prep, B	15.58	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_07	20WS-0016-SO5933-12.7-13.0-N-070120	30.5	S	J	<RL, Prep, B	123.93	S	J	Prep	752.35	S	J	Prep, B	17.06	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_08	20WS-0016-SO5934-12.7-13.2-N-070120	45.46	S	J	Prep, B	17.29	S	J	<RL, Prep	631.07	S	J	Prep, B	14.54	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120	38.32	S	J	Prep, B	46.01	S	J	<RL, Prep	644.05	S	J	Prep, B	9.62	S	J	<RL, Prep, B, FD	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_11	20WS-0013-SO5936-12.3-12.6-N-070120	53.13	S	J	Prep, B	68.17	S	J	<RL, Prep	714.67	S	J	Prep, B	26.02	S	J	Prep, B	<362	S	UJ	ND, Prep, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200624_92950_28	20WS-0006-SO5895-5.4-5.7-N-061920	<239	S	UJ	ND, Prep	12714.88	S	J	Prep	58.84	S	J	Prep	3828.64	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_29	20WS-0043-SO5896-5.9-6.5-N-061920	<239	S	UJ	ND, Prep	9721.77	S	J	Prep	44.88	S	J	Prep	689.64	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_33	20WS-0043-SO5897-7.3-7.7-N-061920	<239	S	UJ	ND, Prep	10639.75	S	J	Prep	52.01	S	J	Prep	861.69	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_34	20WS-0043-SO5898-10.8-11.2-N-061920	<239	S	UJ	ND, Prep	10462.02	S	J	Prep	43.07	S	J	Prep	1849.04	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_35	20WS-0043-SO5899-16.0-16.3-N-061920	<239	S	UJ	ND, Prep	18470.09	S	J	Prep	30.84	S	J	<RL, Prep	530.9	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_36	20WS-0003-SO5900-1.0-1.5-N-062320	<239	S	UJ	ND, Prep	14806	S	J	Prep	36.45	S	J	Prep	943.03	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_37	20WS-0003-SO5901-4.4-4.7-N-062320	<239	S	UJ	ND, Prep	10373.93	S	J	Prep	29.67	S	J	<RL, Prep	438.92	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_40	20WS-0003-SO5902-8.6-9.0-N-062320	<239	S	UJ	ND, Prep, CX	11467.22	S	J	Prep, CX	33.08	S	J	<RL, Prep, CX	1037.27	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_41	20WS-0003-SO5903-4.6-4.9-N-062320	<239	S	UJ	ND, Prep, CX	13571.61	S	J	Prep, CX	47.13	S	J	Prep, CX	2537.05	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_42	20WS-0003-SO5904-12.6-13.0-N-062320	141.56	S	J	<RL, Prep, CX	12156.98	S	J	Prep, CX	30.5	S	J	<RL, Prep, CX	893.41	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_43	20WS-0010-SO5905-8.4-8.8-N-062320	117.84	S	J	<RL, Prep, CX	11844.51	S	J	Prep, CX	66.76	S	J	Prep, CX	2017.08	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_44	20WS-0010-SO5906-13.0-13.5-N-062320	131.04	S	J	<RL, Prep, CX	9483.67	S	J	Prep, CX	295.23	S	J	Prep, CX	7307.68	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_45	20WS-0010-SO5907-12.2-12.6-N-062320	<239	S	UJ	ND, Prep, CX	7937.79	S	J	Prep, CX	406.14	S	J	Prep, CX	2404.07	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200624_92950_46	20WS-0010-SO5908-12.4-12.8-N-062320	123.93	S	J	<RL, Prep, CX	14839.75	S	J	Prep, CX	101.88	S	J	Prep, CX	1854.55	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_50	20WS-0010-SO5909-8.2-8.5-N-062420	<239	S	UJ	ND, Prep	16533.69	S	J	Prep	28.13	S	J	<RL, Prep	3143.3	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_51	20WS-0010-SO5910-9.2-9.6-N-062420	111.85	S	J	<RL, Prep	14093.73	S	J	Prep	149.28	S	J	Prep	3583.74	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_52	20WS-0297-SO5911-12.7-13.0-N-062420	<239	S	UJ	ND, Prep	6889.16	S	J	Prep	930.01	S	J	Prep	1754.1	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_53	20WS-0297-SO5912-4.5-4.8-N-062420	<239	S	UJ	ND, Prep	9479.83	S	J	Prep	242.65	S	J	Prep	428.98	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_54	20WS-0297-SO5913-0.2-0.8-N-062420	<239	S	UJ	ND, Prep	7485.4	S	J	Prep	118.72	S	J	Prep	654.8	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_55	20WS-0297-SO5914-0.4-0.8-N-062420	<239	S	UJ	ND, Prep	5628.71	S	J	Prep	1497.04	S	J	Prep	953.54	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_56	20WS-0288-SO5915-4.6-5.0-N-062420	<239	S	UJ	ND, Prep	4483.32	S	J	Prep	51.92	S	J	Prep	792.78	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_57	20WS-0285-SO5916-4.4-4.5-N-062520	<239	S	UJ	ND, Prep	4311.2	S	J	Prep	124.41	S	J	Prep	475.24	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_58	20WS-0285-SO5917-8.4-8.7-N-062520	139.9	S	J	<RL, Prep	26252.2	S	J	Prep	1421.01	S	J	Prep	27764.61	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_59	20WS-0285-SO5918-0.3-0.9-N-062520	<239	S	UJ	ND, Prep	7329.12	S	J	Prep	728.93	S	J	Prep	5822.56	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_61	20WS-0285-SO5919-1.2-1.5-N-062520	<239	S	UJ	ND, Prep	13500.87	S	J	Prep	1134.87	S	J	Prep	4780.61	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_62	20WS-0285-SO5920-1.3-1.5-N-062520	104.38	S	J	<RL, Prep	5242.78	S	J	Prep	422.28	S	J	Prep	2052.38	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_63	20WS-0246-SO5921-12.2-12.6-N-062520	<239	S	UJ	ND, Prep	11531.28	S	J	Prep	34.03	S	J	<RL, Prep	3934.59	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_64	20WS-0246-SO5922-8.8-9.2-N-062520	<239	S	UJ	ND, Prep	5896.53	S	J	Prep	124.78	S	J	Prep	2223.41	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_65	20WS-0246-SO5923-4.8-5.1-N-062520	78.04	S	J	<RL, Prep	15967.59	S	J	Prep	42.91	S	J	Prep	13205.5	S	J	Prep	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520	56.66	S	J	<RL, Prep	7170.09	S	J	Prep	129.21	S	J	Prep, D%	1415.12	S	J	Prep, D%	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_72	20WS-0285-SO5925-1.0-1.4-N-062520	<239	S	UJ	ND, Prep, CX	6925.74	S	J	Prep, CX	204.53	S	J	Prep, CX	1762.23	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_73	20WS-1150-SO5926-20.5-20.8-N-062520	76.15	S	J	<RL, Prep, CX	5939.52	S	J	Prep, CX	1700.41	S	J	Prep, CX	6308.05	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_74	20WS-0015-SO5927-5.5-6.2-N-062620	<239	S	UJ	ND, Prep, CX	8890.78	S	J	Prep, CX	151.4	S	J	Prep, CX	674.88	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_75	20WS-0015-SO5928-12.5-12.7-N-062620	<239	S	UJ	ND, Prep, CX	12637.66	S	J	Prep, CX	36.96	S	J	Prep, CX	780.05	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_76	20WS-0015-SO5929-12.7-13.0-N-062620	<239	S	UJ	ND, Prep, CX	17225.53	S	J	Prep, CX	27.73	S	J	<RL, Prep, CX	651.17	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_77	20WS-0015-SO5930-8.7-9.0-N-062620	<239	S	UJ	ND, Prep, CX	11526.04	S	J	Prep, CX	214.17	S	J	Prep, CX	855.24	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200629_92950_78	20WS-0015-SO5931-9.2-9.5-N-062620	<239	S	UJ	ND, Prep, CX	11310.7	S	J	Prep, CX	130.07	S	J	Prep, CX	1646.77	S	J	Prep, CX	<81	S	UJ	ND, Prep, CCS
P_20200707_92951_06	20WS-0016-SO5932-4.8-5.2-N-070120	76.62	S	J	Prep	17260.93	S	J	Prep, C%	287.35	S	J	Prep	4420.68	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_07	20WS-0016-SO5933-12.7-13.0-N-070120	60.51	S	J	<RL, Prep	42438.61	S	J	Prep, C%	924.22	S	J	Prep	8661.27	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_08	20WS-0016-SO5934-12.7-13.2-N-070120	41.37	S	J	<RL, Prep	24702.81	S	J	Prep, C%	200.4	S	J	Prep	2738.67	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120	51.93	S	J	<RL, Prep	27380.54	S	J	Prep, C%	380.89	S	J	Prep, FD	5735.16	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_11	20WS-0013-SO5936-12.3-12.6-N-070120	85.47	S	J	Prep	29192.77	S	J	Prep, C%	138.2	S	J	Prep, C%	8790.85	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200624_92950_28	20WS-0006-SO5895-5.4-5.7-N-061920	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	43.77	S	J	Prep	288.48	S	J	Prep
P_20200624_92950_29	20WS-0043-SO5896-5.9-6.5-N-061920	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	30.61	S	J	Prep	95.54	S	J	Prep
P_20200624_92950_33	20WS-0043-SO5897-7.3-7.7-N-061920	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	47.27	S	J	Prep	133.35	S	J	Prep
P_20200624_92950_34	20WS-0043-SO5898-10.8-11.2-N-061920	11.17	S	J	<RL, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	32.39	S	J	Prep	116.03	S	J	Prep
P_20200624_92950_35	20WS-0043-SO5899-16.0-16.3-N-061920	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	34.46	S	J	Prep	63.26	S	J	<RL, Prep
P_20200624_92950_36	20WS-0003-SO5900-1.0-1.5-N-062320	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	30.47	S	J	Prep	58.34	S	J	<RL, Prep
P_20200624_92950_37	20WS-0003-SO5901-4.4-4.7-N-062320	<34	S	UJ	ND, Prep, C%	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	23.63	S	J	Prep	66.9	S	J	<RL, Prep
P_20200624_92950_40	20WS-0003-SO5902-8.6-9.0-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	27.62	S	J	Prep, CX	68.78	S	J	<RL, Prep, CX
P_20200624_92950_41	20WS-0003-SO5903-4.6-4.9-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	35.15	S	J	Prep, CX	88.34	S	J	Prep, CX
P_20200624_92950_42	20WS-0003-SO5904-12.6-13.0-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	29.44	S	J	Prep, CX	139.59	S	J	Prep, CX
P_20200624_92950_43	20WS-0010-SO5905-8.4-8.8-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	28.76	S	J	Prep, CX	226.05	S	J	Prep, CX
P_20200624_92950_44	20WS-0010-SO5906-13.0-13.5-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	41.99	S	J	Prep, CX	227.42	S	J	Prep, CX
P_20200624_92950_45	20WS-0010-SO5907-12.2-12.6-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	41.65	S	J	Prep, CX	458.49	S	J	Prep, CX
P_20200624_92950_46	20WS-0010-SO5908-12.4-12.8-N-062320	<34	S	UJ	ND, Prep, CX, C%	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	37.82	S	J	Prep, CX	386.06	S	J	Prep, CX
P_20200629_92950_50	20WS-0010-SO5909-8.2-8.5-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	31.86	S	J	Prep	746.65	S	J	Prep
P_20200629_92950_51	20WS-0010-SO5910-9.2-9.6-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	27.93	S	J	Prep	570.56	S	J	Prep
P_20200629_92950_52	20WS-0297-SO5911-12.7-13.0-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	59.45	S	J	Prep	603.61	S	J	Prep
P_20200629_92950_53	20WS-0297-SO5912-4.5-4.8-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	39.84	S	J	Prep	607.22	S	J	Prep
P_20200629_92950_54	20WS-0297-SO5913-0.2-0.8-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	44.11	S	J	Prep	264.3	S	J	Prep
P_20200629_92950_55	20WS-0297-SO5914-0.4-0.8-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	80.16	S	J	Prep	1243.74	S	J	Prep
P_20200629_92950_56	20WS-0288-SO5915-4.6-5.0-N-062420	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	40.36	S	J	Prep	743.87	S	J	Prep
P_20200629_92950_57	20WS-0285-SO5916-4.4-4.5-N-062520	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	24.18	S	J	Prep	583.71	S	J	Prep
P_20200629_92950_58	20WS-0285-SO5917-8.4-8.7-N-062520	42.58	S	J	Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	30.89	S	J	Prep	1945.4	S	J	Prep
P_20200629_92950_59	20WS-0285-SO5918-0.3-0.9-N-062520	14.1	S	J	<RL, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	59.04	S	J	Prep	692.91	S	J	Prep
P_20200629_92950_61	20WS-0285-SO5919-1.2-1.5-N-062520	28.2	S	J	<RL, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	61.29	S	J	Prep	1354.58	S	J	Prep
P_20200629_92950_62	20WS-0285-SO5920-1.3-1.5-N-062520	13.25	S	J	<RL, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	62.55	S	J	Prep	640.54	S	J	Prep
P_20200629_92950_63	20WS-0246-SO5921-12.2-12.6-N-062520	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	37.61	S	J	Prep	328.58	S	J	Prep
P_20200629_92950_64	20WS-0246-SO5922-8.8-9.2-N-062520	14.54	S	J	<RL, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	34.59	S	J	Prep	318.38	S	J	Prep
P_20200629_92950_65	20WS-0246-SO5923-4.8-5.1-N-062520	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	<38	S	UJ	ND, Prep	26.21	S	J	Prep	395.44	S	J	Prep
P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520	<34	S	UJ	ND, Prep	<392	S	UJ	ND, Prep	8	S	J	<RL, Prep	28.71	S	J	Prep, D%	278.67	S	J	Prep
P_20200629_92950_72	20WS-0285-SO5925-1.0-1.4-N-062520	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	49.21	S	J	Prep, CX	340.72	S	J	Prep, CX
P_20200629_92950_73	20WS-1150-SO5926-20.5-20.8-N-062520	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	39.8	S	J	Prep, CX	1936.71	S	J	Prep, CX
P_20200629_92950_74	20WS-0015-SO5927-5.5-6.2-N-062620	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	33.65	S	J	Prep, CX	252.83	S	J	Prep, CX
P_20200629_92950_75	20WS-0015-SO5928-12.5-12.7-N-062620	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	23.87	S	J	Prep, CX	109.61	S	J	Prep, CX
P_20200629_92950_76	20WS-0015-SO5929-12.7-13.0-N-062620	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	22.75	S	J	Prep, CX	78.21	S	J	Prep, CX
P_20200629_92950_77	20WS-0015-SO5930-8.7-9.0-N-062620	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	24.5	S	J	Prep, CX	190.69	S	J	Prep, CX
P_20200629_92950_78	20WS-0015-SO5931-9.2-9.5-N-062620	<34	S	UJ	ND, Prep, CX	<392	S	UJ	ND, Prep, CX	<38	S	UJ	ND, Prep, CX	36.53	S	J	Prep, CX	266.92	S	J	Prep, CX
P_20200707_92951_06	20WS-0016-SO5932-4.8-5.2-N-070120	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	6.77	S	J	<RL, Prep, B	2675.29	S	J	Prep
P_20200707_92951_07	20WS-0016-SO5933-12.7-13.0-N-070120	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	<18	S	UJ	ND, Prep	1767.25	S	J	Prep
P_20200707_92951_08	20WS-0016-SO5934-12.7-13.2-N-070120	<14	S	UJ	ND, Prep	28.49	S	J	<RL, Prep, C%	<15	S	UJ	ND, Prep	6.91	S	J	<RL, Prep, B	933.62	S	J	Prep
P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120	<14	S	UJ	ND, Prep	34.29	S	J	<RL, Prep, C%	<15	S	UJ	ND, Prep	<18	S	UJ	ND, Prep	1538.24	S	J	Prep
P_20200707_92951_11	20WS-0013-SO5936-12.3-12.6-N-070120	<14	S	UJ	ND, Prep	36.42	S	J	<RL, Prep, C%	<15	S	UJ	ND, Prep	7.96	S	J	<RL, Prep, B	1982.56	S	J	Prep

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Cobalt			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200707_92951_12	20WS-1150-SO5937-12.3-12.7-N-070120	34.28	S	J	<RL, Prep, B	11.74	S	J	<RL, Prep	334.46	S	J	Prep, B	15.18	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_13	20WS-1150-SO5938-24.4-24.9-N-070120	43.44	S	J	Prep, B	19.58	S	J	<RL, Prep	790.91	S	J	Prep, B	16.26	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_14	20WS-0288-SO5939-4.0-4.4-N-070220	44.77	S	J	Prep, B	162.62	S	J	Prep	363.04	S	J	Prep, B	17.14	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_15	20WS-0288-SO5940-4.4-4.9-N-070220	29.74	S	J	<RL, Prep, B	20.14	S	J	<RL, Prep	399.46	S	J	Prep, B	18.15	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_16	20WS-0288-SO5941-4.0-4.5-N-070220	44.96	S	J	Prep, B	25.47	S	J	<RL, Prep	357.48	S	J	Prep, B	10.52	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_17	20WS-0288-SO5942-0.9-1.3-N-070220	51.81	S	J	Prep, B	33.34	S	J	<RL, Prep	379.42	S	J	Prep, B	10.55	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_18	20WS-0289-SO5944-12.3-12.6-N-070220	32.77	S	J	<RL, Prep, B	137.18	S	J	Prep	537.56	S	J	Prep, B	12.15	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_19	20WS-0289-SO5945-12.8-13.3-N-070220	46.89	S	J	Prep, B	146.76	S	J	Prep	353.2	S	J	Prep, B	9.58	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_20	20WS-0162-SO5943-12.3-12.7-N-070620	32.68	S	J	<RL, Prep, B	37.8	S	J	<RL, Prep	600.81	S	J	Prep, B	10.38	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_21	20WS-0162-SO5946-16.0-16.4-N-070620	53.78	S	J	Prep, B	9.38	S	J	<RL, Prep	800.6	S	J	Prep, B	15.13	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_22	20WS-0162-SO5947-20.0-20.4-N-070620	59.7	S	J	Prep, B	6.91	S	J	<RL, Prep	746.3	S	J	Prep, B	12.72	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620	32.58	S	J	<RL, Prep, B	18.59	S	J	<RL, Prep	447.21	S	J	Prep, B	<23	S	UJ	ND, Prep	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_26	20WS-0138-SO5949-13.1-13.6-N-070620	<37	S	UJ	ND, Prep	13.11	S	J	<RL, Prep	377.08	S	J	Prep, B	<23	S	UJ	ND, Prep	<362	S	UJ	ND, Prep, CCS
P_20200707_92951_27	20WS-0138-SO5950-9.5-9.8-N-070620	29.64	S	J	<RL, Prep, B	14.68	S	J	<RL, Prep	565.47	S	J	Prep, B	13.4	S	J	<RL, Prep, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_32	20WS-0179-SO5951-4.2-4.5-N-070820	39.12	S	J	Prep, CX, B	142.51	S	J	Prep, CX	670.64	S	J	Prep, CX, B	13.1	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_33	20WS-0179-SO5953-5.4-5.7-N-070820	40.89	S	J	Prep, CX, B	19.16	S	J	<RL, Prep, CX, B	758.33	S	J	Prep, CX, B	<23	S	UJ	ND, Prep, CX	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820	40.03	S	J	Prep, CX, B	109.59	S	J	Prep, CX	736.7	S	J	Prep, CX, B	12.73	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_36	20WS-0179-SO5955-0.7-1.2-N-070820	45.74	S	J	Prep, CX, B	93.48	S	J	Prep, CX	620.98	S	J	Prep, CX, B	9.7	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_37	20WS-0017-SO5956-8.1-8.6-N-070820	42.01	S	J	Prep, CX, B	25.26	S	J	<RL, Prep, CX, B	682.54	S	J	Prep, CX, B	11.4	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_38	20WS-0019-SO5957-5.3-5.7-N-070820	46.55	S	J	Prep, CX, B	25.68	S	J	<RL, Prep, CX, B	566.26	S	J	Prep, CX, B	15.52	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_39	20WS-0017-SO5958-12.4-12.8-N-070820	39.22	S	J	Prep, CX, B	15.7	S	J	<RL, Prep, CX, B	681.62	S	J	Prep, CX, B	<23	S	UJ	ND, Prep, CX	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_40	20WS-0315-SO5959-8.8-9-N-070920	39.88	S	J	Prep, CX, B	23.55	S	J	<RL, Prep, CX, B	313.51	S	J	Prep, CX, B	11.99	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_41	20WS-0315-SO5960-4.3-4.7-N-070920	43.54	S	J	Prep, CX, B	<82	S	UJ	ND, Prep, CX	346.72	S	J	Prep, CX, B	12.53	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_42	20WS-0315-SO5961-4.3-4.6-N-070920	42.86	S	J	Prep, CX, B	40.63	S	J	<RL, Prep, CX	299.5	S	J	Prep, CX, B	6.93	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200709_92951_43	20WS-0315-SO5962-5.3-5.6-N-070920	30.38	S	J	<RL, Prep, CX, B	80.22	S	J	<RL, Prep, CX	353.91	S	J	Prep, CX, B	8.39	S	J	<RL, Prep, CX, B	<362	S	UJ	ND, Prep, CCS
P_20200731_92950_91	20WS-1124-SO5963-N-072820	<40	E	U	ND	31.63	E	J	<RL	135.76	S	J	<RL, C%	<24	E	U	ND	<556	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Copper				Iron				Lead				Manganese				Mercury			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200707_92951_12	20WS-1150-SO5937-12.3-12.7-N-070120	66.2	S	J	<RL, Prep	7318.25	S	J	Prep, C%	84.51	S	J	Prep, C%	3768.92	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_13	20WS-1150-SO5938-24.4-24.9-N-070120	27.72	S	J	<RL, Prep	16067	S	J	Prep, C%	158.48	S	J	Prep, C%	4569.47	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_14	20WS-0288-SO5939-4.0-4.4-N-070220	25.16	S	J	<RL, Prep	20648.46	S	J	Prep, C%	955.06	S	J	Prep	461.16	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_15	20WS-0288-SO5940-4.4-4.9-N-070220	66.58	S	J	<RL, Prep	13132.23	S	J	Prep, C%	82.57	S	J	Prep, C%	2554.04	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_16	20WS-0288-SO5941-4.0-4.5-N-070220	17.24	S	J	<RL, Prep	4521.49	S	J	Prep, C%	20.59	S	J	Prep, C%	524.3	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_17	20WS-0288-SO5942-0.9-1.3-N-070220	34.98	S	J	<RL, Prep	4998.23	S	J	Prep, C%	25.51	S	J	Prep, C%	2007.76	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_18	20WS-0289-SO5944-12.3-12.6-N-070220	38.05	S	J	<RL, Prep	17736.04	S	J	Prep, C%	25.92	S	J	Prep, C%	2841.93	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_19	20WS-0289-SO5945-12.8-13.3-N-070220	47.43	S	J	<RL, Prep	12987.94	S	J	Prep, C%	61.59	S	J	Prep, C%	2708.7	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_20	20WS-0162-SO5943-12.3-12.7-N-070620	130.53	S	J	Prep	25431.92	S	J	Prep, C%	32.32	S	J	Prep, C%	550.73	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_21	20WS-0162-SO5946-16.0-16.4-N-070620	66.01	S	J	<RL, Prep	29960.13	S	J	Prep, C%	41.1	S	J	Prep, C%	830.4	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_22	20WS-0162-SO5947-20.0-20.4-N-070620	44.75	S	J	<RL, Prep	35416.48	S	J	Prep, C%	12	S	J	<RL, Prep, C%	817.64	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620	46.9	S	J	<RL, Prep, D%	19743.59	S	J	Prep, C%	87.95	S	J	Prep, C%	2502.17	S	J	Prep, C%, D%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_26	20WS-0138-SO5949-13.1-13.6-N-070620	55.97	S	J	<RL, Prep	23037.54	S	J	Prep, C%	73.48	S	J	Prep, C%	1760.39	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200707_92951_27	20WS-0138-SO5950-9.5-9.8-N-070620	71.96	S	J	Prep	20966.06	S	J	Prep, C%	79.15	S	J	Prep, C%	6088.09	S	J	Prep, C%	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_32	20WS-0179-SO5951-4.2-4.5-N-070820	58.33	S	J	<RL, Prep, CX	38108.51	S	J	Prep, CX	15.35	S	J	<RL, Prep, CX	579.46	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_33	20WS-0179-SO5953-5.4-5.7-N-070820	65.62	S	J	<RL, Prep, CX	28397.04	S	J	Prep, CX	16.91	S	J	<RL, Prep, CX	501.55	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820	97.4	S	J	Prep, CX	43408.16	S	J	Prep, CX	15.63	S	J	<RL, Prep, CX, FD	492.87	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_36	20WS-0179-SO5955-0.7-1.2-N-070820	88.99	S	J	Prep, CX	45387.48	S	J	Prep, CX	32.87	S	J	Prep, CX	1822.76	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_37	20WS-0017-SO5956-8.1-8.6-N-070820	33.01	S	J	<RL, Prep, CX	31577.58	S	J	Prep, CX	28.38	S	J	Prep, CX	2782.75	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_38	20WS-0019-SO5957-5.3-5.7-N-070820	<70	S	UJ	ND, Prep, CX	25828.25	S	J	Prep, CX	35.45	S	J	Prep, CX	16008.1	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_39	20WS-0017-SO5958-12.4-12.8-N-070820	51.93	S	J	<RL, Prep, CX	42505.96	S	J	Prep, CX	24.97	S	J	Prep, CX	2447.93	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_40	20WS-0315-SO5959-8.8-9-N-070920	45.84	S	J	<RL, Prep, CX	5058.6	S	J	Prep, CX	67.22	S	J	Prep, CX	6544.29	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_41	20WS-0315-SO5960-4.3-4.7-N-070920	16.87	S	J	<RL, Prep, CX	4074.98	S	J	Prep, CX	18.09	S	J	Prep, CX	92.18	S	J	<RL, Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_42	20WS-0315-SO5961-4.3-4.6-N-070920	153.1	S	J	Prep, CX	11925.28	S	J	Prep, CX	71.19	S	J	Prep, CX	2675.46	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200709_92951_43	20WS-0315-SO5962-5.3-5.6-N-070920	61.63	S	J	<RL, Prep, CX	19340.48	S	J	Prep, CX	48.04	S	J	Prep, CX	604.59	S	J	Prep, CX	<24	S	UJ	ND, Prep, CCS
P_20200731_92950_91	20WS-1124-SO5963-N-072820	161.67	E	J	<RL	25107.36	S	J	C%	77.55	E			812.28	S	J	C%	<81	S	UJ	ND, CCS

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF			
Analyte		Molybdenum				Nickel				Selenium				Silver				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Sample Name	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code	Result	E/S	DV Qual	Reason Code
P_20200707_92951_12	20WS-1150-SO5937-12.3-12.7-N-070120	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	5.44	S	J	<RL, Prep, B	1781.91	S	J	Prep
P_20200707_92951_13	20WS-1150-SO5938-24.4-24.9-N-070120	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	8.34	S	J	<RL, Prep, B	2636.94	S	J	Prep
P_20200707_92951_14	20WS-0288-SO5939-4.0-4.4-N-070220	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	77.34	S	J	Prep, B	550.13	S	J	Prep
P_20200707_92951_15	20WS-0288-SO5940-4.4-4.9-N-070220	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	8.86	S	J	<RL, Prep, B	1555.03	S	J	Prep
P_20200707_92951_16	20WS-0288-SO5941-4.0-4.5-N-070220	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	5.68	S	J	<RL, Prep, B	398.42	S	J	Prep
P_20200707_92951_17	20WS-0288-SO5942-0.9-1.3-N-070220	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	11.7	S	J	<RL, Prep, B	702.76	S	J	Prep
P_20200707_92951_18	20WS-0289-SO5944-12.3-12.6-N-070220	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	7.92	S	J	<RL, Prep, B	2926.36	S	J	Prep
P_20200707_92951_19	20WS-0289-SO5945-12.8-13.3-N-070220	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	15.48	S	J	<RL, Prep, B	374.7	S	J	Prep
P_20200707_92951_20	20WS-0162-SO5943-12.3-12.7-N-070620	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	6.43	S	J	<RL, Prep, B	568.23	S	J	Prep
P_20200707_92951_21	20WS-0162-SO5946-16.0-16.4-N-070620	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	11.4	S	J	<RL, Prep, B	215.77	S	J	Prep
P_20200707_92951_22	20WS-0162-SO5947-20.0-20.4-N-070620	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	8.21	S	J	<RL, Prep, B	65.05	S	J	<RL, Prep, B
P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	9.49	S	J	<RL, Prep, B	185.58	S	J	Prep
P_20200707_92951_26	20WS-0138-SO5949-13.1-13.6-N-070620	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	16.98	S	J	<RL, Prep, B	279.77	S	J	Prep
P_20200707_92951_27	20WS-0138-SO5950-9.5-9.8-N-070620	<14	S	UJ	ND, Prep	<80	S	UJ	ND, Prep, C%	<15	S	UJ	ND, Prep	<18	S	UJ	ND, Prep	332.77	S	J	Prep
P_20200709_92951_32	20WS-0179-SO5951-4.2-4.5-N-070820	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	<18	S	UJ	ND, Prep, CX	114.2	S	J	Prep, CX
P_20200709_92951_33	20WS-0179-SO5953-5.4-5.7-N-070820	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	<18	S	UJ	ND, Prep, CX	62.24	S	J	<RL, Prep, CX
P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	7.36	S	J	<RL, Prep, CX, B	76.29	S	J	<RL, Prep, CX
P_20200709_92951_36	20WS-0179-SO5955-0.7-1.2-N-070820	<14	S	UJ	ND, Prep, CX	35.27	S	J	<RL, Prep, CX	<15	S	UJ	ND, Prep, CX	11.43	S	J	<RL, Prep, CX, B	85.74	S	J	<RL, Prep, CX
P_20200709_92951_37	20WS-0017-SO5956-8.1-8.6-N-070820	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	6.79	S	J	<RL, Prep, CX, B	93.02	S	J	<RL, Prep, CX
P_20200709_92951_38	20WS-0019-SO5957-5.3-5.7-N-070820	<14	S	UJ	ND, Prep, CX	36.91	S	J	<RL, Prep, CX	<15	S	UJ	ND, Prep, CX	12.52	S	J	<RL, Prep, CX, B	521.59	S	J	Prep, CX
P_20200709_92951_39	20WS-0017-SO5958-12.4-12.8-N-070820	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	<18	S	UJ	ND, Prep, CX	116.17	S	J	Prep, CX
P_20200709_92951_40	20WS-0315-SO5959-8.8-9-N-070920	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	12.55	S	J	<RL, Prep, CX, B	78.54	S	J	<RL, Prep, CX
P_20200709_92951_41	20WS-0315-SO5960-4.3-4.7-N-070920	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	7.24	S	J	<RL, Prep, CX, B	37.75	S	J	<RL, Prep, CX
P_20200709_92951_42	20WS-0315-SO5961-4.3-4.6-N-070920	<14	S	UJ	ND, Prep, CX	28.29	S	J	<RL, Prep, CX	<15	S	UJ	ND, Prep, CX	13.4	S	J	<RL, Prep, CX, B	167.55	S	J	Prep, CX
P_20200709_92951_43	20WS-0315-SO5962-5.3-5.6-N-070920	<14	S	UJ	ND, Prep, CX	<80	S	UJ	ND, Prep, CX	<15	S	UJ	ND, Prep, CX	10.97	S	J	<RL, Prep, CX, B	63.35	S	J	<RL, Prep, CX
P_20200731_92950_91	20WS-1124-SO5963-N-072820	<34	E	U	ND	<392	S	UJ	ND, C%	<38	E	U	ND	<18	E	U	ND	271.62	S	J	C%

Table 2
FPXRF SiO2 Standard Results

Abbreviations:
mg/kg - milligram per kilogram
ND = not detected
J = detected result is less than the reporting limit

Table 2. FPXRF SiO2 Standard Results

Analysis Run ID	Sample Type	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
P_20191023_92951_133	SiO2	28.69J	ND	195.92	10.11J	ND	ND	35.05J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191023_92951_145	SiO2	29.29J	ND	172.48	11.09J	ND	ND	63.45J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191023_92951_154	SiO2	28.75J	ND	181.54	10.46J	ND	ND	49.47J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191024_92951_156	SiO2	27.1J	ND	185.93	12.48J	ND	ND	38.15J	ND	51J	ND	ND	ND	ND	ND	ND
P_20191024_92951_164	SiO2	23.42J	ND	152.62	9.86J	ND	ND	56.32J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191028_92951_176	SiO2	25.45J	ND	158.71	12.59J	ND	ND	71.12J	ND	ND	ND	ND	ND	ND	7.17J	ND
P_20191101_92951_305	SiO2	26.7J	ND	165.5	10.64J	ND	ND	68.48J	ND	36.19J	ND	ND	ND	ND	ND	ND
P_20191105_92951_319	SiO2	25.46J	ND	149.25	8.55J	ND	ND	78.51J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191106_92951_335	SiO2	23.43J	ND	166.13	12.1J	ND	ND	95.85J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191108_92951_352	SiO2	28.59J	ND	164.02	11.44J	ND	ND	75.31J	ND	ND	ND	ND	ND	ND	ND	ND
P_20191111_92951_371	SiO2	34.48J	ND	198.43	7.19J	ND	ND	70.28J	ND	55.84J	ND	ND	ND	ND	ND	ND
P_20191115_92951_387	SiO2	22.07J	ND	149.58	7.85J	ND	ND	89.22J	ND	40.69J	ND	ND	ND	ND	5.65J	ND
P_20191115_92951_400	SiO2	21.42J	ND	170.08	13.75J	ND	ND	74.74J	ND	48.52J	ND	ND	ND	ND	ND	ND
P_20200512_92951_511	SiO2	26.96J	ND	175.32	12.74J	ND	ND	88.05J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200513_92951_523	SiO2	30.05J	ND	182	9.31J	ND	ND	65.24J	ND	50.07J	ND	ND	ND	ND	ND	ND
P_20200514_92951_546	SiO2	24.27J	ND	156.1	ND	ND	ND	49.6J	ND	41.18J	ND	ND	ND	ND	ND	ND
P_20200514_92951_573	SiO2	25.83J	ND	165.79	12.83J	ND	ND	45.47J	ND	45.24J	ND	ND	ND	ND	5.4J	ND
P_20200519_92951_575	SiO2	24.61J	ND	145.85	10.04J	ND	ND	73.04J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200519_92951_599	SiO2	30.16J	ND	168.81	8.99J	ND	ND	67.58J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200526_92951_608	SiO2	23.16J	ND	154.87	10.14J	ND	ND	63.27J	ND	43.01J	ND	ND	ND	ND	ND	ND
P_20200528_92951_641	SiO2	14.6J	ND	77.22J	ND	ND	ND	58.86J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200529_92951_659	SiO2	ND	ND	55.78J	ND	ND	ND	47.1J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200601_92951_676	SiO2	10.88J	ND	50.31J	ND	ND	ND	43.77J	ND	32.83J	ND	ND	ND	ND	ND	ND
P_20200603_92951_707	SiO2	ND	ND	72.38J	ND	ND	ND	65.94J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200603_92951_760	SiO2	10.56J	ND	71.45J	ND	ND	ND	113.36J	ND	53.48J	ND	ND	ND	ND	ND	ND
P_20200604_92951_763	SiO2	18.35J	ND	99.48J	ND	ND	ND	90.97J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200610_92951_787	SiO2	12.04J	ND	83.99J	8.44J	ND	ND	61.49J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200624_92950_16	SiO2	ND	ND	ND	ND	ND	ND	130.04J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200624_92950_38	SiO2	ND	ND	ND	ND	ND	ND	145.22J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200629_92950_48	SiO2	ND	ND	ND	ND	ND	ND	97.77J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200629_92950_70	SiO2	ND	ND	ND	ND	ND	ND	127.06J	ND	ND	ND	ND	ND	ND	ND	ND
P_20200707_92951_03	SiO2	39.8	ND	235.57	12.44J	ND	ND	35.81J	ND	ND	ND	ND	ND	ND	8.63J	7.7J
P_20200709_92951_30	SiO2	36.08J	3.6J	217.04	13.24J	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.92J	ND
P_20200731_92950_90	SiO2	ND	ND	ND	ND	ND	ND	60.56J	ND	ND	ND	ND	ND	ND	ND	ND

Table 3
FPXRF Calibration Check Standards Results

Abbreviations:

mg/kg - milligram per kilogram

%R = percent recovery

ND = not detected

J = detected result is less than the reporting limit

Table 3. FPXRF Calibration Check Standards Results

Analysis Run ID	Sample Type	Antimony		Arsenic		Barium		Cadmium		Cobalt		Copper		Iron		Lead		Manganese		Mercury		Molybdenum		Nickel		Selenium		Silver		Zinc	
		Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R
P_20191023_92951_134	NIST 2709a	24.4J	N/A	10.82J	N/A	821.36	84%	ND	N/A	ND	N/A	33.94J	N/A	27590.74	82%	12.42J	72%	488.18	92%	ND	N/A	ND	N/A	45.26J	53%	ND	N/A	ND	N/A	93.09J	90%
P_20191023_92951_143	RCRA	21.71J	N/A	436.37	87%	775.48	N/A	474.99	95%	ND	N/A	18.78J	N/A	14241.57	N/A	463.77	93%	104.14J	N/A	ND	N/A	ND	N/A	ND	N/A	451.23	90%	462.44	92%	50.44J	N/A
P_20191023_92951_146	USGS SdAR-M2	104.01	97%	44.6J	N/A	884.99	89%	15.13J	N/A	ND	N/A	192.8	82%	13185.46	N/A	794.01	98%	746.85	N/A	ND	N/A	8.07J	61%	32.68J	N/A	ND	N/A	16.7J	N/A	687.72	90%
P_20191024_92951_157	RCRA	31.55J	N/A	446.91	89%	775.97	N/A	473.96	95%	ND	N/A	ND	N/A	14092.23	N/A	475.69	95%	125.2J	N/A	ND	N/A	ND	N/A	ND	N/A	448.84	90%	477.21	95%	47.42J	N/A
P_20191024_92951_162	NIST 2709a	31.85J	N/A	10.33J	N/A	825.36	84%	9.53J	N/A	ND	N/A	21.87J	N/A	27420.45	82%	13.98J	81%	486.63	92%	ND	N/A	ND	N/A	39.19J	46%	ND	N/A	ND	N/A	85.32J	83%
P_20191024_92951_165	USGS SdAR-M2	111.24	104%	63.52J	N/A	856.27	86%	14.48J	N/A	ND	N/A	197.35	84%	13019.11	N/A	761.86	94%	788.96	N/A	ND	N/A	7.59J	57%	28.72J	N/A	ND	N/A	20.39	N/A	660.44	87%
P_20191024_92951_174	RCRA	15.59J	N/A	436.78	87%	754.87	N/A	476.1	95%	ND	N/A	23.91J	N/A	14073.59	N/A	463.73	93%	120.07J	N/A	ND	N/A	ND	N/A	ND	N/A	458.9	92%	465.58	93%	44.57J	N/A
P_20191028_92951_177	USGS SdAR-M2	103.39	97%	57.51J	N/A	857.63	87%	11.37J	N/A	ND	N/A	203.19	86%	13608.15	N/A	809.89	100%	798.24	N/A	ND	N/A	8.95J	67%	44.93J	N/A	ND	N/A	20.37	N/A	728.47	96%
P_20191028_92951_199	NIST 2709a	22.6J	N/A	8.43J	N/A	788.06	80%	ND	N/A	ND	N/A	36.45J	N/A	28372.18	84%	13.02J	75%	490.74	93%	ND	N/A	ND	N/A	39.54J	47%	ND	N/A	ND	N/A	96.75J	94%
P_20191101_92951_306	NIST 2709a	29.08J	N/A	7.95J	N/A	826.18	84%	ND	N/A	ND	N/A	32.22J	N/A	28112.61	84%	20.81	120%	487.9	92%	ND	N/A	ND	N/A	39.57J	47%	ND	N/A	ND	N/A	98.4J	96%
P_20191101_92951_317	USGS SdAR-M2	105.4	99%	68.94J	N/A	879.11	89%	13.23J	N/A	ND	N/A	200.52	85%	12981.44	N/A	738.11	91%	789.5	N/A	ND	N/A	9.88J	74%	ND	N/A	ND	N/A	17.15J	N/A	676.77	89%
P_20191105_92951_320	RCRA	25.8J	N/A	434.51	87%	775.03	N/A	480.73	96%	ND	N/A	18.64J	N/A	14278.79	N/A	476.81	95%	139.46J	N/A	ND	N/A	ND	N/A	ND	N/A	445.38	89%	466.49	93%	55.79J	N/A
P_20191105_92951_333	NIST 2709a	26.05J	N/A	8.76J	N/A	775.9	79%	8.3J	N/A	ND	N/A	31.01J	N/A	27868.53	83%	13.39J	77%	453.73	86%	ND	N/A	ND	N/A	37.64J	44%	ND	N/A	ND	N/A	94.49J	92%
P_20191106_92951_336	USGS SdAR-M2	104.52	98%	78.58J	N/A	874.9	88%	13.12J	N/A	ND	N/A	182.6	77%	13237.74	N/A	762.44	94%	800.66	N/A	ND	N/A	7.21J	54%	ND	N/A	ND	N/A	20.03	N/A	681.67	90%
P_20191106_92951_350	NIST 2709a	29.05J	N/A	12.44J	N/A	808.74	83%	ND	N/A	ND	N/A	32.18J	N/A	28334.09	84%	13.89J	80%	510.74	97%	ND	N/A	ND	N/A	42.45J	50%	ND	N/A	ND	N/A	97.52J	95%
P_20191108_92951_353	USGS SdAR-M2	115.8	108%	85.87	N/A	882.52	89%	16.25J	N/A	ND	N/A	181.26	77%	13039.33	N/A	760.02	94%	769.94	N/A	ND	N/A	9.58J	72%	ND	N/A	ND	N/A	20.02	N/A	685.92	90%
P_20191108_92951_368	NIST 2709a	19.68J	N/A	8.41J	N/A	787.11	80%	ND	N/A	ND	N/A	ND	N/A	27391.79	82%	15.41J	89%	438.75	83%	ND	N/A	ND	N/A	41.37J	49%	ND	N/A	ND	N/A	88.87J	86%
P_20191111_92951_372	RCRA	26.56J	N/A	446.59	89%	790.17	N/A	489.05	98%	ND	N/A	23.1J	N/A	14338.38	N/A	459.27	92%	116.1J	N/A	ND	N/A	ND	N/A	ND	N/A	456.75	91%	465.76	93%	54.26J	N/A
P_20191111_92951_385	NIST 2709a	23.06J	N/A	7.24J	N/A	805.35	82%	ND	N/A	ND	N/A	32.27J	N/A	27703.79	82%	18.23	105%	451.37	85%	ND	N/A	ND	N/A	46.19J	54%	ND	N/A	ND	N/A	88.72J	86%
P_20191115_92951_388	RCRA	24.95J	N/A	424.91	85%	756.54	N/A	480.37	96%	ND	N/A	ND	N/A	14424.9	N/A	458.73	92%	115.45J	N/A	ND	N/A	ND	N/A	ND	N/A	448.73	90%	458.4	92%	49.4J	N/A
P_20191115_92951_398	USGS SdAR-M2	104.9	98%	77.21J	N/A	891.56	90%	17.26J	N/A	ND	N/A	186.03	79%	13629.36	N/A	788.9	98%	778.91	N/A	ND	N/A	9.65J	73%	29.68J	N/A	ND	N/A	17.5J	N/A	738.66	97%
P_20191115_92951_401	NIST 2709a	20.58J	N/A	8.92J	N/A	800	82%	ND	N/A	ND	N/A	31.46J	N/A	27207.11	81%	11.1J	64%	456.53	86%	ND	N/A	ND	N/A	48.02J	56%	ND	N/A	ND	N/A	91.99J	89%
P_20191115_92951_416	RCRA	27.96J	N/A	429.05	86%	795.06	N/A	493.54	99%	ND	N/A	ND	N/A	14491.25	N/A	461.04	92%	127.24J	N/A	ND	N/A	ND	N/A	ND	N/A	451.76	90%	482.44	96%	50.3J	N/A
P_20200512_92951_512	NIST 2709a	27.4J	N/A	8.44J	N/A	825.49	84%	8.88J	N/A	ND	N/A	32.44J	N/A	27846.77	83%	13.63J	79%	410.06	78%	ND	N/A	ND	N/A	46.89J	55%	ND	N/A	ND	N/A	96.47J	94%
P_20200512_92951_521	USGS SdAR-M2	95.91	90%	96.84	N/A	823.15	83%	12.06J	N/A	ND	N/A	190.44	81%	13214.29	N/A	737.27	91%	803.93	N/A	ND	N/A	6.45J	48%	38.94J	N/A	ND	N/A	16.69J	N/A	665.79	88%
P_20200513_92951_524	RCRA	43.18	N/A	417.26	83%	781.71	N/A	486	97%	ND	N/A	ND	N/A	14074.03	N/A	481.6	96%	162.59	N/A	ND	N/A	ND	N/A	ND	N/A	450.83	90%	484.99	97%	48.06J	N/A
P_20200513_92951_544	NIST 2709a	35.43J	N/A	9.07J	N/A	834.4	85%	10.3J	N/A	ND	N/A	20.11J	N/A	28113.55	84%	15.88J	92%	498.76	94%	ND	N/A	ND	N/A	ND	0%	ND	N/A	ND	N/A	96.95J	94%
P_20200514_92951_547	USGS SdAR-M2	114.32	107%	59.14J	N/A	929.57	94%	14.06J	N/A	ND	N/A	211.6	90%	13435.54	N/A	805.74	100%	849.68	N/A	ND	N/A	10.13J	76%	30.61J	N/A	ND	N/A	18.38	N/A	716.91	94%
P_20200514_92951_568	RCRA	23.71J	N/A	452.44	90%	768.67	N/A	484.16	97%	ND	N/A	23.42J	N/A	14451.98	N/A	472.08	94%	170.13	N/A	ND	N/A	ND	N/A	ND	N/A	465.97	93%	473.49	95%	46.09J	N/A
P_20200519_92951_576	NIST 2709a	31.92J	N/A	6.96J	N/A	865.19	88%	8.63J	N/A	ND	N/A	ND	N/A	27451.93	82%	16.02J	93%	402.74	76%	ND	N/A	ND	N/A	46.4J	55%	ND	N/A	ND	N/A	95.61J	93%
P_20200519_92951_596	USGS SdAR-M2	110	103%	77.85J	N/A	929.5	94%	14.49J	N/A	ND	N/A	202.67	86%	13004.36	N/A	743.46	92%	797.34	N/A	ND	N/A	5.43J	41%	ND	N/A	ND	N/A	20.25	N/A	690.07	91%
P_20200519_92951_606	USGS SdAR-M2	102.8	96%	61.21J	N/A	887.93	90%	15.86J	N/A	ND	N/A	200.05	85%	13329.16	N/A	770.82	95%	780.41	N/A	ND	N/A	6.73J	51%	38.57J	N/A	ND	N/A	14.6J	N/A	699.8	92%
P_20200526_92951_609	RCRA	35.91J	N/A	414.09	83%	826.55	N/A	486.2	97%	ND	N/A	19.69J	N/A	14529.53	N/A	460.87	92%	144.32J	N/A	ND	N/A	ND	N/A	ND	N/A	436.83	87%	473.23	95%	46.37J	N/A
P_20200526_92951_629	NIST 2709a	28.95J	N/A	10.48J	N/A	746.53	76%	8.25J	N/A	ND	N/A	ND	N/A	28137.64	84%	13.62J	79%	478.41	90%	ND	N/A	ND	N/A	36.92J	43%	ND	N/A	ND	N/A	92.38J	90%
P_20200526_92951_639	USGS SdAR-M2	103.36	97%	69.44J	N/A	853.16	86%	ND	N/A	ND	N/A	199.05	84%	13192.83	N/A	788.76	98%	865.72	N/A	ND	N/A	9.44J	71%	ND	N/A	ND	N/A	18.99	N/A	713.57	94%
P_20200528_92951_642	RCRA	30.62J	N/A	419.1	84%	769.77	N/A	479.35	96%	123.9J	N/A	20.57J	N/A	13659.71	N/A	466.91	93%	124.91J	N/A	ND	N/A	ND	N/A	ND	N/A	448.71	90%	474.32	95%	42.19J	N/A
P_20200528_92951_657	NIST 2709a	27.5J	N/A	9.63J	N/A	810.93	83%	8.28J	N/A	ND	N/A	28.24J	N/A	28006.86	83%	17.76	103%	473.35	89%	ND	N/A	ND	N/A	36.48J	43%	ND	N/A	ND	N/A	89.06J	86%
P_20200529_92951_660	USGS SdAR-M2	107.2	100%	55.32J	N/A	872.4	88%	12.04J	N/A	ND	N/A	193.7	82%	13530.52	N/A	803.17	99%	780.01	N/A	ND	N/A	10.38J	78%	29.72J	N/A	ND	N/A	19.04	N/A	725.48	95%
P_20200529_92951_674	RCRA	24.49J	N/A	431.03	86%	767.03	N/A	463.32	93%	ND	N/A	22.4J	N/A	14551.03	N/A	470.39	94%	142.06J	N/A	ND	N/A	ND	N/A	ND	N/A	451.44	90%	447.91	90%	50.56J	N/A
P_20200601_92951_677	NIST 2709a	27.93J	N/A	8.88J	N/A	828.34	85%	ND	N/A	ND	N/A	24.24J	N/A	27196.36	81%	13.84J	80%	474.39	90%	ND	N/A	ND	N/A	50.52J	59%	ND	N/A	ND	N/A	90.47J	88%
P_20200601_92951_701	USGS SdAR-M2	106.94	100%	63.7J	N/A	888.67	90%	ND	N/A	ND	N/A	214.49	91%	13789.1	N/A	803.77	99%	831.55	N/A	ND	N/A	8.42J	63%	47.07J	N/A	ND	N/A	12.65J	N/A	718.07	94%
P_20200603_92951_708	USGS SdAR-M2	112.87	105%	62.38J	N/A	893.51	90%	13.62J	N/A	ND	N/A	188.78	80%	13288.94	N/A	749.83	93%	775.56	N/A	ND	N/A	9.48J	71%	ND	N/A	ND	N/A	21.2	N/A	679.2	89%
P_20200603_92951_731	RCRA	19.89J	N/A	437.31	87%	766.35	N/A	488.43	98%	ND	N/A	ND	N/A	13913.66	N/A	461.22	92%	152.11	N/A	ND	N/A	ND	N/A	ND	N/A	444.96	89%	490.22	98%	48.8J	N/A

Table 3. FPXRF Calibration Check Standards Results

Analysis Run ID	Sample Type	Antimony		Arsenic		Barium		Cadmium		Cobalt		Copper		Iron		Lead		Manganese		Mercury		Molybdenum		Nickel		Selenium		Silver		Zinc	
		Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R
P_20200603_92951_761	RCRA	37.35	N/A	439.79	88%	777.32	N/A	479.08	96%	ND	N/A	19.07J	N/A	13885.54	N/A	474.73	95%	152.18	N/A	ND	N/A	ND	N/A	ND	N/A	457.86	92%	474.97	95%	49.72J	N/A
P_20200604_92951_764	NIST 2709a	30.31J	N/A	6.3J	N/A	782.83	80%	ND	N/A	ND	N/A	28.3J	N/A	28015.26	83%	16.79J	97%	500.38	95%	ND	N/A	ND	N/A	37.88J	45%	ND	N/A	ND	N/A	99.46J	97%
P_20200604_92951_784	RCRA	34.09J	N/A	434.44	87%	782.22	N/A	496.45	99%	ND	N/A	ND	N/A	13882.5	N/A	448.98	90%	127.17J	N/A	ND	N/A	ND	N/A	ND	N/A	438.58	88%	489.55	98%	52.85J	N/A
P_20200610_92951_788	RCRA	38.64	N/A	417.78	84%	809.68	N/A	505.8	101%	ND	N/A	ND	N/A	13731.27	N/A	488.26	98%	147.24	N/A	ND	N/A	ND	N/A	ND	N/A	436.89	87%	479.56	96%	51.37J	N/A
P_20200610_92951_807	NIST 2709a	24.37J	N/A	8.75J	N/A	804.29	82%	10.18J	N/A	ND	N/A	27.76J	N/A	27860.45	83%	18.99	110%	456.46	86%	ND	N/A	ND	N/A	48.69J	57%	ND	N/A	ND	N/A	102.13J	99%
P_20200624_92950_17	NIST 2709a	ND	N/A	8.52J	N/A	823.09	84%	ND	N/A	ND	N/A	ND	N/A	26781.59	80%	18.87J	109%	430.8	81%	ND	N/A	ND	N/A	78.41J	92%	ND	N/A	ND	N/A	98.28	95%
P_20200624_92950_39	USGS SdAR-M2	85.7	80%	71.96J	N/A	927.9	94%	ND	N/A	ND	N/A	202.59J	86%	13049.59	N/A	800.58	99%	771.18	N/A	ND	N/A	9.09J	68%	57.19J	N/A	ND	N/A	13.18J	N/A	692.45	91%
P_20200629_92950_49	NIST 2709a	ND	N/A	10.82J	N/A	849.76	87%	ND	N/A	ND	N/A	23.98J	N/A	26960.84	80%	17.31J	100%	472.48	89%	ND	N/A	ND	N/A	72.78J	86%	ND	N/A	ND	N/A	93.11	90%
P_20200629_92950_71	USGS SdAR-M2	81.7	76%	83.11	N/A	894.88	90%	ND	N/A	ND	N/A	212.57J	90%	12816.34	N/A	799.44	99%	792.52	N/A	ND	N/A	13.93J	105%	ND	N/A	4.49J	N/A	12.12J	N/A	690.75	91%
P_20200707_92951_04	USGS SdAR-M2	119.27	111%	68.79J	N/A	881.29	89%	18.95J	N/A	ND	N/A	215.26	91%	13460.26	N/A	808.96	100%	788	N/A	ND	N/A	ND	0%	33.58J	N/A	ND	N/A	21.41	N/A	718.28	95%
P_20200707_92951_05	RCRA	43.61	N/A	466.62	93%	758.31	N/A	446.18	89%	ND	N/A	24.81J	N/A	14311.46	N/A	485.43	97%	ND	N/A	ND	N/A	ND	N/A	ND	N/A	500.89	100%	438.78	88%	48.24J	N/A
P_20200707_92951_28	NIST 2709a	53.89	N/A	12.2J	N/A	839.15	86%	13.89J	N/A	ND	N/A	29.92J	N/A	26508.74	79%	12.95J	75%	388.48	73%	ND	N/A	ND	N/A	51.62J	61%	ND	N/A	8.02J	N/A	87.36J	85%
P_20200709_92951_31	RCRA	46.62	N/A	468.57	94%	786.58	N/A	457.49	91%	ND	N/A	25.57J	N/A	14607.35	N/A	468.55	94%	76.99J	N/A	ND	N/A	ND	N/A	25.58J	N/A	506.18	101%	460.77	92%	46.37J	N/A
P_20200731_92950_92	NIST 2709a	ND	N/A	8.68J	N/A	753.53	77%	ND	N/A	ND	N/A	ND	N/A	26336.62	78%	17.48J	101%	416.62	79%	ND	N/A	ND	N/A	62.6J	74%	ND	N/A	ND	N/A	81.01	79%

Table 4
FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results

Abbreviations:
mg/kg - milligram per kilogram
RPD = relative percent differnce
ND = not detected
J = detected result is less than the reporting limit

Table 4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results

Sample Type	Analysis Run ID	Sample Name	Parent Sample	Antimony		Arsenic		Barium		Cadmium		Cobalt		Copper		Iron		Lead		Manganese	
				Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20191023_92951_140	WS19-0003-SO5032-N-102319		30.84J		12.72J		781.56		ND		ND		57.22J		13731.89		61.88		1327.8	
XRF Replicate	P_20191023_92951_141	WS19-0003-SO5032-N-102319-R	WS19-0003-SO5032-N-102319	21.65J	35%	14.5J	13%	748.35	4%	8.76J	N/A	ND	N/A	62.4J	9%	13957.7	2%	65.57	6%	1332.34	0%
XRF Duplicate	P_20191023_92951_142	WS19-0003-SO5032-N-102319-D	WS19-0003-SO5032-N-102319	17.94J	53%	22.71J	56%	694.21	12%	ND	N/A	ND	N/A	74.26	26%	14405.11	5%	62.05	0%	1713.35	25%
Natural	P_20191024_92951_171	WS19-0040-SO5062-N-102419		29.29J		124.57		538.57		ND		ND		92.21		43310.85		825.34		27301.57	
XRF Replicate	P_20191024_92951_172	WS19-0040-SO5062-N-102419-R	WS19-0040-SO5062-N-102419	34.45J	16%	129.06	4%	571.94	6%	ND	N/A	ND	N/A	91.33	1%	43588.93	1%	834.47	1%	27530.36	1%
XRF Duplicate	P_20191024_92951_173	WS19-0040-SO5062-N-102419-D	WS19-0040-SO5062-N-102419	15.62J	61%	131.48	5%	571.01	6%	12.78J	N/A	ND	N/A	98.43	7%	35678.51	19%	868.94	5%	30311.83	10%
Natural	P_20191028_92951_196	WS19-0043-SO5094-N-102819		26.6J		66.87J		578.93		ND		ND		101.29		33088.44		268.41		21981.76	
XRF Replicate	P_20191028_92951_197	WS19-0043-SO5094-N-102819-R	WS19-0043-SO5094-N-102819	33.48J	23%	81.09J	19%	619.97	7%	ND	N/A	ND	N/A	89.3	13%	32809.95	1%	260.44	3%	22137.2	1%
XRF Duplicate	P_20191028_92951_198	WS19-0043-SO5094-N-102819-D	WS19-0043-SO5094-N-102819	33.09J	22%	80.13J	18%	585.23	1%	ND	N/A	ND	N/A	117.16	15%	34177.11	3%	296.52	10%	24128.06	9%
Natural	P_20191101_92951_314	WS19-0041-SO5116-N-103119		30.71J		61.92J		612.83		13.32J		ND		21.96J		29755.43		359.15		33685.67	
XRF Replicate	P_20191101_92951_315	WS19-0041-SO5116-N-103119-R	WS19-0041-SO5116-N-103119	36.51J	17%	62.67J	1%	641.78	5%	8.69J	42%	ND	N/A	37.05J	51%	29920.84	1%	363.48	1%	34647.95	3%
XRF Duplicate	P_20191101_92951_316	WS19-0041-SO5116-N-103119-D	WS19-0041-SO5116-N-103119	21.73J	34%	67.1J	8%	563.67	8%	ND	N/A	ND	N/A	33.68J	42%	30391.56	2%	359.25	0%	28750.61	16%
Natural	P_20191105_92951_330	WS19-0037-SO5138-N-110419		20.36J		98.48		749.9		9.17J		ND		ND		35257.91		688.91		32641.65	
XRF Replicate	P_20191105_92951_331	WS19-0037-SO5138-N-110419-R	WS19-0037-SO5138-N-110419	18.11J	12%	79.26J	22%	761.56	2%	ND	N/A	ND	N/A	ND	N/A	34620.9	2%	679.04	1%	32245.07	1%
XRF Duplicate	P_20191105_92951_332	WS19-0037-SO5138-N-110419-D	WS19-0037-SO5138-N-110419	24.45J	18%	67.85J	37%	524.19	35%	ND	N/A	ND	N/A	ND	N/A	31841.12	10%	748.26	8%	31157.44	5%
Natural	P_20191106_92951_347	WS19-0010-SO5171-N-110519		16.69J		113.83		666.5		17.33J		ND		170.81		40580.63		2089.88		25012.1	
XRF Replicate	P_20191106_92951_348	WS19-0010-SO5171-N-110519-R	WS19-0010-SO5171-N-110519	ND	N/A	104.97	8%	607.32	9%	9.96J	54%	ND	N/A	172.19	1%	40948.03	1%	2114.13	1%	24873.03	1%
XRF Duplicate	P_20191106_92951_349	WS19-0010-SO5171-N-110519-D	WS19-0010-SO5171-N-110519	25.49J	42%	146.88	25%	666.11	0%	21.87J	23%	ND	N/A	149.17	14%	40890.09	1%	1797.03	15%	24311.64	3%
Natural	P_20191108_92951_358	WS19-0010-SO5174-N-110719		27.97J		301.67		458.51		34.67		ND		76.21		57102.39		5536.26		80283.64	
Field Duplicate	P_20191108_92951_359	WS19-0010-SO5174-D-110719	WS19-0010-SO5174-N-110719	ND	N/A	280.5	7%	293.05	44%	20.94J	49%	ND	N/A	52.52J	37%	51164.69	11%	4222.83	27%	68970.91	15%
Natural	P_20191108_92951_365	WS19-0010-SO5185-N-110719		21.7J		126.29		560.85		11.4J		ND		45.37J		39139.91		748.49		11890.6	
XRF Replicate	P_20191108_92951_366	WS19-0010-SO5185-N-110719-R	WS19-0010-SO5185-N-110719	15.04J	36%	113.44	11%	556.7	1%	13.11J	14%	ND	N/A	40.37J	12%	39897.9	2%	763.08	2%	12064.72	1%
XRF Duplicate	P_20191108_92951_367	WS19-0010SO5185-N-110719-D	WS19-0010-SO5185-N-110719	15.85J	31%	130.56	3%	555.58	1%	11.08J	3%	ND	N/A	51.68J	13%	44805.36	14%	979.36	27%	12578.61	6%
Natural	P_20191111_92951_382	WS19-0015-SO5204-N-110819		27.29J		141.51		691.54		ND		ND		57.28J		28266.7		3648.92		2333.1	
XRF Replicate	P_20191111_92951_383	WS19-0015-SO5204-N-110819-R	WS19-0015-SO5204-N-110819	40.96	40%	131.9	7%	709.19	3%	10.23J	N/A	ND	N/A	67.16J	16%	28882.73	2%	3660.81	0%	2502.46	7%
XRF Duplicate	P_20191111_92951_384	WS19-0015-SO5204-N-110819-D	WS19-0015-SO5204-N-110819	31.7J	15%	143.37	1%	690.14	0%	9.53J	N/A	ND	N/A	54.03J	6%	27982.45	1%	3534.24	3%	2389.73	2%
Natural	P_20191115_92951_395	WS19-0292-SO5214-N-111319		12.87J		15.4J		825.53		ND		ND		72.05		13525.83		82.63		350.87	
XRF Replicate	P_20191115_92951_396	WS19-0292-SO5214-N-111319-R	WS19-0292-SO5214-N-111319	17.23J	29%	15.01J	3%	827.94	0%	ND	N/A	ND	N/A	68.97J	4%	13528.41	0%	79.53	4%	350.44	0%
XRF Duplicate	P_20191115_92951_397	WS19-0292-SO5214-N-111319-D	WS19-0292-SO5214-N-111319	21.11J	49%	19.14J	22%	776.73	6%	ND	N/A	ND	N/A	70.9	2%	13304.43	2%	74.64	10%	403	14%
Natural	P_20191115_92951_413	WS19-0286-SO5236-N-111519		27.69J		28.59J		500.43		ND		ND		ND		41016.53		15.91J		1790.25	
XRF Replicate	P_20191115_92951_414	WS19-0286-SO5236-N-111519-R	WS19-0286-SO5236-N-111519	22.34J	21%	25.68J	11%	518.35	4%	ND	N/A	ND	N/A	28.28J	N/A	41030.88	0%	12.28J	26%	1813.92	1%
XRF Duplicate	P_20191115_92951_415	WS19-0286-SO5236-N-111519-D	WS19-0286-SO5236-N-111519	27.88J	1%	25.43J	12%	521.38	4%	ND	N/A	ND	N/A	20.78J	N/A	41060.77	0%	12.93J	21%	1737.83	3%
Natural	P_20200512_92951_518	20WS-0297-SO5244-N-051220		27.05J		49.16J		290.44		ND		ND		28.98J		9301.93		1614.9		5381.2	
XRF Replicate	P_20200512_92951_519	20WS-0297-SO5244-N-051220-R	20WS-0297-SO5244-N-051220	30.71J	13%	ND	N/A	313.53	8%	15.69J	N/A	ND	N/A	29.61J	2%	9301.25	0%	1651.04	2%	5508.94	2%
XRF Duplicate	P_20200512_92951_520	20WS-0297-SO5244-N-051220-D	20WS-0297-SO5244-N-051220	14.67J	59%	ND	N/A	226.07	25%	9.11J	N/A	ND	N/A	34.02J	16%	8538.34	9%	1569.29	3%	5126.75	5%
Natural	P_20200513_92951_538	20WS-0300-SO5265-N-051220		27.2J		556.39		260.46		ND		ND		72.96		17059.76		1939.02		19590.51	
XRF Replicate	P_20200513_92951_539	20WS-0300-SO5265-N-051220-R	20WS-0300-SO5265-N-051220	28.89J	6%	538.5	3%	230.76	12%	8.93J	N/A	ND	N/A	80.6	10%	17196.21	1%	1926.46	1%	20222.83	3%
Natural	P_20200513_92951_540	20WS-0300-SO5266-N-051220		32.33J		205.36		285.91		13.48J		ND		51.86J		7106.17		1780.17		1912.67	
XRF Duplicate	P_20200513_92951_541	20WS-0300-SO5266-N-051220-D	20WS-0300-SO5266-N-051220	39.69	20%	192.33	7%	297.71	4%	ND	N/A	ND	N/A	43.78J	17%	7146.17	1%	1748.02	2%	1301.65	38%
Natural	P_20200514_92951_565	20WS-0285-SO5324-N-051420		15.76J		496.41		160.1		33.97		ND		175.73		79174.59		11354.59		125012.48	
XRF Replicate	P_20200514_92951_566	20WS-0285-SO5324-N-051420-R	20WS-0285-SO5324-N-051420	23.27J	38%	619.78	22%	191.32	18%	32.01	6%	ND	N/A	205.55	16%	81032.56	2%	11722.12	3%	129457.8	3%
XRF Duplicate	P_20200514_92951_567	20WS-0285-SO5324-N-051420-D	20WS-0285-SO5324-N-051420	32.99J	71%	619.65	22%	264.57	49%	38.16	12%	ND	N/A	179.26	2%	97876.7	21%	12350.56	8%	148489.83	17%
Natural	P_20200519_92951_593	20WS-0246-SO5384-N-051820		25.42J		165.43		564.21		ND		ND		39.08J		39009.5		622.86		16098.93	
XRF Replicate	P_20200519_92951_594	20WS-0246-SO5384-N-051820-R	20WS-0246-SO5384-N-051820	20.49J	21%	140.07	17%	522.66	8%	ND	N/A	ND	N/A	52.54J	29%	39278.25	1%	638.23	2%	16302.39	1%
XRF Duplicate	P_20200519_92951_595	20WS-0246-SO5384-N-051820-D	20WS-0246-SO5384-N-051820	18.77J	30%	113.5	37%	654.78	15%	ND	N/A	ND	N/A	48.86J	22%	33119.36	16%	366.85	52%	12466.74	25%
Natural	P_20200526_92951_618	20WS-0315-SO5480-N-052620		ND		29.98J		375.95		ND		ND		74.74		10814.83		105.23		2338.22	
XRF Replicate	P_20200526_92951_619	20WS-0315-SO5480-N-052620-R	20WS-0315-SO5480-N-052620	13.37J	N/A	34.07J	13%	310.07	19%	ND	N/A	ND	N/A	74.49	0%	10959.27	1%	109.08	4%	2472.11	6%

Table 4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results

Sample Type	Analysis Run ID	Sample Name	Parent Sample	Mercury		Molybdenum		Nickel		Selenium		Silver		Zinc	
				Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20191023_92951_140	WS19-0003-SO5032-N-102319		ND		ND		ND		ND		ND		110.48J	
XRF Replicate	P_20191023_92951_141	WS19-0003-SO5032-N-102319-R	WS19-0003-SO5032-N-102319	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	122.66	10%
XRF Duplicate	P_20191023_92951_142	WS19-0003-SO5032-N-102319-D	WS19-0003-SO5032-N-102319	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	148.24	29%
Natural	P_20191024_92951_171	WS19-0040-SO5062-N-102419		ND		ND		46.09J		ND		33.19		1356.95	
XRF Replicate	P_20191024_92951_172	WS19-0040-SO5062-N-102419-R	WS19-0040-SO5062-N-102419	ND	N/A	ND	N/A	53.37J	15%	ND	N/A	40.24	19%	1386.63	2%
XRF Duplicate	P_20191024_92951_173	WS19-0040-SO5062-N-102419-D	WS19-0040-SO5062-N-102419	ND	N/A	ND	N/A	35.65J	26%	ND	N/A	37.72	13%	2625.06	64%
Natural	P_20191028_92951_196	WS19-0043-SO5094-N-102819		ND		ND		ND		ND		38.06		600.03	
XRF Replicate	P_20191028_92951_197	WS19-0043-SO5094-N-102819-R	WS19-0043-SO5094-N-102819	ND	N/A	ND	N/A	35.18J	N/A	ND	N/A	43.44	13%	624.93	4%
XRF Duplicate	P_20191028_92951_198	WS19-0043-SO5094-N-102819-D	WS19-0043-SO5094-N-102819	ND	N/A	ND	N/A	ND	N/A	ND	N/A	36.91	3%	638.58	6%
Natural	P_20191101_92951_314	WS19-0041-SO5116-N-103119		ND		ND		42.07J		ND		ND		1247.54	
XRF Replicate	P_20191101_92951_315	WS19-0041-SO5116-N-103119-R	WS19-0041-SO5116-N-103119	ND	N/A	ND	N/A	49.82J	17%	ND	N/A	8.91J	N/A	1210.1	3%
XRF Duplicate	P_20191101_92951_316	WS19-0041-SO5116-N-103119-D	WS19-0041-SO5116-N-103119	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	1054.42	17%
Natural	P_20191105_92951_330	WS19-0037-SO5138-N-110419		ND		ND		43.68J		ND		44.93		803.42	
XRF Replicate	P_20191105_92951_331	WS19-0037-SO5138-N-110419-R	WS19-0037-SO5138-N-110419	ND	N/A	ND	N/A	ND	N/A	ND	N/A	45.52	1%	761.74	5%
XRF Duplicate	P_20191105_92951_332	WS19-0037-SO5138-N-110419-D	WS19-0037-SO5138-N-110419	ND	N/A	ND	N/A	ND	N/A	ND	N/A	27.99	46%	977.94	20%
Natural	P_20191106_92951_347	WS19-0010-SO5171-N-110519		ND		ND		ND		ND		36.15		2488.73	
XRF Replicate	P_20191106_92951_348	WS19-0010-SO5171-N-110519-R	WS19-0010-SO5171-N-110519	ND	N/A	ND	N/A	34.29J	N/A	ND	N/A	39.13	8%	2524.98	1%
XRF Duplicate	P_20191106_92951_349	WS19-0010-SO5171-N-110519-D	WS19-0010-SO5171-N-110519	ND	N/A	ND	N/A	55J	N/A	ND	N/A	24.14	40%	2055.59	19%
Natural	P_20191108_92951_358	WS19-0010-SO5174-N-110719		ND		15.6		50.69J		ND		21.69		7982.14	
Field Duplicate	P_20191108_92951_359	WS19-0010-SO5174-D-110719	WS19-0010-SO5174-N-110719	ND	N/A	18.61	18%	70.8J	33%	12.44J	N/A	24.71	13%	6998.41	13%
Natural	P_20191108_92951_365	WS19-0010-SO5185-N-110719		ND		ND		ND		ND		23.03		663.26	
XRF Replicate	P_20191108_92951_366	WS19-0010-SO5185-N-110719-R	WS19-0010-SO5185-N-110719	ND	N/A	ND	N/A	ND	N/A	ND	N/A	25.55	10%	690.17	4%
XRF Duplicate	P_20191108_92951_367	WS19-0010-SO5185-N-110719-D	WS19-0010-SO5185-N-110719	ND	N/A	ND	N/A	ND	N/A	ND	N/A	26.87	15%	750.05	12%
Natural	P_20191111_92951_382	WS19-0015-SO5204-N-110819		ND		ND		ND		ND		21		2656.48	
XRF Replicate	P_20191111_92951_383	WS19-0015-SO5204-N-110819-R	WS19-0015-SO5204-N-110819	ND	N/A	ND	N/A	ND	N/A	ND	N/A	24.6	16%	2708.72	2%
XRF Duplicate	P_20191111_92951_384	WS19-0015-SO5204-N-110819-D	WS19-0015-SO5204-N-110819	ND	N/A	ND	N/A	ND	N/A	ND	N/A	26.19	22%	3769.35	35%
Natural	P_20191115_92951_395	WS19-0292-SO5214-N-111319		ND		ND		ND		ND		ND		85.56J	
XRF Replicate	P_20191115_92951_396	WS19-0292-SO5214-N-111319-R	WS19-0292-SO5214-N-111319	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	89.16J	4%
XRF Duplicate	P_20191115_92951_397	WS19-0292-SO5214-N-111319-D	WS19-0292-SO5214-N-111319	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	89.61J	5%
Natural	P_20191115_92951_413	WS19-0286-SO5236-N-111519		ND		ND		ND		ND		ND		95.17J	
XRF Replicate	P_20191115_92951_414	WS19-0286-SO5236-N-111519-R	WS19-0286-SO5236-N-111519	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	91.62J	4%
XRF Duplicate	P_20191115_92951_415	WS19-0286-SO5236-N-111519-D	WS19-0286-SO5236-N-111519	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	98.13J	3%
Natural	P_20200512_92951_518	20WS-0297-SO5244-N-051220		ND		ND		ND		ND		49.62		3225.87	
XRF Replicate	P_20200512_92951_519	20WS-0297-SO5244-N-051220-R	20WS-0297-SO5244-N-051220	ND	N/A	4.81J	N/A	ND	N/A	ND	N/A	49.34	1%	3212.66	0%
XRF Duplicate	P_20200512_92951_520	20WS-0297-SO5244-N-051220-D	20WS-0297-SO5244-N-051220	ND	N/A	ND	N/A	ND	N/A	ND	N/A	41.64	17%	2637.02	20%
Natural	P_20200513_92951_538	20WS-0300-SO5265-N-051220		ND		30.35		ND		7.48J		79.54		854.59	
XRF Replicate	P_20200513_92951_539	20WS-0300-SO5265-N-051220-R	20WS-0300-SO5265-N-051220	ND	N/A	29.86	2%	ND	N/A	ND	N/A	79.57	0%	814.25	5%
Natural	P_20200513_92951_540	20WS-0300-SO5266-N-051220		ND		6.01J		ND		ND		61.16		775.23	
XRF Duplicate	P_20200513_92951_541	20WS-0300-SO5266-N-051220-D	20WS-0300-SO5266-N-051220	ND	N/A	6.83J	13%	ND	N/A	ND	N/A	54.02	12%	762.67	2%
Natural	P_20200514_92951_565	20WS-0285-SO5324-N-051420		ND		ND		170.75		ND		108.4		17582.62	
XRF Replicate	P_20200514_92951_566	20WS-0285-SO5324-N-051420-R	20WS-0285-SO5324-N-051420	ND	N/A	11.79J	N/A	168.21	2%	ND	N/A	109.26	1%	17560.14	0%
XRF Duplicate	P_20200514_92951_567	20WS-0285-SO5324-N-051420-D	20WS-0285-SO5324-N-051420	ND	N/A	18.06	N/A	199.67	16%	ND	N/A	140.66	26%	18712.51	6%
Natural	P_20200519_92951_593	20WS-0246-SO5384-N-051820		ND		ND		38.19J		ND		50.93		663.97	
XRF Replicate	P_20200519_92951_594	20WS-0246-SO5384-N-051820-R	20WS-0246-SO5384-N-051820	ND	N/A	ND	N/A	ND	N/A	ND	N/A	46.78	8%	629.42	5%
XRF Duplicate	P_20200519_92951_595	20WS-0246-SO5384-N-051820-D	20WS-0246-SO5384-N-051820	ND	N/A	ND	N/A	ND	N/A	ND	N/A	21.07	83%	504.35	27%
Natural	P_20200526_92951_618	20WS-0315-SO5480-N-052620		ND		ND		ND		ND		ND		145.32	
XRF Replicate	P_20200526_92951_619	20WS-0315-SO5480-N-052620-R	20WS-0315-SO5480-N-052620	ND	N/A	ND	N/A	ND	N/A	ND	N/A	12.25J	N/A	145.94	0%

Table 4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results

Sample Type	Analysis Run ID	Sample Name	Parent Sample	Antimony		Arsenic		Barium		Cadmium		Cobalt		Copper		Iron		Lead		Manganese	
				Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20200526_92951_626	20WS-0306-SO5421-N-052020		11.49J		46.57J		188.04		ND		ND		62.4J		4633.81		32.61		331.92	
XRF Replicate	P_20200526_92951_627	20WS-0306-SO5421-N-052020-R	20WS-0306-SO5421-N-052020	18.93J	49%	45.92J	1%	210.2	11%	ND	N/A	ND	N/A	52.99J	16%	4632.13	0%	31.63	3%	326.6	2%
Natural	P_20200526_92951_630	20WS-0016-SO5426-N-052120		49.85		411.88		700.04		15.61J		ND		370.79		32065.85		17271.25		4437.81	
XRF Duplicate	P_20200526_92951_631	20WS-0016-SO5426-N-052120-D	20WS-0016-SO5426-N-052120	35.37J	34%	384.39	7%	608.14	14%	14.3J	9%	ND	N/A	379.94	2%	32646.98	2%	14804.55	15%	4382.36	1%
Natural	P_20200528_92951_654	20WS-0320-SO5527-N-052720		14.97J		44.31J		221.54		ND		ND		61.05J		5514.07		54.17		3903.43	
XRF Replicate	P_20200528_92951_655	20WS-0320-SO5527-N-052720-R	20WS-0320-SO5527-N-052720	16.88J	12%	42.6J	4%	219.72	1%	ND	N/A	ND	N/A	47.65J	25%	5559.27	1%	55.03	2%	3997.02	2%
XRF Duplicate	P_20200528_92951_656	20WS-0320-SO5527-N-052720-D	20WS-0320-SO5527-N-052720	18.45J	21%	37.68J	16%	244.98	10%	ND	N/A	ND	N/A	72.03	17%	6196.82	12%	48.28	12%	4290.56	9%
Natural	P_20200601_92951_686	20WS-0301-SO5579-N-052920		15.55J		22.5J		431.02		8.2J		ND		35.32J		16278.84		331.95		821.72	
XRF Replicate	P_20200601_92951_687	20WS-0301-SO5579-N-052920-R	20WS-0301-SO5579-N-052920	21.49J	32%	22.53J	0%	472.48	9%	ND	N/A	ND	N/A	41.52J	16%	16887.92	4%	335.58	1%	805.77	2%
XRF Duplicate	P_20200601_92951_688	20WS-0301-SO5579-N-052920-D	20WS-0301-SO5579-N-052920	13.77J	12%	30.85J	31%	441.8	2%	ND	N/A	ND	N/A	44.72J	23%	14905.85	9%	373.69	12%	828.08	1%
Natural	P_20200603_92951_727	20WS-0130-SO5731-N-060220		ND		22.93J		601.47		ND		ND		458.65		39643.02		146.65		2069.37	
XRF Duplicate	P_20200603_92951_728	20WS-0130-SO5731-N-060220-D	20WS-0130-SO5731-N-060220	ND	N/A	23.41J	2%	515.66	15%	ND	N/A	ND	N/A	504.93	10%	33225.52	18%	95.92	42%	1559.81	28%
XRF Replicate	P_20200603_92951_729	20WS-0130-SO5731-N-060220-R	20WS-0130-SO5731-N-060220-D	ND	N/A	40.56J	54%	580.24	12%	ND	N/A	ND	N/A	755.07	40%	53176.57	46%	198.4	70%	2896.34	60%
Natural	P_20200603_92951_749	20WS-0138-SO5756-N-060320		29.72J		70.08J		425.18		ND		ND		107.39		42409.03		1489.82		40745.61	
XRF Replicate	P_20200603_92951_750	20WS-0138-SO5756-N-060320-R	20WS-0138-SO5756-N-060320	32.73J	10%	75.66J	8%	452.85	6%	ND	N/A	ND	N/A	88.34	19%	41883.38	1%	1510.6	1%	40874.06	0%
Natural	P_20200603_92951_751	20WS-0138-SO5757-N-060320		18.13J		120.42		542.28		18.89J		ND		130.54		34137.82		1673.93		20130.93	
XRF Duplicate	P_20200603_92951_752	20WS-0138-SO5757-N-060320-D	20WS-0138-SO5757-N-060320	34.25J	62%	104.91	14%	638.65	16%	13.31J	35%	ND	N/A	141.14	8%	40675.96	17%	1992.37	17%	21049.27	4%
Natural	P_20200604_92951_772	20WS-0138-SO5793-N-060420		32.64J		134.43		398.66		ND		ND		159.73		40357.75		1016.21		23459.54	
XRF Duplicate	P_20200604_92951_773	20WS-0138-SO5793-N-060420-D	20WS-0138-SO5793-N-060420	45.1	32%	208.22	43%	473.73	17%	9.87J	N/A	ND	N/A	196.75	21%	39007.96	3%	1269.47	22%	19603.38	18%
Natural	P_20200604_92951_774	20WS-0138-SO5796-N-060420		25.72J		97.82		496.49		ND		ND		156.2		35899.89		748.37		14788.65	
XRF Replicate	P_20200604_92951_775	20WS-0138-SO5796-N-060420-R	20WS-0138-SO5796-N-060420	31.05J	19%	87.12	12%	480.35	3%	ND	N/A	ND	N/A	112.07	33%	35640.95	1%	741.52	1%	14823.3	0%
Natural	P_20200610_92951_797	20WS-1113-SO5857-N-060920		ND		108		493.4		ND		ND		131.02		28073.63		208.24		3991.48	
XRF Duplicate	P_20200610_92951_798	20WS-1113-SO5857-N-060920-D	20WS-1113-SO5857-N-060920	21.49J	N/A	115.5	7%	613.54	22%	ND	N/A	ND	N/A	135.79	4%	36969.15	27%	184.96	12%	3972.14	0%
Natural	P_20200610_92951_799	20WS-1113-SO5859-N-060920		52.27		317.46		338.63		13.13J		ND		69.87J		32710.88		11238.01		355.79	
XRF Replicate	P_20200610_92951_800	20WS-1113-SO5859-N-060920-R	20WS-1113-SO5859-N-060920	61.39	16%	283.64	11%	348.07	3%	14.89J	13%	ND	N/A	66.36J	5%	32877.46	1%	11423.13	2%	276.4	25%
Natural	P_20200624_92950_29	20WS-0043-SO5896-5.9-6.5-N-061920		180.35		ND		1564.64		57.65		ND		ND		9721.77		44.88		689.64	
Field Duplicate	P_20200624_92950_30	20WS-0043-SO5896-5.9-6.5-D-061920	20WS-0043-SO5896-5.9-6.5-N-061920	159.66	12%	ND	N/A	1625.71	4%	69.43	19%	ND	N/A	ND	N/A	11218.65	14%	49.89	11%	743.89	8%
XRF Replicate	P_20200624_92950_31	20WS-0043-SO5896-5.9-6.5-D-061920-R	20WS-0043-SO5896-5.9-6.5-D-061920	149.84	6%	ND	N/A	1489.91	9%	50.4	32%	ND	N/A	ND	N/A	11402.34	2%	56.71	13%	749.38	1%
XRF Duplicate	P_20200624_92950_32	20WS-0043-SO5896-5.9-6.5-D-061920-D	20WS-0043-SO5896-5.9-6.5-D-061920	129.89	21%	ND	N/A	1193.22	31%	53.34	26%	ND	N/A	ND	N/A	10431.45	7%	60.1	19%	753.94	1%
Natural	P_20200629_92950_59	20WS-0285-SO5918-0.3-0.9-N-062520		114.44		ND		781.45		58.24		ND		ND		7329.12		728.93		5822.56	
Field Duplicate	P_20200629_92950_60	20WS-0285-SO5918-0.3-0.9-D-062520	20WS-0285-SO5918-0.3-0.9-N-062520	123.7	8%	ND	N/A	804.21	3%	61.45	5%	ND	N/A	ND	N/A	8211.95	11%	809.28	10%	5731.01	2%
Natural	P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520		93.02		22.9J		804.13		32.68		ND		56.66J		7170.09		129.21		1415.12	
XRF Replicate	P_20200629_92950_67	20WS-0246-SO5924-8.7-9.0-N-062520-R	20WS-0246-SO5924-8.7-9.0-N-062520	110.54	17%	29.04J	24%	896.31	11%	44.1	30%	ND	N/A	ND	N/A	7391.96	3%	108.77	17%	1341.76	5%
XRF Duplicate	P_20200629_92950_68	20WS-0246-SO5924-8.7-9.0-N-062520-D	20WS-0246-SO5924-8.7-9.0-N-062520	144.62	43%	40.65J	56%	1184.56	38%	61.24	61%	ND	N/A	64.5J	13%	7209.32	1%	356.22	94%	2716.79	63%
Natural	P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120		38.32		46.01J		644.05		9.62J		ND		51.93J		27380.54		380.89		5735.16	
Field Duplicate	P_20200707_92951_10	20WS-0016-SO5935-4.0-5.0-D-070120	20WS-0016-SO5935-4.0-5.0-N-070120	40.3	5%	58.16J	23%	616.53	4%	14.2J	38%	ND	N/A	44.06J	16%	34219.91	22%	702.52	59%	6237.32	8%
Natural	P_20200707_92951_22	20WS-0162-SO5947-20.0-20.4-N-070620		59.7		6.91J		746.3		12.72J		ND		44.75J		35416.48		12J		817.64	
XRF Replicate	P_20200707_92951_23	20WS-0162-SO5947-20.0-20.4-N-070620-R	20WS-0162-SO5947-20.0-20.4-N-070620	54.72	9%	ND	N/A	748.45	0%	14.28J	12%	ND	N/A	40.02J	11%	34896.17	1%	12.01J	0%	988.57	19%
Natural	P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620		32.58J		18.59J		447.21		ND		ND		46.9J		19743.59		87.95		2502.17	
XRF Duplicate	P_20200707_92951_25	20WS-0138-SO5948-12.8-13.3-N-070620-D	20WS-0138-SO5948-12.8-13.3-N-070620	33.5J	3%	25.59J	32%	505.83	12%	ND	N/A	ND	N/A	73.38	44%	23366.2	17%	111.24	23%	4167.84	50%
Natural	P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820		40.03		109.59		736.7		12.73J		ND		97.4		43408.16		15.63J		492.87	
Field Duplicate	P_20200709_92951_35	20WS-0179-SO5954-4.3-4.9-D-070820	20WS-0179-SO5954-4.3-4.9-N-070820	43.13	7%	115.03	5%	626.98	16%	ND	N/A	ND	N/A	109.88	12%	53004.08	20%	23.22	39%	598.56	19%

Table 4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results

Sample Type	Analysis Run ID	Sample Name	Parent Sample	Mercury		Molybdenum		Nickel		Selenium		Silver		Zinc	
				Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20200526_92951_626	20WS-0306-SO5421-N-052020		ND		ND		ND		ND		ND		44.92J	
XRF Replicate	P_20200526_92951_627	20WS-0306-SO5421-N-052020-R	20WS-0306-SO5421-N-052020	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	45.32J	1%
Natural	P_20200526_92951_630	20WS-0016-SO5426-N-052120		ND		ND		ND		ND		52.96		1830.53	
XRF Duplicate	P_20200526_92951_631	20WS-0016-SO5426-N-052120-D	20WS-0016-SO5426-N-052120	ND	N/A	ND	N/A	ND	N/A	ND	N/A	51.42	3%	1713.24	7%
Natural	P_20200528_92951_654	20WS-0320-SO5527-N-052720		ND		ND		ND		ND		ND		86.51J	
XRF Replicate	P_20200528_92951_655	20WS-0320-SO5527-N-052720-R	20WS-0320-SO5527-N-052720	ND	N/A	4.28J	N/A	ND	N/A	ND	N/A	ND	N/A	84.71J	2%
XRF Duplicate	P_20200528_92951_656	20WS-0320-SO5527-N-052720-D	20WS-0320-SO5527-N-052720	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	93.99J	8%
Natural	P_20200601_92951_686	20WS-0301-SO5579-N-052920		ND		ND		ND		ND		ND		509.77	
XRF Replicate	P_20200601_92951_687	20WS-0301-SO5579-N-052920-R	20WS-0301-SO5579-N-052920	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	513.17	1%
XRF Duplicate	P_20200601_92951_688	20WS-0301-SO5579-N-052920-D	20WS-0301-SO5579-N-052920	ND	N/A	ND	N/A	ND	N/A	ND	N/A	5.86J	N/A	575.88	12%
Natural	P_20200603_92951_727	20WS-0130-SO5731-N-060220		ND		ND		ND		ND		ND		264.36	
XRF Duplicate	P_20200603_92951_728	20WS-0130-SO5731-N-060220-D	20WS-0130-SO5731-N-060220	ND	N/A	ND	N/A	ND	N/A	ND	N/A	8.8J	N/A	283.53	7%
XRF Replicate	P_20200603_92951_729	20WS-0130-SO5731-N-060220-R	20WS-0130-SO5731-N-060220-D	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	923.05	106%
Natural	P_20200603_92951_749	20WS-0138-SO5756-N-060320		ND		ND		73.58J		ND		31.4		869.76	
XRF Replicate	P_20200603_92951_750	20WS-0138-SO5756-N-060320-R	20WS-0138-SO5756-N-060320	ND	N/A	ND	N/A	56.72J	26%	ND	N/A	28.93	8%	886.13	2%
Natural	P_20200603_92951_751	20WS-0138-SO5757-N-060320		ND		ND		36.57J		ND		50.57		2234.4	
XRF Duplicate	P_20200603_92951_752	20WS-0138-SO5757-N-060320-D	20WS-0138-SO5757-N-060320	ND	N/A	ND	N/A	35.38J	3%	ND	N/A	53.43	6%	2158.61	3%
Natural	P_20200604_92951_772	20WS-0138-SO5793-N-060420		ND		5.64J		35.15J		ND		52.11		1662.76	
XRF Duplicate	P_20200604_92951_773	20WS-0138-SO5793-N-060420-D	20WS-0138-SO5793-N-060420	ND	N/A	ND	N/A	ND	N/A	ND	N/A	52.63	1%	2388.82	36%
Natural	P_20200604_92951_774	20WS-0138-SO5796-N-060420		ND		ND		ND		ND		28.25		1328.91	
XRF Replicate	P_20200604_92951_775	20WS-0138-SO5796-N-060420-R	20WS-0138-SO5796-N-060420	ND	N/A	ND	N/A	ND	N/A	ND	N/A	30.43	7%	1337.39	1%
Natural	P_20200610_92951_797	20WS-1113-SO5857-N-060920		ND		ND		28.76J		ND		ND		213.41	
XRF Duplicate	P_20200610_92951_798	20WS-1113-SO5857-N-060920-D	20WS-1113-SO5857-N-060920	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	244.03	13%
Natural	P_20200610_92951_799	20WS-1113-SO5859-N-060920		ND		11.41J		ND		ND		54.15		1143.58	
XRF Replicate	P_20200610_92951_800	20WS-1113-SO5859-N-060920-R	20WS-1113-SO5859-N-060920	ND	N/A	11.91J	4%	ND	N/A	ND	N/A	55.94	3%	1142.02	0%
Natural	P_20200624_92950_29	20WS-0043-SO5896-5.9-6.5-N-061920		ND		ND		ND		ND		30.61		95.54	
Field Duplicate	P_20200624_92950_30	20WS-0043-SO5896-5.9-6.5-D-061920	20WS-0043-SO5896-5.9-6.5-N-061920	ND	N/A	ND	N/A	ND	N/A	ND	N/A	43.13	34%	75.6	23%
XRF Replicate	P_20200624_92950_31	20WS-0043-SO5896-5.9-6.5-D-061920-R	20WS-0043-SO5896-5.9-6.5-D-061920	ND	N/A	ND	N/A	ND	N/A	ND	N/A	32.85	27%	80.52	6%
XRF Duplicate	P_20200624_92950_32	20WS-0043-SO5896-5.9-6.5-D-061920-D	20WS-0043-SO5896-5.9-6.5-D-061920	ND	N/A	16.41J	N/A	ND	N/A	ND	N/A	31.33	32%	87.27	14%
Natural	P_20200629_92950_59	20WS-0285-SO5918-0.3-0.9-N-062520		ND		14.1J		ND		ND		59.04		692.91	
Field Duplicate	P_20200629_92950_60	20WS-0285-SO5918-0.3-0.9-D-062520	20WS-0285-SO5918-0.3-0.9-N-062520	ND	N/A	17.18J	20%	ND	N/A	ND	N/A	52.74	11%	873.6	23%
Natural	P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520		ND		ND		ND		8J		28.71		278.67	
XRF Replicate	P_20200629_92950_67	20WS-0246-SO5924-8.7-9.0-N-062520-R	20WS-0246-SO5924-8.7-9.0-N-062520	ND	N/A	9.91J	N/A	ND	N/A	ND	N/A	36.39	24%	290.79	4%
XRF Duplicate	P_20200629_92950_68	20WS-0246-SO5924-8.7-9.0-N-062520-D	20WS-0246-SO5924-8.7-9.0-N-062520	ND	N/A	13.17J	N/A	ND	N/A	ND	N/A	60.91	72%	276.89	1%
Natural	P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120		ND		ND		34.29J		ND		ND		1538.24	
Field Duplicate	P_20200707_92951_10	20WS-0016-SO5935-4.0-5.0-D-070120	20WS-0016-SO5935-4.0-5.0-N-070120	ND	N/A	ND	N/A	ND	N/A	ND	N/A	8.58J	N/A	1835.24	18%
Natural	P_20200707_92951_22	20WS-0162-SO5947-20.0-20.4-N-070620		ND		ND		ND		ND		8.21J		65.05J	
XRF Replicate	P_20200707_92951_23	20WS-0162-SO5947-20.0-20.4-N-070620-R	20WS-0162-SO5947-20.0-20.4-N-070620	ND	N/A	ND	N/A	ND	N/A	ND	N/A	ND	N/A	60.75J	7%
Natural	P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620		ND		ND		ND		ND		9.49J		185.58	
XRF Duplicate	P_20200707_92951_25	20WS-0138-SO5948-12.8-13.3-N-070620-D	20WS-0138-SO5948-12.8-13.3-N-070620	ND	N/A	ND	N/A	ND	N/A	ND	N/A	8.65J	9%	238.27	25%
Natural	P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820		ND		ND		ND		ND		7.36J		76.29J	
Field Duplicate	P_20200709_92951_35	20WS-0179-SO5954-4.3-4.9-D-070820	20WS-0179-SO5954-4.3-4.9-N-070820	ND	N/A	ND	N/A	ND	N/A	ND	N/A	7.06J	4%	94.58J	21%

Table 5
Sample Identification

Table 5. FPXRF Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20191023_92951_135	WS19-1045-SO5027-N-102319	1045	SO5027	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_136	WS19-1045-SO5028-N-102319	1045	SO5028	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_137	WS19-1045-SO5009-N-102319	1045	SO5009	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_138	WS19-1045-SO5030-N-102319	1045	SO5030	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_139	WS19-0003-SO5031-N-102319	0003	SO5031	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_140	WS19-0003-SO5032-N-102319	0003	SO5032	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_147	WS19-0003-SO5036-N-102319	0003	SO5036	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_148	WS19-0003-SO5037-N-102319	0003	SO5037	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_149	WS19-0003-SO5038-N-102319	0003	SO5038	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_151	WS19-0003-SO5040-N-102319	0003	SO5040	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_152	WS19-0003-SO5042-N-102319	0003	SO5042	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191023_92951_153	WS19-0003-SO5043-N-102319	0003	SO5043	Surface	Soil	10/23/2019	N/A	N/A	Simple Sieve	10/23/2019
P_20191024_92951_158	WS19-0003-SO5048-N-102419	0003	SO5048	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_159	WS19-0003-SO5049-N-102419	0003	SO5049	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_160	WS19-0003-SO5051-N-102419	0003	SO5051	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_161	WS19-0003-SO5052-N-102419	0003	SO5052	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_166	WS19-0040-SO5053-N-102419	0040	SO5053	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_167	WS19-0040-SO5055-N-102419	0040	SO5055	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_168	WS19-0040-SO5059-N-102419	0040	SO5059	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_169	WS19-0040-SO5060-N-102419	0040	SO5060	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_170	WS19-0040-SO5061-N-102419	0040	SO5061	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191024_92951_171	WS19-0040-SO5062-N-102419	0040	SO5062	Surface	Soil	10/24/2019	N/A	N/A	Simple Sieve	10/24/2019
P_20191028_92951_178	WS19-0040-SO5064-N-102519	0040	SO5064	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_179	WS19-0040-SO5069-N-102519	0040	SO5069	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_180	WS19-0040-SO5072-N-102519	0040	SO5072	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_181	WS19-0040-SO5074-N-102519	0040	SO5074	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_183	WS19-0040-SO5076-N-102519	0040	SO5076	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_184	WS19-0040-SO5080-N-102519	0040	SO5080	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_185	WS19-0043-SO5081-N-102519	0043	SO5081	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_186	WS19-0043-SO5083-N-102519	0043	SO5083	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_187	WS19-0043-SO5085-N-102519	0043	SO5085	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_188	WS19-0043-SO5086-N-102519	0043	SO5086	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_189	WS19-0043-SO5087-N-102519	0043	SO5087	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_190	WS19-0005-SO5011-N-102519	0005	SO5011	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_192	WS19-0005-SO5088-N-102519	0005	SO5088	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_193	WS19-0040-SO5073-N-102519	0040	SO5073	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_194	WS19-0005-SO5090-N-102519	0005	SO5090	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_195	WS19-0006-SO5093-N-102519	0006	SO5093	Surface	Soil	10/25/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191028_92951_196	WS19-0043-SO5094-N-102819	0043	SO5094	Surface	Soil	10/28/2019	N/A	N/A	Simple Sieve	10/28/2019
P_20191101_92951_307	WS19-0040-SO5101-N-103119	0040	SO5101	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_308	WS19-0040-SO5102-N-103119	0040	SO5102	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_309	WS19-0040-SO5105-N-103119	0040	SO5105	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_310	WS19-0040-SO5106-N-103119	0040	SO5106	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_311	WS19-0040-SO5107-N-103119	0040	SO5107	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_312	WS19-0040-SO5109-N-103119	0040	SO5109	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_313	WS19-0038-SO5111-N-103119	0038	SO5111	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191101_92951_314	WS19-0041-SO5116-N-103119	0041	SO5116	Surface	Soil	10/31/2019	N/A	N/A	Simple Sieve	11/1/2019
P_20191105_92951_321	WS19-0006-SO5014-N-110419	0006	SO5014	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_322	WS19-0006-SO5015-N-110419	0006	SO5015	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_323	WS19-0006-SO5122-N-110419	0006	SO5122	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_324	WS19-0006-SO5123-N-110419	0006	SO5123	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_325	WS19-0006-SO5125-N-110419	0006	SO5125	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_326	WS19-0006-SO5128-N-110419	0006	SO5128	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_327	WS19-0006-SO5131-N-110419	0006	SO5131	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_328	WS19-0007-SO5132-N-110419	0007	SO5132	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_329	WS19-0037-SO5136-N-110419	0037	SO5136	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191105_92951_330	WS19-0037-SO5138-N-110419	0037	SO5138	Surface	Soil	11/4/2019	N/A	N/A	Simple Sieve	11/5/2019
P_20191106_92951_337	WS19-0037-SO5140-N-110519	0037	SO5140	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_338	WS19-0038-SO5143-N-110519	0038	SO5143	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_339	WS19-0038-SO5147-N-110519	0038	SO5147	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_340	WS19-0038-SO5153-N-110519	0038	SO5153	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_341	WS19-0037-SO5155-N-110519	0037	SO5155	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_342	WS19-0037-SO5158-N-110519	0037	SO5158	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_343	WS19-0010-SO5160-N-110519	0010	SO5160	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_344	WS19-0010-SO5162-N-110519	0010	SO5162	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_345	WS19-0010-SO5164-N-110519	0010	SO5164	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_346	WS19-0010-SO5170-N-110519	0010	SO5170	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191106_92951_347	WS19-0010-SO5171-N-110519	0010	SO5171	Surface	Soil	11/5/2019	N/A	N/A	Simple Sieve	11/6/2019
P_20191108_92951_354	WS19-0315-SO5021-N-110719	0315	SO5021	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_355	WS19-0315-SO5024-N-110719	0315	SO5024	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_356	WS19-0010-SO5172-N-110719	0010	SO5172	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_357	WS19-0010-SO5173-N-110719	0010	SO5173	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_358	WS19-0010-SO5174-N-110719	0010	SO5174	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_360	WS19-0010-SO5176-N-110719	0010	SO5176	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_361	WS19-0010-SO5177-N-110719	0010	SO5177	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019

Table 5. FPXRF Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20191108_92951_362	WS19-0313-SO5180-N-110719	0313	SO5180	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_363	WS19-0015-SO5182-N-110719	0015	SO5182	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_364	WS19-0015-SO5183-N-110719	0015	SO5183	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191108_92951_365	WS19-0010-SO5185-N-110719	0010	SO5185	Surface	Soil	11/7/2019	N/A	N/A	Simple Sieve	11/8/2019
P_20191111_92951_373	WS19-0021-SO5001-N-110819	0021	SO5001	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_374	WS19-0017-SO5005-N-110819	0017	SO5005	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_375	WS19-0010-SO5026-N-110819	0010	SO5026	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_376	WS19-0010-SO5187-N-110819	0010	SO5187	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_377	WS19-0019-SO5192-N-110819	0019	SO5192	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_378	WS19-0019-SO5193-N-110819	0019	SO5193	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_379	WS19-0017-SO5194-N-110819	0017	SO5194	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_380	WS19-0015-SO5197-N-110819	0015	SO5197	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_381	WS19-0015-SO5200-N-110819	0015	SO5200	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191111_92951_382	WS19-0015-SO5204-N-110819	0015	SO5204	Surface	Soil	11/8/2019	N/A	N/A	Simple Sieve	11/11/2019
P_20191115_92951_389	WS19-0289-SO5007-N-111319	0289	SO5007	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_390	WS19-0289-SO5012-N-111319	0289	SO5012	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_391	WS19-0290-SO5018-N-111319	0290	SO5018	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_392	WS19-0290-SO5019-N-111319	0290	SO5019	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_393	WS19-0290-SO5206-N-111319	0290	SO5206	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_394	WS19-0292-SO5211-N-111319	0292	SO5211	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_395	WS19-0292-SO5214-N-111319	0292	SO5214	Surface	Soil	11/13/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_402	WS19-0288-SO5215-N-111519	0288	SO5215	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_403	WS19-0288-SO5217-N-111519	0288	SO5217	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_404	WS19-0297-SO5218-N-111519	0297	SO5218	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_405	WS19-0297-SO5220-N-111519	0297	SO5220	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_406	WS19-0297-SO5221-N-111519	0297	SO5221	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_407	WS19-0288-SO5223-N-111519	0288	SO5223	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_408	WS19-0288-SO5224-N-111519	0288	SO5224	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_409	WS19-0288-SO5226-N-111519	0288	SO5226	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_410	WS19-0288-SO5227-N-111519	0288	SO5227	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_411	WS19-0288-SO5231-N-111519	0288	SO5231	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_412	WS19-0288-SO5234-N-111519	0288	SO5234	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20191115_92951_413	WS19-0286-SO5236-N-111519	0286	SO5236	Surface	Soil	11/15/2019	N/A	N/A	Simple Sieve	11/15/2019
P_20200512_92951_513	20WS-0288-SO5238-N-051220	0288	SO5238	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/12/2020
P_20200512_92951_514	20WS-0297-SO5240-N-051220	0297	SO5240	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/12/2020
P_20200512_92951_515	20WS-0297-SO5241-N-051220	0297	SO5241	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/12/2020
P_20200512_92951_516	20WS-0297-SO5242-N-051220	0297	SO5242	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/12/2020
P_20200512_92951_517	20WS-0297-SO5243-N-051220	0297	SO5243	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/12/2020
P_20200512_92951_518	20WS-0297-SO5244-N-051220	0297	SO5244	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/12/2020
P_20200513_92951_525	20WS-0288-SO5274-N-051320	0288	SO5274	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_526	20WS-0288-SO5276-N-051320	0288	SO5276	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_527	20WS-0288-SO5278-N-051320	0288	SO5278	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_528	20WS-0288-SO5280-N-051320	0288	SO5280	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_529	20WS-0288-SO5281-N-051320	0288	SO5281	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_530	20WS-0297-SO5247-N-051220	0297	SO5247	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_531	20WS-0297-SO5248-N-051220	0297	SO5248	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_532	20WS-0297-SO5251-N-051220	0297	SO5251	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_533	20WS-0297-SO5255-N-051220	0297	SO5255	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_534	20WS-0297-SO5257-N-051220	0297	SO5257	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_535	20WS-0297-SO5260-N-051220	0297	SO5260	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_536	20WS-0300-SO5263-N-051220	0300	SO5263	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_537	20WS-0300-SO5264-N-051220	0300	SO5264	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_538	20WS-0300-SO5265-N-051220	0300	SO5265	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_540	20WS-0300-SO5266-N-051220	0300	SO5266	Surface	Soil	5/12/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_542	20WS-0299-SO5282-N-051320	0299	SO5282	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200513_92951_543	20WS-0300-SO5285-N-051320	0300	SO5285	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/13/2020
P_20200514_92951_548	20WS-0300-SO5288-N-051320	0300	SO5288	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_549	20WS-0300-SO5290-N-051320	0300	SO5290	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_550	20WS-0298-SO5292-N-051320	0289	SO5292	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_551	20WS-0298-SO5293-N-051320	0289	SO5293	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_552	20WS-0298-SO5295-N-051320	0289	SO5295	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_553	20WS-0299-SO5299-N-051320	0299	SO5299	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_554	20WS-0299-SO5301-N-051320	0299	SO5301	Surface	Soil	5/13/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_555	20WS-0285-SO5305-N-051420	0285	SO5305	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_556	20WS-0285-SO5308-N-051420	0285	SO5308	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_557	20WS-0285-SO5311-N-051420	0285	SO5311	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_558	20WS-0285-SO5312-N-051420	0285	SO5312	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_559	20WS-0285-SO5314-N-051420	0285	SO5314	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_560	20WS-0285-SO5316-N-051420	0285	SO5316	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_561	20WS-0285-SO5318-N-051420	0285	SO5318	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_562	20WS-0285-SO5319-N-051420	0285	SO5319	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_563	20WS-0285-SO5321-N-051420	0285	SO5321	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_564	20WS-0285-SO5322-N-051420	0285	SO5322	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_565	20WS-0285-SO5324-N-051420	0285	SO5324	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_569	20WS-0285-SO5326-N-051420	0285	SO5326	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020

Table 5. FPXRF Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20200514_92951_570	20WS-0285-SO5329-N-051420	0285	SO5329	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_571	20WS-0285-SO5333-N-051420	0285	SO5333	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200514_92951_572	20WS-0285-SO5334-N-051420	0285	SO5334	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/14/2020
P_20200519_92951_577	20WS-0285-SO5336-N-051420	0285	SO5336	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_578	20WS-0285-SO5337-N-051420	0285	SO5337	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_579	20WS-0285-SO5340-N-051420	0285	SO5340	Surface	Soil	5/14/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_580	20WS-0299-SO5342-N-051820	0299	SO5342	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_581	20WS-0285-SO5345-N-051820	0285	SO5345	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_582	20WS-0285-SO5349-N-051820	0285	SO5349	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_583	20WS-0285-SO5354-N-051820	0285	SO5354	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_584	20WS-0285-SO5355-N-051820	0285	SO5355	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_585	20WS-0285-SO5357-N-051820	0285	SO5357	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_586	20WS-0285-SO5361-N-051820	0285	SO5361	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_587	20WS-0285-SO5369-N-051820	0285	SO5369	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_588	20WS-0246-SO5373-N-051820	0246	SO5373	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_589	20WS-0246-SO5372-N-051820	0246	SO5372	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_590	20WS-0246-SO5376-N-051820	0246	SO5376	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_591	20WS-0246-SO5377-N-051820	0246	SO5377	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_592	20WS-0246-SO5383-N-051820	0246	SO5383	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_593	20WS-0246-SO5384-N-051820	0246	SO5384	Surface	Soil	5/18/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_600	20WS-0246-SO5386-N-051920	0246	SO5386	Surface	Soil	5/19/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_601	20WS-0246-SO5391-N-051920	0246	SO5391	Surface	Soil	5/19/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_602	20WS-0246-SO5396-N-051920	0246	SO5396	Surface	Soil	5/19/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_603	20WS-0246-SO5397-N-051920	0246	SO5397	Surface	Soil	5/19/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_604	20WS-0246-SO5400-N-051920	0246	SO5400	Surface	Soil	5/19/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200519_92951_605	20WS-0256-SO5402-N-051920	0256	SO5402	Surface	Soil	5/19/2020	N/A	N/A	Simple Sieve	5/19/2020
P_20200526_92951_610	20WS-0315-SO5453-N-052620	0315	SO5453	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_611	20WS-0315-SO5454-N-052620	0315	SO5454	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_612	20WS-0315-SO5459-N-052620	0315	SO5459	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_613	20WS-0315-SO5460-N-052620	0315	SO5460	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_614	20WS-0315-SO5464-N-052620	0315	SO5464	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_615	20WS-0315-SO5471-N-052620	0315	SO5471	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_616	20WS-0315-SO5474-N-052620	0315	SO5474	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_617	20WS-0315-SO5479-N-052620	0315	SO5479	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_618	20WS-0315-SO5480-N-052620	0315	SO5480	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_620	20WS-0315-SO5484-N-052620	0315	SO5484	Surface	Soil	5/26/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_621	20WS-0249-SO5407-N-052020	0249	SO5407	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_622	20WS-0249-SO5411-N-052020	0249	SO5411	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_623	20WS-0249-SO5412-N-052020	0249	SO5412	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_624	20WS-0249-SO5418-N-052020	0249	SO5418	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_625	20WS-0249-SO5419-N-052020	0249	SO5419	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_626	20WS-0306-SO5421-N-052020	0306	SO5421	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_628	20WS-0306-SO5422-N-052020	0306	SO5422	Surface	Soil	5/20/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_630	20WS-0016-SO5426-N-052120	0016	SO5426	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_632	20WS-0016-SO5428-N-052120	0016	SO5428	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_633	20WS-0016-SO5430-N-052120	0016	SO5430	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_634	20WS-0016-SO5437-N-052120	0016	SO5437	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_635	20WS-0015-SO5438-N-052120	0015	SO5438	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_636	20WS-0013-SO5439-N-052120	0013	SO5439	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_637	20WS-0013-SO5443-N-052120	0013	SO5443	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200526_92951_638	20WS-0013-SO5447-N-052120	0013	SO5447	Surface	Soil	5/21/2020	N/A	N/A	Simple Sieve	5/26/2020
P_20200528_92951_643	20WS-0315-SO5490-N-052720	0315	SO5490	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_644	20WS-0315-SO5495-N-052720	0315	SO5495	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_645	20WS-0315-SO5496-N-052720	0315	SO5496	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_646	20WS-0315-SO5498-N-052720	0315	SO5498	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_647	20WS-0313-SO5505-N-052720	0313	SO5505	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_648	20WS-0315-SO5506-N-052720	0315	SO5506	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_649	20WS-0313-SO5511-N-052720	0313	SO5511	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_650	20WS-0315-SO5513-N-052720	0315	SO5513	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_651	20WS-0315-SO5516-N-052720	0315	SO5516	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_652	20WS-0320-SO5523-N-052720	0320	SO5523	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_653	20WS-0320-SO5524-N-052720	0320	SO5524	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200528_92951_654	20WS-0320-SO5527-N-052720	0320	SO5527	Surface	Soil	5/27/2020	N/A	N/A	Simple Sieve	5/28/2020
P_20200529_92951_661	20WS-0321-SO5531-N-052820	0321	SO5531	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_662	20WS-0319-SO5535-N-052820	0319	SO5535	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_663	20WS-0319-SO5536-N-052820	0319	SO5536	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_664	20WS-0312-SO5542-N-052820	0312	SO5542	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_665	20WS-0312-SO5547-N-052820	0312	SO5547	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_666	20WS-0307-SO5548-N-052820	0307	SO5548	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_667	20WS-0313-SO5552-N-052820	0313	SO5552	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_668	20WS-0313-SO5553-N-052820	0313	SO5553	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_669	20WS-0313-SO5556-N-052820	0313	SO5556	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_670	20WS-0301-SO5557-N-052820	0301	SO5557	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_671	20WS-0301-SO5559-N-052820	0301	SO5559	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200529_92951_672	20WS-0301-SO5560-N-052820	0301	SO5560	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020

Table 5. FPXRF Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20200529_92951_673	20WS-0301-SO5566-N-052820	0301	SO5566	Surface	Soil	5/28/2020	N/A	N/A	Simple Sieve	5/29/2020
P_20200601_92951_680	20WS-1150-SO5568-N-052920	1150	SO5568	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_681	20WS-1150-SO5567-N-052920	1150	SO5567	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_682	20WS-0301-SO5573-N-052920	0301	SO5573	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_683	20WS-1150-SO5574-N-052920	1150	SO5574	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_684	20WS-1150-SO5576-N-052920	1150	SO5576	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_685	20WS-1150-SO5577-N-052920	1150	SO5577	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_686	20WS-0301-SO5579-N-052920	0301	SO5579	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_689	20WS-0301-SO5584-N-052920	0301	SO5584	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_690	20WS-0301-SO5585-N-052920	0301	SO5585	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_691	20WS-0300-SO5590-N-052920	0300	SO5590	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_692	20WS-0300-SO5592-N-052920	0300	SO5592	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_693	20WS-0300-SO5593-N-052920	0300	SO5593	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_694	20WS-0306-SO5597-N-052920	0306	SO5597	Surface	Soil	5/29/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_695	20WS-0013-SO5603-N-060120	0013	SO5603	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_696	20WS-0013-SO5608-N-060120	0013	SO5608	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_697	20WS-0296-SO5614-N-060120	0296	SO5614	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_698	20WS-0296-SO5615-N-060120	0296	SO5615	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_699	20WS-0296-SO5618-N-060120	0296	SO5618	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_700	20WS-0296-SO5619-N-060120	0296	SO5619	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_702	20WS-0311-SO5623-N-060120	0311	SO5623	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_703	20WS-0003-SO5661-N-060120	0003	SO5661	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_704	20WS-0038-SO5664-N-060120	0038	SO5664	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200601_92951_705	20WS-0317-SO5668-N-060120	0317	SO5668	Surface	Soil	6/1/2020	N/A	N/A	Simple Sieve	6/1/2020
P_20200603_92951_709	20WS-1143-SO5626-N-060220	1143	SO5626	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_710	20WS-1143-SO5627-N-060220	1143	SO5627	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_711	20WS-1142-SO5631-N-060220	1142	SO5631	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_712	20WS-0350-SO5633-N-060220	0350	SO5633	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_713	20WS-0350-SO5637-N-060220	0350	SO5637	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_714	20WS-0350-SO5640-N-060220	0350	SO5640	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_715	20WS-0350-SO5648-N-060220	0350	SO5648	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_716	20WS-0179-SO5672-N-060220	0179	SO5672	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_717	20WS-0179-SO5675-N-060220	0179	SO5675	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_718	20WS-0179-SO5678-N-060220	0179	SO5678	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_719	20WS-0179-SO5679-N-060220	0179	SO5679	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_720	20WS-0179-SO5684-N-060220	0179	SO5684	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_721	20WS-0179-SO5685-N-060220	0179	SO5685	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_722	20WS-0142-SO5688-N-060220	0142	SO5688	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_723	20WS-0142-SO5692-N-060220	0142	SO5692	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_724	20WS-0138-SO5694-N-060220	0138	SO5694	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_725	20WS-0138-SO5697-N-060220	0138	SO5697	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_726	20WS-0130-SO5729-N-060220	0130	SO5729	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_727	20WS-0130-SO5731-N-060220	0130	SO5731	Surface	Soil	6/2/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_732	20WS-0162-SO5708-N-060320	0162	SO5708	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_733	20WS-0162-SO5710-N-060320	0162	SO5710	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_734	20WS-0162-SO5711-N-060320	0162	SO5711	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_735	20WS-0162-SO5716-N-060320	0162	SO5716	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_736	20WS-0162-SO5719-N-060320	0162	SO5719	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_737	20WS-0162-SO5720-N-060320	0162	SO5720	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_738	20WS-0138-SO5724-N-060320	0138	SO5724	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_740	20WS-0162-SO5734-N-060320	0162	SO5734	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_741	20WS-0162-SO5736-N-060320	0162	SO5736	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_742	20WS-0160-SO5738-N-060320	0160	SO5738	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_743	20WS-0160-SO5739-N-060320	0160	SO5739	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_744	20WS-0158-SO5745-N-060320	0158	SO5745	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_745	20WS-0158-SO5748-N-060320	0158	SO5748	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_746	20WS-0153-SO5751-N-060320	0153	SO5751	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_747	20WS-0138-SO5752-N-060320	0138	SO5752	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_748	20WS-0138-SO5754-N-060320	0138	SO5754	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_749	20WS-0138-SO5756-N-060320	0138	SO5756	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_751	20WS-0138-SO5757-N-060320	0138	SO5757	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_753	20WS-0138-SO5758-N-060320	0138	SO5758	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_754	20WS-0138-SO5761-N-060320	0138	SO5761	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_755	20WS-0138-SO5762-N-060320	0138	SO5762	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_756	20WS-0138-SO5780-N-060320	0138	SO5780	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_757	20WS-0138-SO5781-N-060320	0138	SO5781	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_758	20WS-0138-SO5783-N-060320	0138	SO5783	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200603_92951_759	20WS-0138-SO5785-N-060320	0138	SO5785	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/3/2020
P_20200604_92951_765	20WS-0138-SO5776-N-060320	0138	SO5776	Surface	Soil	6/3/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_766	20WS-0122-SO5765-N-060420	0122	SO5765	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_767	20WS-0122-SO5766-N-060420	0122	SO5766	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_768	20WS-0102-SO5770-N-060420	0102	SO5770	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_769	20WS-0122-SO5773-N-060420	0122	SO5773	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_770	20WS-0123-SO5775-N-060420	0123	SO5775	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_771	20WS-0138-SO5790-N-060420	0138	SO5790	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020

Table 5. FPXRF Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20200604_92951_772	20WS-0138-SO5793-N-060420	0138	SO5793	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_774	20WS-0138-SO5796-N-060420	0138	SO5796	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_776	20WS-0121-SO5803-N-060420	0121	SO5803	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_777	20WS-0121-SO5804-N-060420	0121	SO5804	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_778	20WS-0121-SO5809-N-060420	0121	SO5809	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_779	20WS-0123-SO5827-N-060420	0123	SO5827	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_780	20WS-0122-SO5831-N-060420	0122	SO5831	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_781	20WS-0122-SO5834-N-060420	0122	SO5834	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_782	20WS-0122-SO5837-N-060420	0122	SO5837	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200604_92951_783	20WS-0122-SO5839-N-060420	0122	SO5839	Surface	Soil	6/4/2020	N/A	N/A	Simple Sieve	6/4/2020
P_20200610_92951_789	20WS-1118-SO5815-N-060920	1118	SO5815	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_790	20WS-1116-SO5819-N-060920	1116	SO5819	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_791	20WS-1115-SO5846-N-060920	1115	SO5846	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_792	20WS-1115-SO5850-N-060920	1115	SO5850	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_793	20WS-1115-SO5851-N-060920	1115	SO5851	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_794	20WS-1115-SO5852-N-060920	1115	SO5852	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_795	20WS-1114-SO5853-N-060920	1114	SO5853	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_796	20WS-1113-SO5856-N-060920	1113	SO5856	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_797	20WS-1113-SO5857-N-060920	1113	SO5857	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_799	20WS-1113-SO5859-N-060920	1113	SO5859	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_801	20WS-1112-SO5860-N-060920	1112	SO5860	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_802	20WS-1016-SO5863-N-060920	1016	SO5863	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_803	20WS-1007-SO5866-N-060920	1007	SO5866	Surface	Soil	6/9/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_804	20WS-1016-SO5870-N-061020	1016	SO5870	Surface	Soil	6/10/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_805	20WS-0607-SO5871-N-061020	0607	SO5871	Surface	Soil	6/10/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200610_92951_806	20WS-0607-SO5872-N-061020	0607	SO5872	Surface	Soil	6/10/2020	N/A	N/A	Simple Sieve	6/10/2020
P_20200624_92950_18	20WS-0040-SO5885-5.6-6.2-N-061820	0040	SO5885	Subsurface	Soil	6/18/2020	DPT-01	5.6-6.2	Sample Bag	6/24/2020
P_20200624_92950_19	20WS-0040-SO5886-5.6-10.0-N-061820	0040	SO5886	Subsurface	Soil	6/18/2020	DPT-02	5.6-10	Sample Bag	6/24/2020
P_20200624_92950_20	20WS-0040-SO5887-6.0-6.5-N-061820	0040	SO5887	Subsurface	Soil	6/18/2020	DPT-03	6-6.5	Sample Bag	6/24/2020
P_20200624_92950_21	20WS-0040-SO5888-5.6-6.0-N-061820	0040	SO5888	Subsurface	Soil	6/18/2020	DPT-04	5.6-6	Sample Bag	6/24/2020
P_20200624_92950_22	20WS-0043-SO5889-5.8-6.2-N-061820	0043	SO5889	Subsurface	Soil	6/18/2020	DPT-05	5.8-6.2	Sample Bag	6/24/2020
P_20200624_92950_23	20WS-0043-SO5890-6.2-6.4-N-061820	0043	SO5890	Subsurface	Soil	6/18/2020	DPT-05	6.2-6.4	Sample Bag	6/24/2020
P_20200624_92950_24	20WS-0043-SO5891-10.3-10.9-N-061820	0043	SO5891	Subsurface	Soil	6/18/2020	DPT-06	10.3-10.9	Sample Bag	6/24/2020
P_20200624_92950_25	20WS-0006-SO5892-5.7-6.0-N-061820	0006	SO5892	Subsurface	Soil	6/18/2020	DPT-07	5.7-6	Sample Bag	6/24/2020
P_20200624_92950_26	20WS-0006-SO5893-10.4-10.7-N-061920	0006	SO5893	Subsurface	Soil	6/19/2020	DPT-08	10.4-10.7	Sample Bag	6/24/2020
P_20200624_92950_27	20WS-0006-SO5894-11.1-11.4-N-061920	0006	SO5894	Subsurface	Soil	6/19/2020	DPT-09	11.1-11.4	Sample Bag	6/24/2020
P_20200624_92950_28	20WS-0006-SO5895-5.4-5.7-N-061920	0006	SO5895	Subsurface	Soil	6/19/2020	DPT-10	5.4-5.7	Sample Bag	6/24/2020
P_20200624_92950_29	20WS-0043-SO5896-5.9-6.5-N-061920	0043	SO5896	Subsurface	Soil	6/19/2020	DPT-11	5.9-6.5	Sample Bag	6/24/2020
P_20200624_92950_30	20WS-0043-SO5896-5.9-6.5-D-061920	0043	SO5896	Subsurface	Soil	6/19/2020	DPT-11	5.9-6.5	Sample Bag	6/24/2020
P_20200624_92950_33	20WS-0043-SO5897-7.3-7.7-N-061920	0043	SO5897	Subsurface	Soil	6/19/2020	DPT-12	7.3-7.7	Sample Bag	6/24/2020
P_20200624_92950_34	20WS-0043-SO5898-10.8-11.2-N-061920	0043	SO5898	Subsurface	Soil	6/19/2020	DPT-13	10.8-11.2	Sample Bag	6/24/2020
P_20200624_92950_35	20WS-0043-SO5899-16.0-16.3-N-061920	0043	SO5899	Subsurface	Soil	6/19/2020	DPT-14	16-16.3	Sample Bag	6/24/2020
P_20200624_92950_36	20WS-0003-SO5900-1.0-1.5-N-062320	0003	SO5900	Subsurface	Soil	6/23/2020	DPT-15	1-1.5	Sample Bag	6/24/2020
P_20200624_92950_37	20WS-0003-SO5901-4.4-4.7-N-062320	0003	SO5901	Subsurface	Soil	6/23/2020	DPT-16	4.4-4.7	Sample Bag	6/24/2020
P_20200624_92950_40	20WS-0003-SO5902-8.6-9.0-N-062320	0003	SO5902	Subsurface	Soil	6/23/2020	DPT-17	8.6-9	Sample Bag	6/24/2020
P_20200624_92950_41	20WS-0003-SO5903-4.6-4.9-N-062320	0003	SO5903	Subsurface	Soil	6/23/2020	DPT-18	4.6-4.9	Sample Bag	6/24/2020
P_20200624_92950_42	20WS-0003-SO5904-12.6-13.0-N-062320	0003	SO5904	Subsurface	Soil	6/23/2020	DPT-19	12.6-13	Sample Bag	6/24/2020
P_20200624_92950_43	20WS-0010-SO5905-8.4-8.8-N-062320	0010	SO5905	Subsurface	Soil	6/23/2020	DPT-20	8.4-8.8	Sample Bag	6/24/2020
P_20200624_92950_44	20WS-0010-SO5906-13.0-13.5-N-062320	0010	SO5906	Subsurface	Soil	6/23/2020	DPT-21	13-13.5	Sample Bag	6/24/2020
P_20200624_92950_45	20WS-0010-SO5907-12.2-12.6-N-062320	0010	SO5907	Subsurface	Soil	6/23/2020	DPT-22	12.2-12.6	Sample Bag	6/24/2020
P_20200624_92950_46	20WS-0010-SO5908-12.4-12.8-N-062320	0010	SO5908	Subsurface	Soil	6/23/2020	DPT-23	12.4-12.8	Sample Bag	6/24/2020
P_20200629_92950_50	20WS-0010-SO5909-8.2-8.5-N-062420	0010	SO5909	Subsurface	Soil	6/24/2020	DPT-24	8.2-8.5	Sample Bag	6/29/2020
P_20200629_92950_51	20WS-0010-SO5910-9.2-9.6-N-062420	0010	SO5910	Subsurface	Soil	6/24/2020	DPT-25	9.2-9.6	Sample Bag	6/29/2020
P_20200629_92950_52	20WS-0297-SO5911-12.7-13.0-N-062420	0297	SO5911	Subsurface	Soil	6/24/2020	DPT-26	12.7-13	Sample Bag	6/29/2020
P_20200629_92950_53	20WS-0297-SO5912-4.5-4.8-N-062420	0297	SO5912	Subsurface	Soil	6/24/2020	DPT-28	4.5-4.8	Sample Bag	6/29/2020
P_20200629_92950_54	20WS-0297-SO5913-0.2-0.8-N-062420	0297	SO5913	Subsurface	Soil	6/24/2020	DPT-29	0.2-0.8	Sample Bag	6/29/2020
P_20200629_92950_55	20WS-0297-SO5914-0.4-0.8-N-062420	0297	SO5914	Subsurface	Soil	6/24/2020	DPT-30	0.4-0.8	Sample Bag	6/29/2020
P_20200629_92950_56	20WS-0288-SO5915-4.6-5.0-N-062420	0288	SO5915	Subsurface	Soil	6/24/2020	DPT-31	4.6-5	Sample Bag	6/29/2020
P_20200629_92950_57	20WS-0285-SO5916-4.4-4.5-N-062520	0285	SO5916	Subsurface	Soil	6/25/2020	DPT-32	4.4-4.5	Sample Bag	6/29/2020
P_20200629_92950_58	20WS-0285-SO5917-8.4-8.7-N-062520	0285	SO5917	Subsurface	Soil	6/25/2020	DPT-33	8.4-8.7	Sample Bag	6/29/2020
P_20200629_92950_59	20WS-0285-SO5918-0.3-0.9-N-062520	0285	SO5918	Subsurface	Soil	6/25/2020	DPT-34	0.3-0.9	Sample Bag	6/29/2020
P_20200629_92950_60	20WS-0285-SO5918-0.3-0.9-D-062520	0285	SO5918	Subsurface	Soil	6/25/2020	DPT-34	0.3-0.9	Sample Bag	6/29/2020
P_20200629_92950_61	20WS-0285-SO5919-1.2-1.5-N-062520	0285	SO5919	Subsurface	Soil	6/25/2020	DPT-35	1.2-1.5	Sample Bag	6/29/2020
P_20200629_92950_62	20WS-0285-SO5920-1.3-1.5-N-062520	0285	SO5920	Subsurface	Soil	6/25/2020	DPT-36	1.3-1.5	Sample Bag	6/29/2020
P_20200629_92950_63	20WS-0246-SO5921-12.2-12.6-N-062520	0246	SO5921	Subsurface	Soil	6/25/2020	DPT-37	12.2-12.6	Sample Bag	6/29/2020
P_20200629_92950_64	20WS-0246-SO5922-8.8-9.2-N-062520	0246	SO5922	Subsurface	Soil	6/25/2020	DPT-38	8.8-9.2	Sample Bag	6/29/2020
P_20200629_92950_65	20WS-0246-SO5923-4.8-5.1-N-062520	0246	SO5923	Subsurface	Soil	6/25/2020	DPT-39	4.8-5.1	Sample Bag	6/29/2020
P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520	0246	SO5924	Subsurface	Soil	6/25/2020	DPT-40	8.7-9	Sample Bag	6/29/2020
P_20200629_92950_72	20WS-0285-SO5925-1.0-1.4-N-062520	0285	SO5925	Subsurface	Soil	6/25/2020	DPT-41	1-1.4	Sample Bag	6/29/2020
P_20200629_92950_73	20WS-1150-SO5926-20.5-20.8-N-062520	1150	SO5926	Subsurface	Soil	6/25/2020	DPT-42	20.5-20.8	Sample Bag	6/29/2020
P_20200629_92950_74	20WS-0015-SO5927-5.5-6.2-N-062620	0015	SO5927	Subsurface	Soil	6/26/2020	DPT-43	5.5-6.2	Sample Bag	6/29/2020
P_20200629_92950_75	20WS-0015-SO5928-12.5-12.7-N-062620	0015	SO5928	Subsurface	Soil	6/26/2020	DPT-44	12.5-12.7	Sample Bag	6/29/2020
P_20200629_92950_76	20WS-0015-SO5929-12.7-13.0-N-062620	0015	SO5929	Subsurface	Soil	6/26/2020	DPT-44	12.7-13	Sample Bag	6/29/2020
P_20200629_92950_77	20WS-0015-SO5930-8.7-9.0-N-062620	0015	SO5930	Subsurface	Soil	6/26/2020	DPT-45	8.7-9	Sample Bag	6/29/2020
P_20200629_92950_78	20WS-0015-SO5931-9.2-9.5-N-062620	0015	SO5931	Subsurface	Soil	6/26/2020	DPT-46	9.2-9.5	Sample Bag	6/29/2020

Table 5. FPXRF Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20200707_92951_06	20WS-0016-SO5932-4.8-5.2-N-070120	0016	SO5932	Subsurface	Soil	7/1/2020	DPT-47	4.8-5.2	Sample Bag	7/7/2020
P_20200707_92951_07	20WS-0016-SO5933-12.7-13.0-N-070120	0016	SO5933	Subsurface	Soil	7/1/2020	DPT-48	12.7-13	Sample Bag	7/7/2020
P_20200707_92951_08	20WS-0016-SO5934-12.7-13.2-N-070120	0016	SO5934	Subsurface	Soil	7/1/2020	DPT-49	12.7-13.2	Sample Bag	7/7/2020
P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120	0016	SO5935	Subsurface	Soil	7/1/2020	DPT-50	4-5	Sample Bag	7/7/2020
P_20200707_92951_10	20WS-0016-SO5935-4.0-5.0-D-070120	0016	SO5935	Subsurface	Soil	7/1/2020	DPT-50	4-5	Sample Bag	7/7/2020
P_20200707_92951_11	20WS-0013-SO5936-12.3-12.6-N-070120	0013	SO5936	Subsurface	Soil	7/1/2020	DPT-51	12.3-12.6	Sample Bag	7/7/2020
P_20200707_92951_12	20WS-1150-SO5937-12.3-12.7-N-070120	1150	SO5937	Subsurface	Soil	7/1/2020	DPT-52	12.3-12.7	Sample Bag	7/7/2020
P_20200707_92951_13	20WS-1150-SO5938-24.4-24.9-N-070120	1150	SO5938	Subsurface	Soil	7/1/2020	DPT-53	24.4-24.9	Sample Bag	7/7/2020
P_20200707_92951_14	20WS-0288-SO5939-4.0-4.4-N-070220	0288	SO5939	Subsurface	Soil	7/2/2020	DPT-54	4-4.4	Sample Bag	7/7/2020
P_20200707_92951_15	20WS-0288-SO5940-4.4-4.9-N-070220	0288	SO5940	Subsurface	Soil	7/2/2020	DPT-54	4.4-4.9	Sample Bag	7/7/2020
P_20200707_92951_16	20WS-0288-SO5941-4.0-4.5-N-070220	0288	SO5941	Subsurface	Soil	7/2/2020	DPT-56	4-4.5	Sample Bag	7/7/2020
P_20200707_92951_17	20WS-0288-SO5942-0.9-1.3-N-070220	0288	SO5942	Subsurface	Soil	7/2/2020	DPT-57	0.9-1.3	Sample Bag	7/7/2020
P_20200707_92951_18	20WS-0289-SO5944-12.3-12.6-N-070220	0289	SO5944	Subsurface	Soil	7/2/2020	DPT-59	12.3-12.6	Sample Bag	7/7/2020
P_20200707_92951_19	20WS-0289-SO5945-12.8-13.3-N-070220	0289	SO5945	Subsurface	Soil	7/2/2020	DPT-60	12.8-13.3	Sample Bag	7/7/2020
P_20200707_92951_20	20WS-0162-SO5943-12.3-12.7-N-070620	0162	SO5943	Subsurface	Soil	7/6/2020	DPT-61	12.3-12.7	Sample Bag	7/7/2020
P_20200707_92951_21	20WS-0162-SO5946-16.0-16.4-N-070620	0162	SO5946	Subsurface	Soil	7/6/2020	DPT-62	16-16.4	Sample Bag	7/7/2020
P_20200707_92951_22	20WS-0162-SO5947-20.0-20.4-N-070620	0162	SO5947	Subsurface	Soil	7/6/2020	DPT-63	20-20.4	Sample Bag	7/7/2020
P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620	0138	SO5948	Subsurface	Soil	7/6/2020	DPT-64	12.8-13.3	Sample Bag	7/7/2020
P_20200707_92951_26	20WS-0138-SO5949-13.1-13.6-N-070620	0138	SO5949	Subsurface	Soil	7/6/2020	DPT-65	13.1-13.6	Sample Bag	7/7/2020
P_20200707_92951_27	20WS-0138-SO5950-9.5-9.8-N-070620	0138	SO5950	Subsurface	Soil	7/6/2020	DPT-66	9.5-9.8	Sample Bag	7/7/2020
P_20200709_92951_32	20WS-0179-SO5951-4.2-4.5-N-070820	0179	SO5951	Subsurface	Soil	7/8/2020	DPT-67	4.2-4.5	Sample Bag	7/9/2020
P_20200709_92951_33	20WS-0179-SO5953-5.4-5.7-N-070820	0179	SO5953	Subsurface	Soil	7/8/2020	DPT-69	5.4-5.7	Sample Bag	7/9/2020
P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820	0179	SO5954	Subsurface	Soil	7/8/2020	DPT-70	4.3-4.9	Sample Bag	7/9/2020
P_20200709_92951_35	20WS-0179-SO5954-4.3-4.9-D-070820	0179	SO5954	Subsurface	Soil	7/8/2020	DPT-70	4.3-4.9	Sample Bag	7/9/2020
P_20200709_92951_36	20WS-0179-SO5955-0.7-1.2-N-070820	0179	SO5955	Subsurface	Soil	7/8/2020	DPT-71	0.7-1.2	Sample Bag	7/9/2020
P_20200709_92951_37	20WS-0017-SO5956-8.1-8.6-N-070820	0017	SO5956	Subsurface	Soil	7/8/2020	DPT-72	8.1-8.6	Sample Bag	7/9/2020
P_20200709_92951_38	20WS-0019-SO5957-5.3-5.7-N-070820	0019	SO5957	Subsurface	Soil	7/8/2020	DPT-73	5.3-5.7	Sample Bag	7/9/2020
P_20200709_92951_39	20WS-0017-SO5958-12.4-12.8-N-070820	0017	SO5958	Subsurface	Soil	7/8/2020	DPT-74	12.4-12.8	Sample Bag	7/9/2020
P_20200709_92951_40	20WS-0315-SO5959-8.8-9-N-070920	0315	SO5959	Subsurface	Soil	7/9/2020	DPT-75	8.8-9	Sample Bag	7/9/2020
P_20200709_92951_41	20WS-0315-SO5960-4.3-4.7-N-070920	0315	SO5960	Subsurface	Soil	7/9/2020	DPT-76	4.3-4.7	Sample Bag	7/9/2020
P_20200709_92951_42	20WS-0315-SO5961-4.3-4.6-N-070920	0315	SO5961	Subsurface	Soil	7/9/2020	DPT-77	4.3-4.6	Sample Bag	7/9/2020
P_20200709_92951_43	20WS-0315-SO5962-5.3-5.6-N-070920	0315	SO5962	Subsurface	Soil	7/9/2020	DPT-78	5.3-5.6	Sample Bag	7/9/2020
P_20200731_92950_91	20WS-1124-SO5963-N-072820	1124	SO5963	Surface	Soil	7/28/2020	N/A	N/A	Simple Sieve	7/31/2020

Attachment A
Data Validation Checklists

Attachment A-1. Analytical Run Summary Table

Attachment A-2. Sio_2 Standard Exceedance Summary Table

Attachment A-3. CCS Exceedance Summary Table

Attachment A-4. FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples

Site:	West Side Soils Operable Unit	**Case No:**	2019-2020 WSSOU FPXRF	**Laboratory:**	Field
Project:	WSSOU RI Sampling	**Sample Matrix:**	Soil	**Analyses:** antimony, arsenic, barium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc	
Sample Date(s): 10/23/2019, 10/24/2019, 10/25/2019, 11/04/2019, 11/08/2019, 11/05/2019, 10/31/2019, 10/28/2019, 11/15/2019, 11/07/2019, 11/13/2019, 05/28/2020, 06/03/2020, 05/18/2020, 05/12/2020, 05/13/2020, 05/14/2020, 06/18/2020, 06/19/2020, 06/23/2020, 06/24/2020, 06/25/2020, 06/26/2020, 07/01/2020, 07/02/2020, 07/06/2020, 07/08/2020, 07/09/2020, 06/01/2020, 05/27/2020, 05/26/2020, 06/02/2020, 06/09/2020, 05/19/2020, 05/20/2020, 05/21/2020, 05/29/2020, 06/04/2020, 06/10/2020, 07/28/2020		**Analysis Date(s):** 10/23/2019, 10/24/2019, 10/28/2019, 11/05/2019, 11/11/2019, 11/06/2019, 11/01/2019, 11/15/2019, 11/08/2019, 05/29/2020, 06/03/2020, 05/19/2020, 05/12/2020, 05/13/2020, 05/14/2020, 06/24/2020, 06/29/2020, 07/07/2020, 07/09/2020, 06/01/2020, 05/28/2020, 05/26/2020, 06/10/2020, 06/04/2020, 07/31/2020			
Data Validator:	L. Moon	**Validation Date(s):**	9/15/2021		

1. Holding Times

Analytes	Laboratory	Matrix	Method	Holding Times	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Sb, As, Ba, Cd, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn	Field	Soil	FPXRF	N/A	See above	See above	N/A	N/A

Were any data flagged because of holding time? Y [ ] N [X]

What sample preparation steps were performed (i.e. drying, sieving etc.)? Simple Sieve / Sample Bag

Were the samples prepped according to the SAP/QAPP? Y [ ] N [X]

Describe Any Actions Taken: All subsurface samples underwent the "Sample Bag" prep method as defined in the WSSOU RI QAPP. This prep method does not meet the WSSOU RI QAPP requirement of sieving samples prior to FPXRF analysis; therefore, for all subsurface samples, detected results have been qualified "J" and non-detected results have been qualified "UJ".

Comments: All surface samples underwent the "Simple Sieve" prep method as defined in the WSSOU RI QAPP.

2. Energy Calibration (System Check)

Was the energy calibration performed at the frequency of once per day? Y [X] N [ ]

Was the energy calibration Resolution below 195? Y [X] N [ ]

Did the energy calibration run for at least 50 seconds? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments:

3. SiO_2 Standard

Was the SiO_2 Standard analyzed at the beginning of analysis? Y [X] N [ ]

Was the SiO_2 Standard analyzed at the frequency of 1 per 20 natural samples? Y [X] N [ ]

Were the SiO_2 Standard results within the control limits? Y [ ] N [X]

Were any data flagged because of the SiO_2 Standard results? Y [X] N [ ]

Describe Any Actions Taken: Attachment 1 – Analytical Run Summary Table summarizes the analytical runs and lists QC deficiencies. Sample results in analytical runs that did not have a closing QC standard were qualified "J" for detected results and "UJ" for non-detected results.

SiO_2 Standard results that were outside the control limits are listed in Attachment 2 - SiO2 Standard Exceedance Summary Table. Sample results in the same analytical run as these SiO_2 Standards were qualified as "J+" for the analytes SiO_2 Standard results outside the control limit, if the sample had a detected result less than 10 times the SiO_2 Standard result.

Comments:

4. Calibration Check Standard

Was the appropriate Calibration Check Standard (CCS) analyzed at the beginning of analysis?	Y	X	N	
Was the appropriate CCS analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were CCS results within the control limits?	Y		N	X
Were any data flagged because of CCS problems?	Y	X	N	

Describe Any Actions Taken: There was no CCS that had a detectable amount of cobalt or mercury. All cobalt and mercury results were non-detected and have therefore been qualified "UJ" for the lack of an appropriate CCS.

CCS results that were outside the control limits (%R 80-120%) are listed in Attachment 3 - CCS Exceedance Summary Table. Sample results in the same analytical run as these CSS were qualified as "J" for detected results or "UJ" for non-detected results, except if there was another CCS with results within the control limit in the same analytical run, then applying professional judgement, only the sample results that were within 10 times the failing CCS were qualified as "J" for detected results or "UJ" for non-detected results.

Comments:

5. Duplicate Sample Results

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were Duplicate Sample results within the control window?	Y		N	X
Were any data flagged because of duplicate sample results?	Y	X	N	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results) lists all FPXRF duplicate sample results and the RPDs. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF duplicate was a field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 4 - FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples.

Comments:

6. Replicate Sample Results

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were replicate sample results within the control window?	Y		N	X
Were any data flagged because of replicate sample results?	Y	X	N	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results) lists all FPXRF replicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF replicate was an FPXRF Duplicate or field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 4 - FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples.

Comments:

7. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N	X	N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Sample Results) lists all field duplicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. No samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 4 - FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples.

Comments:

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: All subsurface sample results have been qualified "J/UJ" due to the lack of sieving in the prep method.
All cobalt and mercury results have been qualified "UJ" due to a lack of an appropriate CCS.

Refer to the following tables for a summary of qualifications made:
- Attachment 1 - Analytical Run Summary Table
- Attachment 2 - SiO2 Standard Exceedance Summary Table
- Attachment 3 - CCS Exceedance Summary Table
- Attachment 4 - FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples

Comments:

9. Authorization of Data Validation

Data Validator

Name: L. Moon **Reviewed by:** Josie McElroy

Signature: Laura Moon Josie McElroy

Date: 9/15/2021 9/24/2021

Attachment A.1
Analytical Run Summary Table

Analysis Date	XRF ID	Analytical Run ID	QC Deficiencies	DV Qual	Affected Samples
10/23/2019	92951	P_20191023	None		
10/24/2019	92951	P_20191024	None		
10/28/2019	92951	P_20191028	None		
11/1/2019	92951	P_20191101	None		
11/5/2019	92951	P_20191105	None		
11/6/2019	92951	P_20191106	None		
11/8/2019	92951	P_20191108	None		
11/11/2019	92951	P_20191111	None		
11/15/2019	92951	P_20191115	None		
5/12/2020	92951	P_20200512	None		
6/4/2020	92951	P_20200604	None		
6/10/2020	92951	P_20200610	None		
5/14/2020	92951	P_20200514	None		
5/19/2020	92951	P_20200519	None		
5/13/2020	92951	P_20200513	None		
5/26/2020	92951	P_20200526	None		
5/28/2020	92951	P_20200528	None		
5/29/2020	92951	P_20200529	None		
6/1/2020	92951	P_20200601	No closing QC Standard	J/UJ	20WS-0311-SO5623-N-060120, 20WS-0003-SO5661-N-060120, 20WS-0038-SO5664-N-060120, 20WS-0317-SO5668-N-060120
6/3/2020	92951	P_20200603	None		
6/24/2020	92950	P_20200624	No closing QC Standard	J/UJ	20WS-0003-SO5902-8.6-9.0-N-062320, 20WS-0003-SO5903-4.6-4.9-N-062320, 20WS-0003-SO5904-12.6-13.0-N-062320, 20WS-0010-SO5905-8.4-8.8-N-062320, 20WS-0010-SO5906-13.0-13.5-N-062320, 20WS-0010-SO5907-12.2-12.6-N-062320, 20WS-0010-SO5908-12.4-12.8-N-062320
6/29/2020	92950	P_20200629	No closing QC Standard	J/UJ	20WS-0285-SO5925-1.0-1.4-N-062520, 20WS-1150-SO5926-20.5-20.8-N-062520, 20WS-0015-SO5927-5.5-6.2-N-062620, 20WS-0015-SO5928-12.5-12.7-N-062620, 20WS-0015-SO5929-12.7-13.0-N-062620, 20WS-0015-SO5930-8.7-9.0-N-062620, 20WS-0015-SO5931-9.2-9.5-N-062620
7/7/2020	92951	P_20200707	None		
7/9/2020	92951	P_20200709	No closing QC Standard	J/UJ	20WS-0179-SO5951-4.2-4.5-N-070820, 20WS-0179-SO5953-5.4-5.7-N-070820, 20WS-0179-SO5954-4.3-4.9-N-070820, 20WS-0179-SO5955-0.7-1.2-N-070820, 20WS-0017-SO5956-8.1-8.6-N-070820, 20WS-0019-SO5957-5.3-5.7-N-070820, 20WS-0017-SO5958-12.4-12.8-N-070820, 20WS-0315-SO5959-8.8-9-N-070920, 20WS-0315-SO5960-4.3-4.7-N-070920, 20WS-0315-SO5961-4.3-4.6-N-070920, 20WS-0315-SO5962-5.3-5.6-N-070920
7/31/2020	92950	P_20200731	None		

Attachment A.2
SiO_2 Standard Exceedance Summary Table

Abbreviations:
mg/kg = milligram per kilogram

Attachment A.2. SiO_2 Standard Exceedance Summary Table

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	DV Qual	Affected Samples
P_20191023_92951_133	SiO2	10/23/2019	Cadmium	10.11	J+	WS19-0003-SO5031-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_133	SiO2	10/23/2019	Antimony	28.69	J+	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_133	SiO2	10/23/2019	Barium	195.92	J+	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-1045-SO5009-N-102319, WS19-1045-SO5030-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5037-N-102319, WS19-0003-SO5038-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_133	SiO2	10/23/2019	Iron	35.05		None
P_20191023_92951_145	SiO2	10/23/2019	Iron	63.45		None
P_20191023_92951_145	SiO2	10/23/2019	Antimony	29.29	J+	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_145	SiO2	10/23/2019	Barium	172.48	J+	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-1045-SO5009-N-102319, WS19-1045-SO5030-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5037-N-102319, WS19-0003-SO5038-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_145	SiO2	10/23/2019	Cadmium	11.09	J+	WS19-0003-SO5031-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_154	SiO2	10/23/2019	Barium	181.54	J+	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-1045-SO5009-N-102319, WS19-1045-SO5030-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5037-N-102319, WS19-0003-SO5038-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_154	SiO2	10/23/2019	Cadmium	10.46	J+	WS19-0003-SO5031-N-102319, WS19-0003-SO5043-N-102319
P_20191023_92951_154	SiO2	10/23/2019	Iron	49.47		None
P_20191023_92951_154	SiO2	10/23/2019	Antimony	28.75	J+	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191024_92951_156	SiO2	10/24/2019	Barium	185.93	J+	WS19-0003-SO5048-N-102419, WS19-0003-SO5049-N-102419, WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5055-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419, WS19-0040-SO5061-N-102419, WS19-0040-SO5062-N-102419
P_20191024_92951_156	SiO2	10/24/2019	Cadmium	12.48	J+	WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419
P_20191024_92951_156	SiO2	10/24/2019	Antimony	27.1	J+	WS19-0003-SO5048-N-102419, WS19-0003-SO5049-N-102419, WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5055-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419, WS19-0040-SO5061-N-102419, WS19-0040-SO5062-N-102419
P_20191024_92951_156	SiO2	10/24/2019	Manganese	51		None
P_20191024_92951_156	SiO2	10/24/2019	Iron	38.15		None
P_20191024_92951_164	SiO2	10/24/2019	Cadmium	9.86	J+	WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419
P_20191024_92951_164	SiO2	10/24/2019	Iron	56.32		None
P_20191024_92951_164	SiO2	10/24/2019	Antimony	23.42	J+	WS19-0003-SO5048-N-102419, WS19-0003-SO5049-N-102419, WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5055-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419, WS19-0040-SO5061-N-102419, WS19-0040-SO5062-N-102419
P_20191024_92951_164	SiO2	10/24/2019	Barium	152.62	J+	WS19-0003-SO5048-N-102419, WS19-0003-SO5049-N-102419, WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5055-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419, WS19-0040-SO5061-N-102419, WS19-0040-SO5062-N-102419
P_20191028_92951_176	SiO2	10/28/2019	Antimony	25.45	J+	WS19-0040-SO5064-N-102519, WS19-0040-SO5069-N-102519, WS19-0040-SO5072-N-102519, WS19-0040-SO5074-N-102519, WS19-0040-SO5076-N-102519, WS19-0040-SO5080-N-102519, WS19-0043-SO5081-N-102519, WS19-0043-SO5083-N-102519, WS19-0043-SO5085-N-102519, WS19-0043-SO5086-N-102519, WS19-0043-SO5087-N-102519, WS19-0005-SO5011-N-102519, WS19-0040-SO5073-N-102519, WS19-0005-SO5090-N-102519, WS19-0006-SO5093-N-102519, WS19-0043-SO5094-N-102819
P_20191028_92951_176	SiO2	10/28/2019	Iron	71.12		None
P_20191028_92951_176	SiO2	10/28/2019	Barium	158.71	J+	WS19-0040-SO5064-N-102519, WS19-0040-SO5069-N-102519, WS19-0040-SO5072-N-102519, WS19-0040-SO5074-N-102519, WS19-0040-SO5076-N-102519, WS19-0040-SO5080-N-102519, WS19-0043-SO5081-N-102519, WS19-0043-SO5083-N-102519, WS19-0043-SO5085-N-102519, WS19-0043-SO5086-N-102519, WS19-0043-SO5087-N-102519, WS19-0005-SO5011-N-102519, WS19-0005-SO5088-N-102519, WS19-0040-SO5073-N-102519, WS19-0005-SO5090-N-102519, WS19-0006-SO5093-N-102519, WS19-0043-SO5094-N-102819
P_20191028_92951_176	SiO2	10/28/2019	Cadmium	12.59	J+	WS19-0040-SO5064-N-102519, WS19-0040-SO5069-N-102519, WS19-0040-SO5072-N-102519, WS19-0040-SO5074-N-102519, WS19-0040-SO5080-N-102519, WS19-0043-SO5081-N-102519, WS19-0005-SO5011-N-102519, WS19-0040-SO5073-N-102519
P_20191028_92951_176	SiO2	10/28/2019	Silver	7.17	J+	WS19-0040-SO5076-N-102519, WS19-0040-SO5080-N-102519, WS19-0043-SO5083-N-102519, WS19-0043-SO5085-N-102519, WS19-0043-SO5086-N-102519, WS19-0043-SO5087-N-102519, WS19-0040-SO5073-N-102519, WS19-0005-SO5090-N-102519, WS19-0006-SO5093-N-102519, WS19-0043-SO5094-N-102819
P_20191101_92951_305	SiO2	11/1/2019	Cadmium	10.64	J+	WS19-0040-SO5102-N-103119, WS19-0040-SO5107-N-103119, WS19-0040-SO5109-N-103119, WS19-0038-SO5111-N-103119, WS19-0041-SO5116-N-103119
P_20191101_92951_305	SiO2	11/1/2019	Manganese	36.19		None
P_20191101_92951_305	SiO2	11/1/2019	Iron	68.48		None
P_20191101_92951_305	SiO2	11/1/2019	Barium	165.5	J+	WS19-0040-SO5101-N-103119, WS19-0040-SO5102-N-103119, WS19-0040-SO5105-N-103119, WS19-0040-SO5106-N-103119, WS19-0040-SO5107-N-103119, WS19-0040-SO5109-N-103119, WS19-0038-SO5111-N-103119, WS19-0041-SO5116-N-103119
P_20191101_92951_305	SiO2	11/1/2019	Antimony	26.7	J+	WS19-0040-SO5101-N-103119, WS19-0040-SO5102-N-103119, WS19-0040-SO5105-N-103119, WS19-0040-SO5106-N-103119, WS19-0040-SO5107-N-103119, WS19-0040-SO5109-N-103119, WS19-0038-SO5111-N-103119, WS19-0041-SO5116-N-103119
P_20191105_92951_319	SiO2	11/5/2019	Iron	78.51		None
P_20191105_92951_319	SiO2	11/5/2019	Cadmium	8.55	J+	WS19-0041-SO5015-N-110419, WS19-0007-SO5132-N-110419, WS19-0037-SO5136-N-110419, WS19-0037-SO5138-N-110419
P_20191105_92951_319	SiO2	11/5/2019	Barium	149.25	J+	WS19-0006-SO5014-N-110419, WS19-0041-SO5015-N-110419, WS19-0006-SO5122-N-110419, WS19-0006-SO5123-N-110419, WS19-0006-SO5125-N-110419, WS19-0006-SO5128-N-110419, WS19-0006-SO5131-N-110419, WS19-0007-SO5132-N-110419, WS19-0037-SO5136-N-110419, WS19-0037-SO5138-N-110419

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	DV Qual	Affected Samples
P_20191105_92951_319	SiO2	11/5/2019	Antimony	25.46	J+	WS19-0006-SO5014-N-110419, WS19-0041-SO5015-N-110419, WS19-0006-SO5122-N-110419, WS19-0006-SO5123-N-110419, WS19-0006-SO5125-N-110419, WS19-0006-SO5128-N-110419, WS19-0006-SO5131-N-110419, WS19-0007-SO5132-N-110419, WS19-0037-SO5136-N-110419, WS19-0037-SO5138-N-110419
P_20191106_92951_335	SiO2	11/6/2019	Antimony	23.43	J+	WS19-0037-SO5140-N-110519, WS19-0038-SO5143-N-110519, WS19-0038-SO5147-N-110519, WS19-0038-SO5153-N-110519, WS19-0037-SO5155-N-110519, WS19-0037-SO5158-N-110519, WS19-0010-SO5160-N-110519, WS19-0010-SO5162-N-110519, WS19-0010-SO5164-N-110519, WS19-0010-SO5170-N-110519, WS19-0010-SO5171-N-110519
P_20191106_92951_335	SiO2	11/6/2019	Barium	166.13	J+	WS19-0037-SO5140-N-110519, WS19-0038-SO5143-N-110519, WS19-0038-SO5147-N-110519, WS19-0038-SO5153-N-110519, WS19-0037-SO5155-N-110519, WS19-0037-SO5158-N-110519, WS19-0010-SO5160-N-110519, WS19-0010-SO5162-N-110519, WS19-0010-SO5164-N-110519, WS19-0010-SO5170-N-110519, WS19-0010-SO5171-N-110519
P_20191106_92951_335	SiO2	11/6/2019	Iron	95.85		None
P_20191106_92951_335	SiO2	11/6/2019	Cadmium	12.1	J+	WS19-0037-SO5140-N-110519, WS19-0038-SO5143-N-110519, WS19-0037-SO5155-N-110519, WS19-0010-SO5160-N-110519, WS19-0010-SO5164-N-110519, WS19-0010-SO5170-N-110519, WS19-0010-SO5171-N-110519
P_20191108_92951_352	SiO2	11/8/2019	Barium	164.02	J+	WS19-0315-SO5021-N-110719, WS19-0315-SO5024-N-110719, WS19-0010-SO5172-N-110719, WS19-0010-SO5173-N-110719, WS19-0010-SO5174-N-110719, WS19-0010-SO5176-N-110719, WS19-0010-SO5177-N-110719, WS19-0313-SO5180-N-110719, WS19-0015-SO5182-N-110719, WS19-0015-SO5183-N-110719, WS19-0010-SO5185-N-110719
P_20191108_92951_352	SiO2	11/8/2019	Cadmium	11.44	J+	WS19-0010-SO5173-N-110719, WS19-0010-SO5174-N-110719, WS19-0010-SO5177-N-110719, WS19-0313-SO5180-N-110719, WS19-0015-SO5183-N-110719, WS19-0010-SO5185-N-110719
P_20191108_92951_352	SiO2	11/8/2019	Antimony	28.59	J+	WS19-0315-SO5021-N-110719, WS19-0010-SO5173-N-110719, WS19-0010-SO5174-N-110719, WS19-0010-SO5177-N-110719, WS19-0313-SO5180-N-110719, WS19-0015-SO5182-N-110719, WS19-0015-SO5183-N-110719, WS19-0010-SO5185-N-110719
P_20191108_92951_352	SiO2	11/8/2019	Iron	75.31		None
P_20191111_92951_371	SiO2	11/11/2019	Cadmium	7.19	J+	WS19-0021-SO5001-N-110819, WS19-0017-SO5005-N-110819, WS19-0010-SO5026-N-110819, WS19-0010-SO5187-N-110819, WS19-0015-SO5197-N-110819, WS19-0015-SO5200-N-110819
P_20191111_92951_371	SiO2	11/11/2019	Iron	70.28		None
P_20191111_92951_371	SiO2	11/11/2019	Antimony	34.48	J+	WS19-0021-SO5001-N-110819, WS19-0017-SO5005-N-110819, WS19-0010-SO5026-N-110819, WS19-0010-SO5187-N-110819, WS19-0019-SO5192-N-110819, WS19-0019-SO5193-N-110819, WS19-0017-SO5194-N-110819, WS19-0015-SO5197-N-110819, WS19-0015-SO5200-N-110819, WS19-0015-SO5204-N-110819
P_20191111_92951_371	SiO2	11/11/2019	Manganese	55.84		None
P_20191111_92951_371	SiO2	11/11/2019	Barium	198.43	J+	WS19-0021-SO5001-N-110819, WS19-0017-SO5005-N-110819, WS19-0010-SO5026-N-110819, WS19-0010-SO5187-N-110819, WS19-0019-SO5192-N-110819, WS19-0019-SO5193-N-110819, WS19-0017-SO5194-N-110819, WS19-0015-SO5197-N-110819, WS19-0015-SO5200-N-110819, WS19-0015-SO5204-N-110819
P_20191115_92951_387	SiO2	11/15/2019	Antimony	22.07	J+	WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0289-SO5007-N-111319, WS19-0289-SO5012-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20191115_92951_387	SiO2	11/15/2019	Barium	149.58	J+	WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0289-SO5007-N-111319, WS19-0289-SO5012-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20191115_92951_387	SiO2	11/15/2019	Manganese	40.69	J+	WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0288-SO5217-N-111519
P_20191115_92951_387	SiO2	11/15/2019	Cadmium	7.85	J+	WS19-0289-SO5007-N-111319, WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5234-N-111519
P_20191115_92951_387	SiO2	11/15/2019	Silver	5.65	J+	WS19-0289-SO5007-N-111319, WS19-0289-SO5012-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0288-SO5215-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5234-N-111519
P_20191115_92951_387	SiO2	11/15/2019	Iron	89.22		None
P_20191115_92951_400	SiO2	11/15/2019	Manganese	48.52	J+	WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0288-SO5217-N-111519
P_20191115_92951_400	SiO2	11/15/2019	Barium	170.08	J+	WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0289-SO5007-N-111319, WS19-0289-SO5012-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20191115_92951_400	SiO2	11/15/2019	Iron	74.74		None
P_20191115_92951_400	SiO2	11/15/2019	Antimony	21.42	J+	WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0289-SO5007-N-111319, WS19-0289-SO5012-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20191115_92951_400	SiO2	11/15/2019	Cadmium	13.75	J+	WS19-0289-SO5007-N-111319, WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5234-N-111519
P_20200512_92951_511	SiO2	5/12/2020	Iron	88.05		None
P_20200512_92951_511	SiO2	5/12/2020	Barium	175.32	J+	20WS-0288-SO5238-N-051220, 20WS-0297-SO5240-N-051220, 20WS-0297-SO5241-N-051220, 20WS-0297-SO5242-N-051220, 20WS-0297-SO5243-N-051220, 20WS-0297-SO5244-N-051220
P_20200512_92951_511	SiO2	5/12/2020	Antimony	26.96	J+	20WS-0288-SO5238-N-051220, 20WS-0297-SO5240-N-051220, 20WS-0297-SO5241-N-051220, 20WS-0297-SO5242-N-051220, 20WS-0297-SO5243-N-051220, 20WS-0297-SO5244-N-051220
P_20200512_92951_511	SiO2	5/12/2020	Cadmium	12.74	J+	20WS-0288-SO5238-N-051220, 20WS-0297-SO5241-N-051220, 20WS-0297-SO5242-N-051220, 20WS-0297-SO5243-N-051220
P_20200513_92951_523	SiO2	5/13/2020	Manganese	50.07	J+	20WS-0297-SO5255-N-051220
P_20200513_92951_523	SiO2	5/13/2020	Iron	65.24		None
P_20200513_92951_523	SiO2	5/13/2020	Antimony	30.05	J+	20WS-0300-SO5266-N-051220, 20WS-0288-SO5274-N-051320, 20WS-0288-SO5276-N-051320, 20WS-0288-SO5278-N-051320, 20WS-0288-SO5280-N-051320, 20WS-0288-SO5281-N-051320, 20WS-0297-SO5247-N-051220, 20WS-0297-SO5248-N-051220, 20WS-0297-SO5251-N-051220, 20WS-0297-SO5255-N-051220, 20WS-0297-SO5257-N-051220, 20WS-0297-SO5260-N-051220, 20WS-0300-SO5263-N-051220, 20WS-0300-SO5264-N-051220, 20WS-0300-SO5265-N-051220, 20WS-0299-SO5282-N-051320, 20WS-0300-SO5285-N-051320

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	DV Qual	Affected Samples
P_20200513_92951_523	SiO2	5/13/2020	Barium	182	J+	20WS-0300-SO5266-N-051220, 20WS-0288-SO5274-N-051320, 20WS-0288-SO5276-N-051320, 20WS-0288-SO5278-N-051320, 20WS-0288-SO5280-N-051320, 20WS-0288-SO5281-N-051320, 20WS-0297-SO5247-N-051220, 20WS-0297-SO5248-N-051220, 20WS-0297-SO5251-N-051220, 20WS-0297-SO5255-N-051220, 20WS-0297-SO5257-N-051220, 20WS-0297-SO5260-N-051220, 20WS-0300-SO5263-N-051220, 20WS-0300-SO5264-N-051220, 20WS-0300-SO5265-N-051220, 20WS-0299-SO5282-N-051320, 20WS-0300-SO5285-N-051320
P_20200513_92951_523	SiO2	5/13/2020	Cadmium	9.31	J+	20WS-0288-SO5274-N-051320, 20WS-0288-SO5278-N-051320, 20WS-0297-SO5247-N-051220, 20WS-0297-SO5257-N-051220, 20WS-0297-SO5260-N-051220, 20WS-0300-SO5263-N-051220, 20WS-0300-SO5264-N-051220, 20WS-0300-SO5266-N-051220
P_20200514_92951_546	SiO2	5/14/2020	Iron	49.6		None
P_20200514_92951_546	SiO2	5/14/2020	Antimony	24.27	J+	20WS-0300-SO5288-N-051320, 20WS-0300-SO5290-N-051320, 20WS-0298-SO5293-N-051320, 20WS-0298-SO5295-N-051320, 20WS-0299-SO5299-N-051320, 20WS-0299-SO5301-N-051320, 20WS-0285-SO5305-N-051420, 20WS-0285-SO5308-N-051420, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5314-N-051420, 20WS-0285-SO5316-N-051420, 20WS-0285-SO5318-N-051420, 20WS-0285-SO5319-N-051420, 20WS-0285-SO5322-N-051420, 20WS-0285-SO5324-N-051420, 20WS-0285-SO5326-N-051420, 20WS-0285-SO5329-N-051420, 20WS-0285-SO5334-N-051420
P_20200514_92951_546	SiO2	5/14/2020	Manganese	41.18		None
P_20200514_92951_546	SiO2	5/14/2020	Barium	156.1	J+	20WS-0300-SO5288-N-051320, 20WS-0300-SO5290-N-051320, 20WS-0298-SO5292-N-051320, 20WS-0298-SO5293-N-051320, 20WS-0298-SO5295-N-051320, 20WS-0299-SO5299-N-051320, 20WS-0299-SO5301-N-051320, 20WS-0285-SO5305-N-051420, 20WS-0285-SO5308-N-051420, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5312-N-051420, 20WS-0285-SO5314-N-051420, 20WS-0285-SO5316-N-051420, 20WS-0285-SO5318-N-051420, 20WS-0285-SO5319-N-051420, 20WS-0285-SO5321-N-051420, 20WS-0285-SO5322-N-051420, 20WS-0285-SO5324-N-051420, 20WS-0285-SO5326-N-051420, 20WS-0285-SO5329-N-051420, 20WS-0285-SO5333-N-051420, 20WS-0285-SO5334-N-051420
P_20200514_92951_573	SiO2	5/14/2020	Antimony	25.83	J+	20WS-0300-SO5288-N-051320, 20WS-0300-SO5290-N-051320, 20WS-0298-SO5293-N-051320, 20WS-0298-SO5295-N-051320, 20WS-0299-SO5299-N-051320, 20WS-0299-SO5301-N-051320, 20WS-0285-SO5305-N-051420, 20WS-0285-SO5308-N-051420, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5314-N-051420, 20WS-0285-SO5316-N-051420, 20WS-0285-SO5318-N-051420, 20WS-0285-SO5319-N-051420, 20WS-0285-SO5322-N-051420, 20WS-0285-SO5324-N-051420, 20WS-0285-SO5326-N-051420, 20WS-0285-SO5329-N-051420, 20WS-0285-SO5334-N-051420
P_20200514_92951_573	SiO2	5/14/2020	Cadmium	12.83	J+	20WS-0285-SO5333-N-051420, 20WS-0285-SO5334-N-051420, 20WS-0285-SO5305-N-051420, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5314-N-051420, 20WS-0285-SO5316-N-051420, 20WS-0285-SO5321-N-051420, 20WS-0285-SO5324-N-051420
P_20200514_92951_573	SiO2	5/14/2020	Manganese	45.24		None
P_20200514_92951_573	SiO2	5/14/2020	Iron	45.47		None
P_20200514_92951_573	SiO2	5/14/2020	Barium	165.79	J+	20WS-0300-SO5288-N-051320, 20WS-0300-SO5290-N-051320, 20WS-0298-SO5292-N-051320, 20WS-0298-SO5293-N-051320, 20WS-0298-SO5295-N-051320, 20WS-0299-SO5299-N-051320, 20WS-0299-SO5301-N-051320, 20WS-0285-SO5305-N-051420, 20WS-0285-SO5308-N-051420, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5312-N-051420, 20WS-0285-SO5314-N-051420, 20WS-0285-SO5316-N-051420, 20WS-0285-SO5318-N-051420, 20WS-0285-SO5319-N-051420, 20WS-0285-SO5321-N-051420, 20WS-0285-SO5322-N-051420, 20WS-0285-SO5324-N-051420, 20WS-0285-SO5326-N-051420, 20WS-0285-SO5329-N-051420, 20WS-0285-SO5333-N-051420, 20WS-0285-SO5334-N-051420
P_20200514_92951_573	SiO2	5/14/2020	Silver	5.4	J+	20WS-0285-SO5326-N-051420, 20WS-0300-SO5288-N-051320, 20WS-0300-SO5290-N-051320, 20WS-0298-SO5293-N-051320, 20WS-0298-SO5295-N-051320, 20WS-0299-SO5299-N-051320, 20WS-0299-SO5301-N-051320, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5319-N-051420
P_20200519_92951_575	SiO2	5/19/2020	Cadmium	10.04	J+	20WS-0285-SO5336-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5377-N-051820
P_20200519_92951_575	SiO2	5/19/2020	Barium	145.85	J+	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5386-N-051920, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200519_92951_575	SiO2	5/19/2020	Iron	73.04		None
P_20200519_92951_575	SiO2	5/19/2020	Antimony	24.61	J+	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200519_92951_599	SiO2	5/19/2020	Antimony	30.16	J+	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200519_92951_599	SiO2	5/19/2020	Cadmium	8.99	J+	20WS-0285-SO5336-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5377-N-051820
P_20200519_92951_599	SiO2	5/19/2020	Barium	168.81	J+	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5386-N-051920, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200519_92951_599	SiO2	5/19/2020	Iron	67.58		None
P_20200526_92951_608	SiO2	5/26/2020	Barium	154.87	J+	20WS-0315-SO5453-N-052620, 20WS-0315-SO5454-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0315-SO5460-N-052620, 20WS-0315-SO5464-N-052620, 20WS-0315-SO5471-N-052620, 20WS-0315-SO5474-N-052620, 20WS-0315-SO5479-N-052620, 20WS-0315-SO5480-N-052620, 20WS-0315-SO5484-N-052620, 20WS-0249-SO5407-N-052020, 20WS-0249-SO5411-N-052020, 20WS-0249-SO5412-N-052020, 20WS-0249-SO5418-N-052020, 20WS-0249-SO5419-N-052020, 20WS-0306-SO5421-N-052020, 20WS-0306-SO5422-N-052020, 20WS-0016-SO5426-N-052120, 20WS-0016-SO5428-N-052120, 20WS-0016-SO5430-N-052120, 20WS-0016-SO5437-N-052120, 20WS-0015-SO5438-N-052120, 20WS-0013-SO5439-N-052120, 20WS-0013-SO5443-N-052120, 20WS-0013-SO5447-N-052120
P_20200526_92951_608	SiO2	5/26/2020	Iron	63.27		None

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	DV Qual	Affected Samples
P_20200526_92951_608	SiO2	5/26/2020	Antimony	23.16	J+	20WS-0315-SO5453-N-052620, 20WS-0315-SO5454-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0315-SO5464-N-052620, 20WS-0315-SO5471-N-052620, 20WS-0315-SO5474-N-052620, 20WS-0315-SO5479-N-052620, 20WS-0315-SO5484-N-052620, 20WS-0249-SO5407-N-052020, 20WS-0249-SO5411-N-052020, 20WS-0249-SO5412-N-052020, 20WS-0249-SO5418-N-052020, 20WS-0249-SO5419-N-052020, 20WS-0306-SO5421-N-052020, 20WS-0306-SO5422-N-052020, 20WS-0016-SO5426-N-052120, 20WS-0016-SO5428-N-052120, 20WS-0016-SO5430-N-052120, 20WS-0016-SO5437-N-052120, 20WS-0013-SO5443-N-052120, 20WS-0013-SO5447-N-052120
P_20200526_92951_608	SiO2	5/26/2020	Manganese	43.01	J+	20WS-0315-SO5454-N-052620, 20WS-0306-SO5421-N-052020
P_20200526_92951_608	SiO2	5/26/2020	Cadmium	10.14	J+	20WS-0315-SO5453-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0249-SO5412-N-052020, 20WS-0306-SO5422-N-052020, 20WS-0016-SO5426-N-052120, 20WS-0016-SO5428-N-052120, 20WS-0016-SO5430-N-052120, 20WS-0016-SO5437-N-052120, 20WS-0013-SO5439-N-052120, 20WS-0013-SO5443-N-052120, 20WS-0013-SO5447-N-052120
P_20200528_92951_641	SiO2	5/28/2020	Antimony	14.6	J+	20WS-0315-SO5495-N-052720, 20WS-0315-SO5496-N-052720, 20WS-0315-SO5498-N-052720, 20WS-0313-SO5505-N-052720, 20WS-0315-SO5506-N-052720, 20WS-0313-SO5511-N-052720, 20WS-0315-SO5513-N-052720, 20WS-0320-SO5523-N-052720, 20WS-0320-SO5524-N-052720, 20WS-0320-SO5527-N-052720
P_20200528_92951_641	SiO2	5/28/2020	Iron	58.86		None
P_20200528_92951_641	SiO2	5/28/2020	Barium	77.22	J+	20WS-0315-SO5490-N-052720, 20WS-0315-SO5495-N-052720, 20WS-0315-SO5496-N-052720, 20WS-0315-SO5498-N-052720, 20WS-0313-SO5505-N-052720, 20WS-0315-SO5506-N-052720, 20WS-0313-SO5511-N-052720, 20WS-0315-SO5513-N-052720, 20WS-0315-SO5516-N-052720, 20WS-0320-SO5523-N-052720, 20WS-0320-SO5524-N-052720, 20WS-0320-SO5527-N-052720
P_20200529_92951_659	SiO2	5/29/2020	Barium	55.78	J+	20WS-0321-SO5531-N-052820, 20WS-0319-SO5535-N-052820, 20WS-0319-SO5536-N-052820, 20WS-0312-SO5542-N-052820, 20WS-0312-SO5547-N-052820, 20WS-0307-SO5548-N-052820, 20WS-0313-SO5553-N-052820, 20WS-0301-SO5559-N-052820, 20WS-0301-SO5566-N-052820
P_20200529_92951_659	SiO2	5/29/2020	Iron	47.1		None
P_20200601_92951_676	SiO2	6/1/2020	Antimony	10.88	J+	20WS-0302-SO5568-N-052920, 20WS-0302-SO5567-N-052920, 20WS-0302-SO5574-N-052920, 20WS-0302-SO5576-N-052920, 20WS-0302-SO5577-N-052920, 20WS-0301-SO5579-N-052920, 20WS-0301-SO5584-N-052920, 20WS-0301-SO5585-N-052920, 20WS-0300-SO5590-N-052920, 20WS-0300-SO5592-N-052920, 20WS-0300-SO5593-N-052920, 20WS-0306-SO5597-N-052920, 20WS-0013-SO5603-N-060120, 20WS-0296-SO5614-N-060120, 20WS-0296-SO5615-N-060120, 20WS-0296-SO5618-N-060120, 20WS-0296-SO5619-N-060120
P_20200601_92951_676	SiO2	6/1/2020	Barium	50.31	J+	20WS-0302-SO5568-N-052920, 20WS-0302-SO5567-N-052920, 20WS-0301-SO5573-N-052920, 20WS-0302-SO5574-N-052920, 20WS-0302-SO5576-N-052920, 20WS-0302-SO5577-N-052920, 20WS-0301-SO5579-N-052920, 20WS-0300-SO5590-N-052920, 20WS-0300-SO5592-N-052920, 20WS-0300-SO5593-N-052920, 20WS-0306-SO5597-N-052920, 20WS-0013-SO5603-N-060120, 20WS-0296-SO5614-N-060120, 20WS-0296-SO5615-N-060120, 20WS-0296-SO5618-N-060120, 20WS-0296-SO5619-N-060120
P_20200601_92951_676	SiO2	6/1/2020	Manganese	32.83	J+	20WS-0296-SO5615-N-060120
P_20200601_92951_676	SiO2	6/1/2020	Iron	43.77		None
P_20200603_92951_707	SiO2	6/3/2020	Iron	65.94		None
P_20200603_92951_707	SiO2	6/3/2020	Barium	72.38	J+	20WS-1143-SO5626-N-060220, 20WS-1143-SO5627-N-060220, 20WS-1142-SO5631-N-060220, 20WS-0350-SO5633-N-060220, 20WS-0350-SO5637-N-060220, 20WS-0350-SO5640-N-060220, 20WS-0350-SO5648-N-060220, 20WS-0179-SO5672-N-060220, 20WS-0179-SO5675-N-060220, 20WS-0179-SO5678-N-060220, 20WS-0179-SO5679-N-060220, 20WS-0179-SO5684-N-060220, 20WS-0179-SO5685-N-060220, 20WS-0142-SO5688-N-060220, 20WS-0142-SO5692-N-060220, 20WS-0138-SO5694-N-060220, 20WS-0138-SO5697-N-060220, 20WS-0130-SO5729-N-060220, 20WS-0130-SO5731-N-060220, 20WS-0162-SO5708-N-060320, 20WS-0162-SO5710-N-060320, 20WS-0162-SO5711-N-060320, 20WS-0162-SO5716-N-060320, 20WS-0162-SO5719-N-060320, 20WS-0162-SO5720-N-060320, 20WS-0138-SO5724-N-060320, 20WS-0162-SO5734-N-060320, 20WS-0162-SO5736-N-060320, 20WS-0160-SO5738-N-060320, 20WS-0160-SO5739-N-060320, 20WS-0158-SO5745-N-060320, 20WS-0158-SO5748-N-060320, 20WS-0138-SO5752-N-060320, 20WS-0138-SO5754-N-060320, 20WS-0138-SO5756-N-060320, 20WS-0138-SO5757-N-060320, 20WS-0138-SO5758-N-060320, 20WS-0138-SO5761-N-060320, 20WS-0138-SO5762-N-060320, 20WS-0138-SO5780-N-060320, 20WS-0138-SO5781-N-060320, 20WS-0138-SO5783-N-060320, 20WS-0138-SO5785-N-060320
P_20200603_92951_760	SiO2	6/3/2020	Antimony	10.56	J+	20WS-1143-SO5626-N-060220, 20WS-1143-SO5627-N-060220, 20WS-0350-SO5633-N-060220, 20WS-0350-SO5637-N-060220, 20WS-0350-SO5640-N-060220, 20WS-0350-SO5648-N-060220, 20WS-0179-SO5675-N-060220, 20WS-0179-SO5678-N-060220, 20WS-0179-SO5679-N-060220, 20WS-0179-SO5684-N-060220, 20WS-0179-SO5685-N-060220, 20WS-0142-SO5692-N-060220, 20WS-0138-SO5694-N-060220, 20WS-0138-SO5697-N-060220, 20WS-0130-SO5729-N-060220, 20WS-0162-SO5708-N-060320, 20WS-0162-SO5711-N-060320, 20WS-0162-SO5719-N-060320, 20WS-0162-SO5720-N-060320, 20WS-0138-SO5724-N-060320, 20WS-0162-SO5734-N-060320, 20WS-0160-SO5738-N-060320, 20WS-0160-SO5739-N-060320, 20WS-0158-SO5745-N-060320, 20WS-0158-SO5748-N-060320, 20WS-0153-SO5751-N-060320, 20WS-0138-SO5752-N-060320, 20WS-0138-SO5754-N-060320, 20WS-0138-SO5756-N-060320, 20WS-0138-SO5757-N-060320, 20WS-0138-SO5758-N-060320, 20WS-0138-SO5761-N-060320, 20WS-0138-SO5762-N-060320, 20WS-0138-SO5785-N-060320
P_20200603_92951_760	SiO2	6/3/2020	Barium	71.45	J+	20WS-1143-SO5626-N-060220, 20WS-1143-SO5627-N-060220, 20WS-1142-SO5631-N-060220, 20WS-0350-SO5633-N-060220, 20WS-0350-SO5637-N-060220, 20WS-0350-SO5640-N-060220, 20WS-0350-SO5648-N-060220, 20WS-0179-SO5672-N-060220, 20WS-0179-SO5675-N-060220, 20WS-0179-SO5678-N-060220, 20WS-0179-SO5679-N-060220, 20WS-0179-SO5684-N-060220, 20WS-0179-SO5685-N-060220, 20WS-0142-SO5688-N-060220, 20WS-0142-SO5692-N-060220, 20WS-0138-SO5694-N-060220, 20WS-0138-SO5697-N-060220, 20WS-0130-SO5729-N-060220, 20WS-0130-SO5731-N-060220, 20WS-0162-SO5708-N-060320, 20WS-0162-SO5710-N-060320, 20WS-0162-SO5711-N-060320, 20WS-0162-SO5716-N-060320, 20WS-0162-SO5719-N-060320, 20WS-0162-SO5720-N-060320, 20WS-0138-SO5724-N-060320, 20WS-0162-SO5734-N-060320, 20WS-0162-SO5736-N-060320, 20WS-0160-SO5738-N-060320, 20WS-0160-SO5739-N-060320, 20WS-0158-SO5745-N-060320, 20WS-0158-SO5748-N-060320, 20WS-0138-SO5752-N-060320, 20WS-0138-SO5754-N-060320, 20WS-0138-SO5756-N-060320, 20WS-0138-SO5757-N-060320, 20WS-0138-SO5758-N-060320, 20WS-0138-SO5761-N-060320, 20WS-0138-SO5762-N-060320, 20WS-0138-SO5780-N-060320, 20WS-0138-SO5781-N-060320, 20WS-0138-SO5783-N-060320, 20WS-0138-SO5785-N-060320
P_20200603_92951_760	SiO2	6/3/2020	Iron	113.36		None
P_20200603_92951_760	SiO2	6/3/2020	Manganese	53.48	J+	20WS-0179-SO5672-N-060220, 20WS-0179-SO5679-N-060220, 20WS-0179-SO5684-N-060220, 20WS-0158-SO5745-N-060320, 20WS-0158-SO5748-N-060320
P_20200604_92951_763	SiO2	6/4/2020	Antimony	18.35	J+	20WS-0138-SO5776-N-060320, 20WS-0122-SO5765-N-060420, 20WS-0122-SO5766-N-060420, 20WS-0102-SO5770-N-060420, 20WS-0122-SO5773-N-060420, 20WS-0123-SO5775-N-060420, 20WS-0138-SO5790-N-060420, 20WS-0138-SO5793-N-060420, 20WS-0138-SO5796-N-060420, 20WS-0121-SO5803-N-060420, 20WS-0121-SO5804-N-060420, 20WS-0121-SO5809-N-060420, 20WS-0122-SO5831-N-060420, 20WS-0122-SO5834-N-060420, 20WS-0122-SO5837-N-060420, 20WS-0122-SO5839-N-060420
P_20200604_92951_763	SiO2	6/4/2020	Iron	90.97		None
P_20200604_92951_763	SiO2	6/4/2020	Barium	99.48	J+	20WS-0138-SO5776-N-060320, 20WS-0122-SO5765-N-060420, 20WS-0122-SO5766-N-060420, 20WS-0102-SO5770-N-060420, 20WS-0122-SO5773-N-060420, 20WS-0123-SO5775-N-060420, 20WS-0138-SO5790-N-060420, 20WS-0138-SO5793-N-060420, 20WS-0138-SO5796-N-060420, 20WS-0121-SO5803-N-060420, 20WS-0121-SO5804-N-060420, 20WS-0121-SO5809-N-060420, 20WS-0123-SO5827-N-060420, 20WS-0122-SO5831-N-060420, 20WS-0122-SO5834-N-060420, 20WS-0122-SO5837-N-060420, 20WS-0122-SO5839-N-060420
P_20200610_92951_787	SiO2	6/10/2020	Barium	83.99	J+	20WS-1118-SO5815-N-060920, 20WS-1116-SO5819-N-060920, 20WS-1115-SO5846-N-060920, 20WS-1115-SO5850-N-060920, 20WS-1115-SO5851-N-060920, 20WS-1115-SO5852-N-060920, 20WS-1114-SO5853-N-060920, 20WS-1113-SO5856-N-060920, 20WS-1113-SO5857-N-060920, 20WS-1113-SO5859-N-060920, 20WS-1112-SO5860-N-060920, 20WS-1016-SO5863-N-060920, 20WS-1007-SO5866-N-060920, 20WS-1016-SO5870-N-061020, 20WS-0607-SO5871-N-061020, 20WS-0607-SO5872-N-061020

Attachment A.2. SiO_2 Standard Exceedance Summary Table

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	DV Qual	Affected Samples
P_20200610_92951_787	SiO2	6/10/2020	Cadmium	8.44	J+	20WS-1116-SO5819-N-060920, 20WS-1115-SO5850-N-060920, 20WS-1113-SO5859-N-060920, 20WS-1016-SO5863-N-060920
P_20200610_92951_787	SiO2	6/10/2020	Iron	61.49		None
P_20200610_92951_787	SiO2	6/10/2020	Antimony	12.04	J+	20WS-1116-SO5819-N-060920, 20WS-1115-SO5850-N-060920, 20WS-1115-SO5851-N-060920, 20WS-1114-SO5853-N-060920, 20WS-1113-SO5856-N-060920, 20WS-1113-SO5859-N-060920, 20WS-1112-SO5860-N-060920, 20WS-1016-SO5863-N-060920, 20WS-1007-SO5866-N-060920, 20WS-1016-SO5870-N-061020, 20WS-0607-SO5872-N-061020
P_20200624_92950_16	SiO2	6/24/2020	Iron	130.04		None
P_20200624_92950_38	SiO2	6/24/2020	Iron	145.22		None
P_20200629_92950_48	SiO2	6/29/2020	Iron	97.77		None
P_20200629_92950_70	SiO2	6/29/2020	Iron	127.06		None
P_20200707_92951_03	SiO2	7/7/2020	Antimony	39.8	J+	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5933-12.7-13.0-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0016-SO5935-4.0-5.0-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20200707_92951_03	SiO2	7/7/2020	Zinc	7.7	J+	20WS-0162-SO5947-20.0-20.4-N-070620
P_20200707_92951_03	SiO2	7/7/2020	Silver	8.63	J+	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5949-13.1-13.6-N-070620
P_20200707_92951_03	SiO2	7/7/2020	Cadmium	12.44	J+	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5933-12.7-13.0-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0016-SO5935-4.0-5.0-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20200707_92951_03	SiO2	7/7/2020	Iron	35.81		None
P_20200707_92951_03	SiO2	7/7/2020	Barium	235.57	J+	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5933-12.7-13.0-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0016-SO5935-4.0-5.0-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5949-13.1-13.6-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20200709_92951_30	SiO2	7/9/2020	Arsenic	3.6		None
P_20200709_92951_30	SiO2	7/9/2020	Cadmium	13.24		None
P_20200709_92951_30	SiO2	7/9/2020	Antimony	36.08		None
P_20200709_92951_30	SiO2	7/9/2020	Barium	217.04		None
P_20200709_92951_30	SiO2	7/9/2020	Silver	8.92		None
P_20200731_92950_90	SiO2	7/31/2020	Iron	60.56		None

Attachment A.3
CCS Exceedance Summary Table

Abbreviations:
mg/kg = milligram per kilogram
%R = percent recovery

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	True Value (mg/kg)	%R	DV Qual	Affected Samples
P_20200707_92951_28	NIST 2709a	7/7/2020	Iron	26508.74	33600	79%	J/UJ	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5933-12.7-13.0-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0016-SO5935-4.0-5.0-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5949-13.1-13.6-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20200731_92950_92	NIST 2709a	7/31/2020	Iron	26336.62	33600	78%	J/UJ	20WS-1124-SO5963-N-072820
P_20191023_92951_134	NIST 2709a	10/23/2019	Lead	12.42	17.3	72%	J/UJ	WS19-0003-SO5032-N-102319
P_20191028_92951_199	NIST 2709a	10/28/2019	Lead	13.02	17.3	75%	J/UJ	WS19-0005-SO5011-N-102519, WS19-0005-SO5090-N-102519
P_20191105_92951_333	NIST 2709a	11/5/2019	Lead	13.39	17.3	77%		None
P_20191115_92951_401	NIST 2709a	11/15/2019	Lead	11.1	17.3	64%	J/UJ	WS19-0297-SO5221-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0286-SO5236-N-111519
P_20200512_92951_512	NIST 2709a	5/12/2020	Lead	13.63	17.3	79%	J/UJ	20WS-0297-SO5240-N-051220
P_20200526_92951_629	NIST 2709a	5/26/2020	Lead	13.62	17.3	79%	J/UJ	20WS-0315-SO5454-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0315-SO5460-N-052620, 20WS-0315-SO5474-N-052620, 20WS-0315-SO5479-N-052620, 20WS-0315-SO5480-N-052620, 20WS-0315-SO5484-N-052620, 20WS-0249-SO5407-N-052020, 20WS-0249-SO5411-N-052020, 20WS-0249-SO5412-N-052020, 20WS-0249-SO5418-N-052020, 20WS-0249-SO5419-N-052020, 20WS-0306-SO5421-N-052020
P_20200707_92951_28	NIST 2709a	7/7/2020	Lead	12.95	17.3	75%	J/UJ	20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5949-13.1-13.6-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20191106_92951_336	USGS SdAR-M2	11/6/2019	Copper	182.6	236	77%	J/UJ	WS19-0037-SO5140-N-110519, WS19-0038-SO5143-N-110519, WS19-0038-SO5147-N-110519, WS19-0038-SO5153-N-110519, WS19-0037-SO5155-N-110519, WS19-0037-SO5158-N-110519, WS19-0010-SO5160-N-110519, WS19-0010-SO5162-N-110519, WS19-0010-SO5164-N-110519, WS19-0010-SO5170-N-110519, WS19-0010-SO5171-N-110519
P_20191108_92951_353	USGS SdAR-M2	11/8/2019	Copper	181.26	236	77%	J/UJ	WS19-0315-SO5021-N-110719, WS19-0315-SO5024-N-110719, WS19-0010-SO5172-N-110719, WS19-0010-SO5173-N-110719, WS19-0010-SO5174-N-110719, WS19-0010-SO5176-N-110719, WS19-0010-SO5177-N-110719, WS19-0313-SO5180-N-110719, WS19-0015-SO5182-N-110719, WS19-0015-SO5183-N-110719, WS19-0010-SO5185-N-110719
P_20191115_92951_398	USGS SdAR-M2	11/15/2019	Copper	186.03	236	79%	J/UJ	WS19-0289-SO5007-N-111319, WS19-0289-SO5012-N-111319, WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20200512_92951_512	NIST 2709a	5/12/2020	Manganese	410.06	529	78%	J/UJ	20WS-0288-SO5238-N-051220, 20WS-0297-SO5240-N-051220, 20WS-0297-SO5241-N-051220, 20WS-0297-SO5242-N-051220, 20WS-0297-SO5243-N-051220, 20WS-0297-SO5244-N-051220
P_20200519_92951_576	NIST 2709a	5/19/2020	Manganese	402.74	529	76%	J/UJ	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5373-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5376-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820
P_20200707_92951_28	NIST 2709a	7/7/2020	Manganese	388.48	529	73%	J/UJ	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5933-12.7-13.0-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0016-SO5935-4.0-5.0-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5949-13.1-13.6-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20200731_92950_92	NIST 2709a	7/31/2020	Manganese	416.62	529	79%	J/UJ	20WS-1124-SO5963-N-072820
P_20200731_92950_92	NIST 2709a	7/31/2020	Zinc	81.01	103	79%	J/UJ	20WS-1124-SO5963-N-072820
P_20200629_92950_71	USGS SdAR-M2	6/29/2020	Antimony	81.7	107	76%	J/UJ	20WS-0010-SO5909-8.2-8.5-N-062420, 20WS-0010-SO5910-9.2-9.6-N-062420, 20WS-0297-SO5911-12.7-13.0-N-062420, 20WS-0297-SO5912-4.5-4.8-N-062420, 20WS-0297-SO5913-0.2-0.8-N-062420, 20WS-0297-SO5914-0.4-0.8-N-062420, 20WS-0288-SO5915-4.6-5.0-N-062420, 20WS-0285-SO5916-4.4-4.5-N-062520, 20WS-0285-SO5917-8.4-8.7-N-062520, 20WS-0285-SO5918-0.3-0.9-N-062520, 20WS-0285-SO5919-1.2-1.5-N-062520, 20WS-0285-SO5920-1.3-1.5-N-062520, 20WS-0246-SO5921-12.2-12.6-N-062520, 20WS-0246-SO5922-8.8-9.2-N-062520, 20WS-0246-SO5923-4.8-5.1-N-062520, 20WS-0246-SO5924-8.7-9.0-N-062520, 20WS-0285-SO5925-1.0-1.4-N-062520, 20WS-1150-SO5926-20.5-20.8-N-062520, 20WS-0015-SO5927-5.5-6.2-N-062620, 20WS-0015-SO5928-12.5-12.7-N-062620, 20WS-0015-SO5929-12.7-13.0-N-062620, 20WS-0015-SO5930-8.7-9.0-N-062620, 20WS-0015-SO5931-9.2-9.5-N-062620
P_20200731_92950_92	NIST 2709a	7/31/2020	Barium	753.53	979	77%	J/UJ	20WS-1124-SO5963-N-072820
P_20200526_92951_629	NIST 2709a	5/26/2020	Barium	746.53	979	76%	J/UJ	20WS-0315-SO5453-N-052620, 20WS-0315-SO5454-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0315-SO5460-N-052620, 20WS-0315-SO5464-N-052620, 20WS-0315-SO5471-N-052620, 20WS-0315-SO5474-N-052620, 20WS-0315-SO5479-N-052620, 20WS-0315-SO5480-N-052620, 20WS-0315-SO5484-N-052620, 20WS-0249-SO5407-N-052020, 20WS-0249-SO5411-N-052020, 20WS-0249-SO5412-N-052020, 20WS-0249-SO5418-N-052020, 20WS-0249-SO5419-N-052020, 20WS-0306-SO5421-N-052020, 20WS-0306-SO5422-N-052020, 20WS-0016-SO5426-N-052120, 20WS-0016-SO5428-N-052120, 20WS-0016-SO5430-N-052120, 20WS-0016-SO5437-N-052120, 20WS-0015-SO5438-N-052120, 20WS-0013-SO5439-N-052120, 20WS-0013-SO5443-N-052120, 20WS-0013-SO5447-N-052120
P_20191105_92951_333	NIST 2709a	11/5/2019	Barium	775.9	979	79%	J/UJ	WS19-0006-SO5014-N-110419, WS19-0041-SO5015-N-110419, WS19-0006-SO5122-N-110419, WS19-0006-SO5123-N-110419, WS19-0006-SO5125-N-110419, WS19-0006-SO5128-N-110419, WS19-0006-SO5131-N-110419, WS19-0007-SO5132-N-110419, WS19-0037-SO5136-N-110419, WS19-0037-SO5138-N-110419
P_20200731_92950_92	NIST 2709a	7/31/2020	Nickel	62.6	85	74%	J/UJ	20WS-1124-SO5963-N-072820

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	True Value (mg/kg)	%R	DV Qual	Affected Samples
P_20200512_92951_512	NIST 2709a	5/12/2020	Nickel	46.89	85	55%	J/UJ	20WS-0288-SO5238-N-051220, 20WS-0297-SO5240-N-051220, 20WS-0297-SO5241-N-051220, 20WS-0297-SO5242-N-051220, 20WS-0297-SO5243-N-051220, 20WS-0297-SO5244-N-051220
P_20200513_92951_544	NIST 2709a	5/13/2020	Nickel	80	85	0%	J/UJ	20WS-0300-SO5266-N-051220, 20WS-0288-SO5274-N-051320, 20WS-0288-SO5276-N-051320, 20WS-0288-SO5278-N-051320, 20WS-0288-SO5280-N-051320, 20WS-0288-SO5281-N-051320, 20WS-0297-SO5247-N-051220, 20WS-0297-SO5248-N-051220, 20WS-0297-SO5251-N-051220, 20WS-0297-SO5255-N-051220, 20WS-0297-SO5257-N-051220, 20WS-0297-SO5260-N-051220, 20WS-0300-SO5263-N-051220, 20WS-0300-SO5264-N-051220, 20WS-0300-SO5265-N-051220, 20WS-0299-SO5282-N-051320, 20WS-0300-SO5285-N-051320
P_20200519_92951_576	NIST 2709a	5/19/2020	Nickel	46.4	85	55%	J/UJ	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5373-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5376-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5386-N-051920, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200526_92951_629	NIST 2709a	5/26/2020	Nickel	36.92	85	43%	J/UJ	20WS-0315-SO5453-N-052620, 20WS-0315-SO5454-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0315-SO5460-N-052620, 20WS-0315-SO5464-N-052620, 20WS-0315-SO5471-N-052620, 20WS-0315-SO5474-N-052620, 20WS-0315-SO5479-N-052620, 20WS-0315-SO5480-N-052620, 20WS-0315-SO5484-N-052620, 20WS-0249-SO5407-N-052020, 20WS-0249-SO5411-N-052020, 20WS-0249-SO5412-N-052020, 20WS-0249-SO5418-N-052020, 20WS-0249-SO5419-N-052020, 20WS-0306-SO5421-N-052020, 20WS-0306-SO5422-N-052020, 20WS-0016-SO5426-N-052120, 20WS-0016-SO5428-N-052120, 20WS-0016-SO5430-N-052120, 20WS-0016-SO5437-N-052120, 20WS-0015-SO5438-N-052120, 20WS-0013-SO5439-N-052120, 20WS-0013-SO5443-N-052120, 20WS-0013-SO5447-N-052120
P_20200528_92951_657	NIST 2709a	5/28/2020	Nickel	36.48	85	43%	J/UJ	20WS-0315-SO5490-N-052720, 20WS-0315-SO5495-N-052720, 20WS-0315-SO5496-N-052720, 20WS-0315-SO5498-N-052720, 20WS-0313-SO5505-N-052720, 20WS-0315-SO5506-N-052720, 20WS-0313-SO5511-N-052720, 20WS-0315-SO5513-N-052720, 20WS-0315-SO5516-N-052720, 20WS-0320-SO5523-N-052720, 20WS-0320-SO5524-N-052720, 20WS-0320-SO5527-N-052720
P_20200601_92951_677	NIST 2709a	6/1/2020	Nickel	50.52	85	59%	J/UJ	20WS-0302-SO5568-N-052920, 20WS-0302-SO5567-N-052920, 20WS-0301-SO5573-N-052920, 20WS-0302-SO5574-N-052920, 20WS-0302-SO5576-N-052920, 20WS-0302-SO5577-N-052920, 20WS-0301-SO5579-N-052920, 20WS-0301-SO5584-N-052920, 20WS-0301-SO5585-N-052920, 20WS-0300-SO5590-N-052920, 20WS-0300-SO5592-N-052920, 20WS-0300-SO5593-N-052920, 20WS-0306-SO5597-N-052920, 20WS-0013-SO5603-N-060120, 20WS-0013-SO5608-N-060120, 20WS-0296-SO5614-N-060120, 20WS-0296-SO5615-N-060120, 20WS-0296-SO5618-N-060120, 20WS-0296-SO5619-N-060120
P_20200604_92951_764	NIST 2709a	6/4/2020	Nickel	37.88	85	45%	J/UJ	20WS-0138-SO5776-N-060320, 20WS-0122-SO5765-N-060420, 20WS-0122-SO5766-N-060420, 20WS-0102-SO5770-N-060420, 20WS-0122-SO5773-N-060420, 20WS-0123-SO5775-N-060420, 20WS-0138-SO5790-N-060420, 20WS-0138-SO5793-N-060420, 20WS-0138-SO5796-N-060420, 20WS-0121-SO5803-N-060420, 20WS-0121-SO5804-N-060420, 20WS-0121-SO5809-N-060420, 20WS-0123-SO5827-N-060420, 20WS-0122-SO5831-N-060420, 20WS-0122-SO5834-N-060420, 20WS-0122-SO5837-N-060420, 20WS-0122-SO5839-N-060420
P_20200610_92951_807	NIST 2709a	6/10/2020	Nickel	48.69	85	57%	J/UJ	20WS-1118-SO5815-N-060920, 20WS-1116-SO5819-N-060920, 20WS-1115-SO5846-N-060920, 20WS-1115-SO5850-N-060920, 20WS-1115-SO5851-N-060920, 20WS-1115-SO5852-N-060920, 20WS-1114-SO5853-N-060920, 20WS-1113-SO5856-N-060920, 20WS-1113-SO5857-N-060920, 20WS-1113-SO5859-N-060920, 20WS-1112-SO5860-N-060920, 20WS-1016-SO5863-N-060920, 20WS-1007-SO5866-N-060920, 20WS-1016-SO5870-N-061020, 20WS-0607-SO5871-N-061020, 20WS-0607-SO5872-N-061020
P_20200707_92951_28	NIST 2709a	7/7/2020	Nickel	51.62	85	61%	J/UJ	20WS-0016-SO5932-4.8-5.2-N-070120, 20WS-0016-SO5933-12.7-13.0-N-070120, 20WS-0016-SO5934-12.7-13.2-N-070120, 20WS-0016-SO5935-4.0-5.0-N-070120, 20WS-0013-SO5936-12.3-12.6-N-070120, 20WS-1150-SO5937-12.3-12.7-N-070120, 20WS-1150-SO5938-24.4-24.9-N-070120, 20WS-0288-SO5939-4.0-4.4-N-070220, 20WS-0288-SO5940-4.4-4.9-N-070220, 20WS-0288-SO5941-4.0-4.5-N-070220, 20WS-0288-SO5942-0.9-1.3-N-070220, 20WS-0289-SO5944-12.3-12.6-N-070220, 20WS-0289-SO5945-12.8-13.3-N-070220, 20WS-0162-SO5943-12.3-12.7-N-070620, 20WS-0162-SO5946-16.0-16.4-N-070620, 20WS-0162-SO5947-20.0-20.4-N-070620, 20WS-0138-SO5948-12.8-13.3-N-070620, 20WS-0138-SO5949-13.1-13.6-N-070620, 20WS-0138-SO5950-9.5-9.8-N-070620
P_20191023_92951_134	NIST 2709a	10/23/2019	Nickel	45.26	85	53%	J/UJ	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-1045-SO5009-N-102319, WS19-1045-SO5030-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5037-N-102319, WS19-0003-SO5038-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191024_92951_162	NIST 2709a	10/24/2019	Nickel	39.19	85	46%	J/UJ	WS19-0003-SO5048-N-102419, WS19-0003-SO5049-N-102419, WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5055-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419, WS19-0040-SO5061-N-102419, WS19-0040-SO5062-N-102419
P_20191028_92951_199	NIST 2709a	10/28/2019	Nickel	39.54	85	47%	J/UJ	WS19-0040-SO5064-N-102519, WS19-0040-SO5069-N-102519, WS19-0040-SO5072-N-102519, WS19-0040-SO5074-N-102519, WS19-0040-SO5076-N-102519, WS19-0040-SO5080-N-102519, WS19-0043-SO5081-N-102519, WS19-0043-SO5083-N-102519, WS19-0043-SO5085-N-102519, WS19-0043-SO5086-N-102519, WS19-0043-SO5087-N-102519, WS19-0005-SO5011-N-102519, WS19-0005-SO5088-N-102519, WS19-0040-SO5073-N-102519, WS19-0005-SO5090-N-102519, WS19-0006-SO5093-N-102519, WS19-0043-SO5094-N-102819
P_20191101_92951_306	NIST 2709a	11/1/2019	Nickel	39.57	85	47%	J/UJ	WS19-0040-SO5101-N-103119, WS19-0040-SO5102-N-103119, WS19-0040-SO5105-N-103119, WS19-0040-SO5106-N-103119, WS19-0040-SO5107-N-103119, WS19-0040-SO5109-N-103119, WS19-0038-SO5111-N-103119, WS19-0041-SO5116-N-103119
P_20191105_92951_333	NIST 2709a	11/5/2019	Nickel	37.64	85	44%	J/UJ	WS19-0006-SO5014-N-110419, WS19-0041-SO5015-N-110419, WS19-0006-SO5122-N-110419, WS19-0006-SO5123-N-110419, WS19-0006-SO5125-N-110419, WS19-0006-SO5128-N-110419, WS19-0006-SO5131-N-110419, WS19-0007-SO5132-N-110419, WS19-0037-SO5136-N-110419, WS19-0037-SO5138-N-110419
P_20191106_92951_350	NIST 2709a	11/6/2019	Nickel	42.45	85	50%	J/UJ	WS19-0037-SO5140-N-110519, WS19-0038-SO5143-N-110519, WS19-0038-SO5147-N-110519, WS19-0038-SO5153-N-110519, WS19-0037-SO5155-N-110519, WS19-0037-SO5158-N-110519, WS19-0010-SO5160-N-110519, WS19-0010-SO5162-N-110519, WS19-0010-SO5164-N-110519, WS19-0010-SO5170-N-110519, WS19-0010-SO5171-N-110519
P_20191108_92951_368	NIST 2709a	11/8/2019	Nickel	41.37	85	49%	J/UJ	WS19-0315-SO5021-N-110719, WS19-0315-SO5024-N-110719, WS19-0010-SO5172-N-110719, WS19-0010-SO5173-N-110719, WS19-0010-SO5174-N-110719, WS19-0010-SO5176-N-110719, WS19-0010-SO5177-N-110719, WS19-0313-SO5180-N-110719, WS19-0015-SO5182-N-110719, WS19-0015-SO5183-N-110719, WS19-0010-SO5185-N-110719
P_20191111_92951_385	NIST 2709a	11/11/2019	Nickel	46.19	85	54%	J/UJ	WS19-0021-SO5001-N-110819, WS19-0017-SO5005-N-110819, WS19-0010-SO5026-N-110819, WS19-0010-SO5187-N-110819, WS19-0019-SO5192-N-110819, WS19-0019-SO5193-N-110819, WS19-0017-SO5194-N-110819, WS19-0015-SO5197-N-110819, WS19-0015-SO5200-N-110819, WS19-0015-SO5204-N-110819

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	True Value (mg/kg)	%R	DV Qual	Affected Samples
P_20191115_92951_401	NIST 2709a	11/15/2019	Nickel	48.02	85	56%	J/UJ	WS19-0289-SO5012-N-111319, WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0289-SO5007-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20191115_92951_398	USGS SdAR-M2	11/15/2019	Molybdenum	9.65	13.3	73%	J/UJ	WS19-0289-SO5012-N-111319, WS19-0290-SO5018-N-111319, WS19-0290-SO5019-N-111319, WS19-0290-SO5206-N-111319, WS19-0292-SO5211-N-111319, WS19-0292-SO5214-N-111319, WS19-0289-SO5007-N-111319, WS19-0288-SO5215-N-111519, WS19-0288-SO5217-N-111519, WS19-0297-SO5218-N-111519, WS19-0297-SO5220-N-111519, WS19-0297-SO5221-N-111519, WS19-0288-SO5223-N-111519, WS19-0288-SO5224-N-111519, WS19-0288-SO5226-N-111519, WS19-0288-SO5227-N-111519, WS19-0288-SO5231-N-111519, WS19-0288-SO5234-N-111519, WS19-0286-SO5236-N-111519
P_20200512_92951_521	USGS SdAR-M2	5/12/2020	Molybdenum	6.45	13.3	48%	J/UJ	20WS-0288-SO5238-N-051220, 20WS-0297-SO5240-N-051220, 20WS-0297-SO5241-N-051220, 20WS-0297-SO5242-N-051220, 20WS-0297-SO5243-N-051220, 20WS-0297-SO5244-N-051220
P_20200514_92951_547	USGS SdAR-M2	5/14/2020	Molybdenum	10.13	13.3	76%	J/UJ	20WS-0300-SO5288-N-051320, 20WS-0300-SO5290-N-051320, 20WS-0298-SO5292-N-051320, 20WS-0298-SO5293-N-051320, 20WS-0298-SO5295-N-051320, 20WS-0299-SO5299-N-051320, 20WS-0299-SO5301-N-051320, 20WS-0285-SO5305-N-051420, 20WS-0285-SO5308-N-051420, 20WS-0285-SO5311-N-051420, 20WS-0285-SO5312-N-051420, 20WS-0285-SO5314-N-051420, 20WS-0285-SO5316-N-051420, 20WS-0285-SO5318-N-051420, 20WS-0285-SO5319-N-051420, 20WS-0285-SO5321-N-051420, 20WS-0285-SO5322-N-051420, 20WS-0285-SO5324-N-051420, 20WS-0285-SO5326-N-051420, 20WS-0285-SO5329-N-051420, 20WS-0285-SO5333-N-051420, 20WS-0285-SO5334-N-051420
P_20200519_92951_596	USGS SdAR-M2	5/19/2020	Molybdenum	5.43	13.3	41%	J/UJ	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5373-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5376-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5386-N-051920, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200519_92951_606	USGS SdAR-M2	5/19/2020	Molybdenum	6.73	13.3	51%	J/UJ	20WS-0285-SO5336-N-051420, 20WS-0285-SO5337-N-051420, 20WS-0285-SO5340-N-051420, 20WS-0299-SO5342-N-051820, 20WS-0285-SO5345-N-051820, 20WS-0285-SO5349-N-051820, 20WS-0285-SO5354-N-051820, 20WS-0285-SO5355-N-051820, 20WS-0285-SO5357-N-051820, 20WS-0285-SO5361-N-051820, 20WS-0285-SO5369-N-051820, 20WS-0246-SO5373-N-051820, 20WS-0246-SO5372-N-051820, 20WS-0246-SO5376-N-051820, 20WS-0246-SO5377-N-051820, 20WS-0246-SO5383-N-051820, 20WS-0246-SO5384-N-051820, 20WS-0246-SO5386-N-051920, 20WS-0246-SO5391-N-051920, 20WS-0246-SO5396-N-051920, 20WS-0246-SO5397-N-051920, 20WS-0246-SO5400-N-051920, 20WS-0256-SO5402-N-051920
P_20200526_92951_639	USGS SdAR-M2	5/26/2020	Molybdenum	9.44	13.3	71%	J/UJ	20WS-0315-SO5453-N-052620, 20WS-0315-SO5454-N-052620, 20WS-0315-SO5459-N-052620, 20WS-0315-SO5460-N-052620, 20WS-0315-SO5464-N-052620, 20WS-0315-SO5471-N-052620, 20WS-0315-SO5474-N-052620, 20WS-0315-SO5479-N-052620, 20WS-0315-SO5480-N-052620, 20WS-0315-SO5484-N-052620, 20WS-0249-SO5407-N-052020, 20WS-0249-SO5411-N-052020, 20WS-0249-SO5412-N-052020, 20WS-0249-SO5418-N-052020, 20WS-0249-SO5419-N-052020, 20WS-0306-SO5421-N-052020, 20WS-0306-SO5422-N-052020, 20WS-0016-SO5426-N-052120, 20WS-0016-SO5428-N-052120, 20WS-0016-SO5430-N-052120, 20WS-0016-SO5437-N-052120, 20WS-0015-SO5438-N-052120, 20WS-0013-SO5439-N-052120, 20WS-0013-SO5443-N-052120, 20WS-0013-SO5447-N-052120
P_20200529_92951_660	USGS SdAR-M2	5/29/2020	Molybdenum	10.38	13.3	78%	J/UJ	20WS-0321-SO5531-N-052820, 20WS-0319-SO5535-N-052820, 20WS-0319-SO5536-N-052820, 20WS-0312-SO5542-N-052820, 20WS-0312-SO5547-N-052820, 20WS-0307-SO5548-N-052820, 20WS-0313-SO5552-N-052820, 20WS-0313-SO5553-N-052820, 20WS-0313-SO5556-N-052820, 20WS-0301-SO5557-N-052820, 20WS-0301-SO5559-N-052820, 20WS-0301-SO5560-N-052820, 20WS-0301-SO5566-N-052820
P_20200601_92951_701	USGS SdAR-M2	6/1/2020	Molybdenum	8.42	13.3	63%	J/UJ	20WS-0302-SO5568-N-052920, 20WS-0302-SO5567-N-052920, 20WS-0301-SO5573-N-052920, 20WS-0302-SO5574-N-052920, 20WS-0302-SO5576-N-052920, 20WS-0302-SO5577-N-052920, 20WS-0301-SO5579-N-052920, 20WS-0301-SO5584-N-052920, 20WS-0301-SO5585-N-052920, 20WS-0300-SO5590-N-052920, 20WS-0300-SO5592-N-052920, 20WS-0300-SO5593-N-052920, 20WS-0306-SO5597-N-052920, 20WS-0013-SO5603-N-060120, 20WS-0013-SO5608-N-060120, 20WS-0296-SO5614-N-060120, 20WS-0296-SO5615-N-060120, 20WS-0296-SO5618-N-060120, 20WS-0296-SO5619-N-060120, 20WS-0311-SO5623-N-060120, 20WS-0003-SO5661-N-060120, 20WS-0038-SO5664-N-060120, 20WS-0317-SO5668-N-060120
P_20200603_92951_708	USGS SdAR-M2	6/3/2020	Molybdenum	9.48	13.3	71%	J/UJ	20WS-1143-SO5626-N-060220, 20WS-1143-SO5627-N-060220, 20WS-1142-SO5631-N-060220, 20WS-0350-SO5633-N-060220, 20WS-0350-SO5637-N-060220, 20WS-0350-SO5640-N-060220, 20WS-0350-SO5648-N-060220, 20WS-0179-SO5672-N-060220, 20WS-0179-SO5675-N-060220, 20WS-0179-SO5678-N-060220, 20WS-0179-SO5679-N-060220, 20WS-0179-SO5684-N-060220, 20WS-0179-SO5685-N-060220, 20WS-0142-SO5688-N-060220, 20WS-0142-SO5692-N-060220, 20WS-0138-SO5694-N-060220, 20WS-0138-SO5697-N-060220, 20WS-0130-SO5729-N-060220, 20WS-0130-SO5731-N-060220, 20WS-0162-SO5708-N-060320, 20WS-0162-SO5710-N-060320, 20WS-0162-SO5711-N-060320, 20WS-0162-SO5716-N-060320, 20WS-0162-SO5719-N-060320, 20WS-0162-SO5720-N-060320, 20WS-0138-SO5724-N-060320, 20WS-0162-SO5734-N-060320, 20WS-0162-SO5736-N-060320, 20WS-0160-SO5738-N-060320, 20WS-0160-SO5739-N-060320, 20WS-0158-SO5745-N-060320, 20WS-0158-SO5748-N-060320, 20WS-0153-SO5751-N-060320, 20WS-0138-SO5752-N-060320, 20WS-0138-SO5754-N-060320, 20WS-0138-SO5756-N-060320, 20WS-0138-SO5757-N-060320, 20WS-0138-SO5758-N-060320, 20WS-0138-SO5761-N-060320, 20WS-0138-SO5762-N-060320, 20WS-0138-SO5780-N-060320, 20WS-0138-SO5781-N-060320, 20WS-0138-SO5783-N-060320, 20WS-0138-SO5785-N-060320
P_20200624_92950_39	USGS SdAR-M2	6/24/2020	Molybdenum	9.09	13.3	68%	J/UJ	20WS-0040-SO5885-5.6-6.2-N-061820, 20WS-0040-SO5886-5.6-10.0-N-061820, 20WS-0040-SO5887-6.0-6.5-N-061820, 20WS-0040-SO5888-5.6-6.0-N-061820, 20WS-0043-SO5889-5.8-6.2-N-061820, 20WS-0043-SO5890-6.2-6.4-N-061820, 20WS-0043-SO5891-10.3-10.9-N-061820, 20WS-0006-SO5892-5.7-6.0-N-061820, 20WS-0006-SO5893-10.4-10.7-N-061920, 20WS-0006-SO5894-11.1-11.4-N-061920, 20WS-0006-SO5895-5.4-5.7-N-061920, 20WS-0043-SO5896-5.9-6.5-N-061920, 20WS-0043-SO5897-7.3-7.7-N-061920, 20WS-0043-SO5898-10.8-11.2-N-061920, 20WS-0043-SO5899-16.0-16.3-N-061920, 20WS-0003-SO5900-1.0-1.5-N-062320, 20WS-0003-SO5901-4.4-4.7-N-062320, 20WS-0003-SO5902-8.6-9.0-N-062320, 20WS-0003-SO5903-4.6-4.9-N-062320, 20WS-0003-SO5904-12.6-13.0-N-062320, 20WS-0010-SO5905-8.4-8.8-N-062320, 20WS-0010-SO5906-13.0-13.5-N-062320, 20WS-0010-SO5907-12.2-12.6-N-062320, 20WS-0010-SO5908-12.4-12.8-N-062320
P_20200707_92951_04	USGS SdAR-M2	7/7/2020	Molybdenum	14	13.3	0%		None
P_20191023_92951_146	USGS SdAR-M2	10/23/2019	Molybdenum	8.07	13.3	61%	J/UJ	WS19-1045-SO5027-N-102319, WS19-1045-SO5028-N-102319, WS19-1045-SO5009-N-102319, WS19-1045-SO5030-N-102319, WS19-0003-SO5031-N-102319, WS19-0003-SO5032-N-102319, WS19-0003-SO5036-N-102319, WS19-0003-SO5037-N-102319, WS19-0003-SO5038-N-102319, WS19-0003-SO5040-N-102319, WS19-0003-SO5042-N-102319, WS19-0003-SO5043-N-102319
P_20191024_92951_165	USGS SdAR-M2	10/24/2019	Molybdenum	7.59	13.3	57%	J/UJ	WS19-0003-SO5048-N-102419, WS19-0003-SO5049-N-102419, WS19-0003-SO5051-N-102419, WS19-0003-SO5052-N-102419, WS19-0040-SO5053-N-102419, WS19-0040-SO5055-N-102419, WS19-0040-SO5059-N-102419, WS19-0040-SO5060-N-102419, WS19-0040-SO5061-N-102419, WS19-0040-SO5062-N-102419

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	True Value (mg/kg)	%R	DV Qual	Affected Samples
P_20191028_92951_177	USGS SdAR-M2	10/28/2019	Molybdenum	8.95	13.3	67%	J/UJ	WS19-0040-SO5064-N-102519, WS19-0040-SO5069-N-102519, WS19-0040-SO5072-N-102519, WS19-0040-SO5074-N-102519, WS19-0040-SO5076-N-102519, WS19-0040-SO5080-N-102519, WS19-0043-SO5081-N-102519, WS19-0043-SO5083-N-102519, WS19-0043-SO5085-N-102519, WS19-0043-SO5086-N-102519, WS19-0043-SO5087-N-102519, WS19-0005-SO5011-N-102519, WS19-0005-SO5088-N-102519, WS19-0040-SO5073-N-102519, WS19-0005-SO5090-N-102519, WS19-0006-SO5093-N-102519, WS19-0043-SO5094-N-102819
P_20191101_92951_317	USGS SdAR-M2	11/1/2019	Molybdenum	9.88	13.3	74%	J/UJ	WS19-0040-SO5101-N-103119, WS19-0040-SO5102-N-103119, WS19-0040-SO5105-N-103119, WS19-0040-SO5106-N-103119, WS19-0040-SO5107-N-103119, WS19-0040-SO5109-N-103119, WS19-0038-SO5111-N-103119, WS19-0041-SO5116-N-103119
P_20191106_92951_336	USGS SdAR-M2	11/6/2019	Molybdenum	7.21	13.3	54%	J/UJ	WS19-0037-SO5140-N-110519, WS19-0038-SO5143-N-110519, WS19-0038-SO5147-N-110519, WS19-0038-SO5153-N-110519, WS19-0037-SO5155-N-110519, WS19-0037-SO5158-N-110519, WS19-0010-SO5160-N-110519, WS19-0010-SO5162-N-110519, WS19-0010-SO5164-N-110519, WS19-0010-SO5170-N-110519, WS19-0010-SO5171-N-110519
P_20191108_92951_353	USGS SdAR-M2	11/8/2019	Molybdenum	9.58	13.3	72%	J/UJ	WS19-0315-SO5021-N-110719, WS19-0315-SO5024-N-110719, WS19-0010-SO5172-N-110719, WS19-0010-SO5173-N-110719, WS19-0010-SO5174-N-110719, WS19-0010-SO5176-N-110719, WS19-0010-SO5177-N-110719, WS19-0313-SO5180-N-110719, WS19-0015-SO5182-N-110719, WS19-0015-SO5183-N-110719, WS19-0010-SO5185-N-110719

Attachment A.4
FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Qualifications to Natural Samples

Abbreviations:
RPD = relative percent difference

				XRF Duplicate			XRF Replicate			Field Duplicate		
Analysis Run ID	Natural Sample ID	Analyte	DV Qual	QC Sample ID	RPD	Reason Code	QC Sample ID	RPD	Reason Code	QC Sample ID	RPD	Reason Code
P_20191023_92951_140	WS19-0003-SO5032-N-102319	Antimony	J	WS19-0003-SO5032-N-102319-D	53%	D%						
		Arsenic	J	WS19-0003-SO5032-N-102319-D	56%	D%						
P_20191024_92951_171	WS19-0040-SO5062-N-102419	Antimony	J	WS19-0040-SO5062-N-102419-D	61%	D%						
		Zinc	J	WS19-0040-SO5062-N-102419-D	64%	D%						
P_20191101_92951_314	WS19-0041-SO5116-N-103119	Cadmium	J				WS19-0041-SO5116-N-103119-R	42%	R%			
		Copper	J	WS19-0041-SO5116-N-103119-D	42%	D%	WS19-0041-SO5116-N-103119-R	51%	R%			
P_20191105_92951_330	WS19-0037-SO5138-N-110419	Arsenic	J	WS19-0037-SO5138-N-110419-D	37%	D%						
		Silver	J	WS19-0037-SO5138-N-110419-D	46%	D%						
P_20191106_92951_347	WS19-0010-SO5171-N-110519	Antimony	J	WS19-0010-SO5171-N-110519-D	42%	D%						
		Cadmium	J				WS19-0010-SO5171-N-110519-R	54%	R%			
		Silver	J	WS19-0010-SO5171-N-110519-D	40%	D%						
P_20191108_92951_358	WS19-0010-SO5174-N-110719	Barium	J							WS19-0010-SO5174-D-110719	44%	FD
		Cadmium	J							WS19-0010-SO5174-D-110719	49%	FD
		Copper	J							WS19-0010-SO5174-D-110719	37%	FD
P_20191108_92951_365	WS19-0010-SO5185-N-110719	Antimony	J				WS19-0010-SO5185-N-110719-R	36%	R%			
P_20191111_92951_382	WS19-0015-SO5204-N-110819	Antimony	J				WS19-0015-SO5204-N-110819-R	40%	R%			
P_20191115_92951_395	WS19-0292-SO5214-N-111319	Antimony	J	WS19-0292-SO5214-N-111319-D	49%	D%						
P_20200512_92951_518	20WS-0297-SO5244-N-051220	Antimony	J	20WS-0297-SO5244-N-051220-D	59%	D%						
P_20200513_92951_540	20WS-0300-SO5266-N-051220	Manganese	J	20WS-0300-SO5266-N-051220-D	38%	D%						
P_20200514_92951_565	20WS-0285-SO5324-N-051420	Antimony	J	20WS-0285-SO5324-N-051420-D	71%	D%	20WS-0285-SO5324-N-051420-R	38%	R%			
		Barium	J	20WS-0285-SO5324-N-051420-D	49%	D%						
P_20200519_92951_593	20WS-0246-SO5384-N-051820	Arsenic	J	20WS-0246-SO5384-N-051820-D	37%	D%						
		Lead	J	20WS-0246-SO5384-N-051820-D	52%	D%						
		Silver	J	20WS-0246-SO5384-N-051820-D	83%	D%						
P_20200526_92951_626	20WS-0306-SO5421-N-052020	Antimony	J				20WS-0306-SO5421-N-052020-R	49%	R%			
P_20200603_92951_727	20WS-0130-SO5731-N-060220	Arsenic	J				20WS-0130-SO5731-N-060220-R	54%	R%			
		Copper	J				20WS-0130-SO5731-N-060220-R	40%	R%			
		Iron	J				20WS-0130-SO5731-N-060220-R	46%	R%			
		Lead	J	20WS-0130-SO5731-N-060220-D	42%	D%	20WS-0130-SO5731-N-060220-R	70%	R%			
		Manganese	J				20WS-0130-SO5731-N-060220-R	60%	R%			
		Zinc	J				20WS-0130-SO5731-N-060220-R	106%	R%			
P_20200603_92951_751	20WS-0138-SO5757-N-060320	Antimony	J	20WS-0138-SO5757-N-060320-D	62%	D%						
P_20200604_92951_772	20WS-0138-SO5793-N-060420	Arsenic	J	20WS-0138-SO5793-N-060420-D	43%	D%						
		Zinc	J	20WS-0138-SO5793-N-060420-D	36%	D%						
P_20200629_92950_66	20WS-0246-SO5924-8.7-9.0-N-062520	Antimony	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	43%	D%						
		Arsenic	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	56%	D%						
		Barium	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	38%	D%						
		Cadmium	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	61%	D%						
		Lead	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	94%	D%						
		Manganese	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	63%	D%						
		Silver	J	20WS-0246-SO5924-8.7-9.0-N-062520-D	72%	D%						
P_20200707_92951_09	20WS-0016-SO5935-4.0-5.0-N-070120	Cadmium	J							20WS-0016-SO5935-4.0-5.0-D-070120	38%	FD
		Lead	J							20WS-0016-SO5935-4.0-5.0-D-070120	59%	FD
P_20200707_92951_24	20WS-0138-SO5948-12.8-13.3-N-070620	Copper	J	20WS-0138-SO5948-12.8-13.3-N-070620-D	44%	D%						
		Manganese	J	20WS-0138-SO5948-12.8-13.3-N-070620-D	50%	D%						
P_20200709_92951_34	20WS-0179-SO5954-4.3-4.9-N-070820	Lead	J							20WS-0179-SO5954-4.3-4.9-D-070820	39%	FD

Attachment B
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: West Side Soils Operable Unit (WSSOU), Multiple Mining Claims
Project: WSSOU Remedial Investigation Sampling 2019 and 2020
Client: Atlantic Richfield
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable
2. Level A
3. Level B X

I. **Level A**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Sampling date	Yes	Logbook and Field Data sheets
2. Sampling team or leader	Yes	Logbook and Field Data sheets
3. Physical description of sampling location	Yes	Logbook
4. Sample depth (soils)	Yes	Logbook
5. Sample collection technique	Yes	Logbook
6. Field preparation technique	Yes	Logbook
7. Sample preservation technique	Yes	Logbook
8. Sample shipping records	N/A	Samples were analyzed in the field after collection.

II**. Level B**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Field instrumentation methods and standardization complete	Yes	Logbook.
2. Sample container preparation	Yes	Logbook
3. Collection of field replicates (1/20 minimum)	Yes	Logbook and Field Data Sheets
4. Proper and decontaminated sampling equipment	Yes	Logbook
6. Field custody documentation	N/A	Samples were analyzed in the field after collection.
7. Shipping custody documentation	N/A	Samples were analyzed in the field after collection.
8. Traceable sample designation number	Yes	Logbook and Field Data sheets
9. Field notebook(s), custody records in secure repository	Yes	
10. Completed field forms	Yes	Field Data sheets

Attachment C
Data Validation QC Criteria

XRF						
Quality Control	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
			Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
System Check	Performed daily, prior to sample analysis	System Check not performed	R	R	CX	SOP-SFM-02 (Pioneer, 2015)
	Resolution < 195	Resolution ≥ 195	R	R	SC	
SiO_2 Standard	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Frequency criteria not met	J	UJ	CX	SOP-SFM-02 (Pioneer, 2015) Niton XL3 Mining QC Sheet (ThermoFisher Scientific, 2014)
	Non-detected result	Detected result	Sample Results < 10x detected SiO2 result- J+	No Qualification	B	
Calibration Check Samples	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Frequency criteria not met	J	UJ	CX	SOP-SFM-02 (Pioneer, 2015) Niton XL3 Mining QC Sheet (ThermoFisher Scientific, 2016)
	%R 80-120%	%R < 80%	J	UJ	C%	
		%R >120%	J	No Qualification		
FPXRF Replicate	At least 1 for every 20 samples	Frequency criteria not met	J	UJ	RX	SOP-SFM-02 (Pioneer, 2015)
	RPD ≤ 35%*	RPD > 35%	J	UJ	R%	
		RPD ≤ 35%	No Qualification	No Qualification		
FPXRF Duplicate	At least 1 for every 20 samples	Frequency criteria not met	J	UJ	DX	SOP-SFM-02 (Pioneer, 2015)
	RPD ≤ 35%*	RPD > 35%	J	UJ	D%	
		RPD ≤ 35%	No Qualification	No Qualification		
Field Duplicate	At least 1 for every 20 samples	Frequency criteria not met	J	UJ	FDX	SOP-SFM-02 (Pioneer, 2015) WSSOU RI QAPP (CDM Smith, 2019)
	RPD ≤ 35%*	RPD > 35%	J	UJ	FD	
		RPD ≤ 35%	No Qualification	No Qualification		

*The RPD must be less than 35% when both sample results are detections.

Appendix B-4

2021 Remedial Investigation Archived Core Sampling Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2021 Remedial Investigation Archived Core Sampling Laboratory Data Validation Report

Atlantic Richfield Company

July 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2021 Remedial Investigation Archived Core Sampling Laboratory Data Validation Report

Prepared for:

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July 2022

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Table 3. Sample Identification.

LIST OF ATTACHMENTS

Attachment A Data Validation Checklists
Attachment B Level A/B Assessment Checklist
Attachment C Data Validation Quality Control Criteria

REVISION SUMMARY

No.	Author	Version	Description	Date
Rev 0	Laura Moon	Draft	Issued for Internal Review	5/18/2020
Rev 0	Josie McElroy	Draft Final	Issued for Internal Review	7/5/2022

1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes analytical results for West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) soil samples sent to the analytical laboratory March 3, 2021, from archived core samples originally collected June 18, 2020, through July 9, 2020. All data have undergone Stage 4 data validation (DV) as defined in U.S. Environmental Protection Agency (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009). The DV was conducted in accordance with the Final Quality Assurance Project Plan (QAPP) for WSSOU RI sampling (CDM Smith, 2019) (referred to as WSSOU RI QAPP), the *Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation (DM/DV) Plan* (ARCO, 1992a) and addendum (AERL, 2000), the CFRSSI QAPP (ARCO, 1992b), and EPA *National Functional Guidelines* (NFG) *for Inorganic Superfund Methods Data Review* (EPA, 2020). This report details the evaluation of laboratory-reported data for the purpose of usability.

This document refers to the tables and attachments below.

- Table 1 contains the analytical results of the natural samples with laboratory qualifiers; DV qualifiers; enforcement, screening, and rejected classifications; and DV reason codes.
- Table 1a contains metals in soil results.
- Table 1b contains Synthetic Precipitation Leaching Procedure (SPLP) results.
- Table 1c contains Acid-Base Accounting (ABA) results.
- Table 2 contains the field duplicate sample pairs with results, laboratory flags, DV qualifiers, DV reason codes, and Quality Control (QC) criteria assessment.
- Table 3 contains sample identification information including the field sample names, laboratory sample names, sample dates, and analytical methods.
- Attachment A contains the DV checklists.
- Attachment B contains the Level A/B Assessment Checklist.
- Attachment C contains the QC criteria used in the DV process.

The full data packages, prepared by Pace Analytical Services, LLC (Pace), provided the information needed to perform Stage 4 DV. All data met the Level A and B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan (ARCO, 1992a), the quality of the data is ranked as enforcement quality, screening quality, or it is rejected. Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A and B criteria (Attachment B) and are not qualified as estimated or rejected after the validation process. Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, remedial investigation/feasibility study, evaluation of alternatives, confirmational purposes, risk assessments, and engineering design. As all data met the Level A and B documentation criteria, all results that were not qualified as estimated or rejected during the DV process were considered "enforcement" quality data and were assigned an "E" in Table 1.

Screening quality data, as defined in the CFRSSI DM/DV Plan (ARCO, 1992a), come from those samples that do not meet the Level B criteria and/or were qualified as estimated (J, J+, J-, or UJ) during the DV process. Potential uses of screening quality data, depending on their quality, include site characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. The EPA Risk Assessment Guidance, Part A, Sec. 5.4.1 (EPA, 1989) states the following with respect to the use of J or UJ qualified results: *"Basically, the guidance here is to use J-qualified concentrations the same way as positive data that do not have the qualifier. If possible, note potential uncertainties associated with the qualifier, so that if data qualified with a J contribute significantly to the risk, the appropriate caveats can be attached."* As all data met the Level A and B documentation criteria, samples that were qualified as estimated during the validation process were considered "screening" quality data and were assigned an "S" in Table 1. Data rejected during DV cannot be used for any Superfund activities. No results were rejected during the DV process.

Investigative soil samples were collected from archived core samples that were originally collected in June and July 2020 by Pioneer Technical Services, Inc. (Pioneer) to support developing risk assessments, determining the nature and extent of contamination present, and completing a feasibility study and a record of decision defining remedial action objectives for WSSOU. Pioneer prepared the archived core samples for laboratory analysis between February 16, 2021, and March 2, 2021. Samples were shipped to the laboratory on March 3, 2021. Samples were collected and data were validated in accordance with the WSSOU RI QAPP.

Soil samples for target analyte list metals and SPLP analyses were sent to Pace in Minneapolis, Minnesota. Soil samples for ABA analysis were sent to Pace in Sheridan, Wyoming. Table 3 lists the methods and analytes for each sample. From the 40 natural samples sent to the laboratories in 2021 (not including field blanks or field duplicate samples), 1,826 natural data points were generated by Pace. A summary is shown below:

Summary of Enforcement and Screening Quality Data Points

Analysis Group	Natural Samples[1]	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
Total Metals	36	900	35 (4%)	865 (96%)	0 (0%)
SPLP	31	744	0 (0%)	744 (100%)	0 (0%)
ABA	13	182	173 (95%)	9 (5%)	0 (0%)
Subtotal	**40**	**1,826**	**208 (11%)**	**1,618 (89%)**	**0 (0%)**

[1]Total number of samples is not a summation of the number of samples for each analytical group because some samples had results for more than one analysis group as listed in Table 3.

Table 1 shows the laboratory qualifiers, DV qualifiers, enforcement or screening designators, and the reason code for the qualification for each natural data point.

Most screening quality data points (1,608 of 1,618) were qualified due to holding time exceedance. Samples were collected from archived core samples that were outside the holding time as discussed in Section 4.3.

2.0 INORGANIC DATA QUALITY ASSURANCE/QUALITY CONTROL

The QC criteria used during the DV process are listed in Attachment C. These QC criteria were derived from the WSSOU RI QAPP, CFRSSI QAPP (ARCO, 1992b), the NFG (EPA, 2020), the internal BP Laboratory Management Program, analytical methods, and method-specific laboratory Standard Operating Procedures (SOPs).

The DV checklists derived from the CFRSSI DM/DV Addendum (AERL, 2000) were completed for each laboratory report (Attachment A). Below are the deviations made to the checklists provided in the CFRSSI DM/DV Addendum guidance document:

- The Laboratory DV Checklist for Metals Analysis by Inductively Coupled Plasma (ICP) or Graphite Furnace Atomic Absorption Spectrometry (GFAA) was revised slightly to more accurately reflect the information provided in the full data package provided by Pace and the requirements listed in the NFG (EPA, 2020). The completed checklists are included in Attachment A.
- The DV Checklist for Field QC was not filled out for each data package. Sections on field blanks and field duplicates were added to each Laboratory DV Checklist worksheet.
- The Laboratory DV Checklist for Metals Analysis by ICP or GFAA was modified for the general chemistry validation. The completed checklists are included in Attachment A. The guidelines for general or wet chemistry laboratory Quality Assurance (QA) and QC listed in Table 11-5 of the CFRSSI QAPP (ARCO, 1992b), along with laboratory QA/QC control limits, were used in evaluating the general chemistry results. The revised checklist more accurately reflects the information provided by the laboratory for these analyses.

The DV for methods Solid Waste (SW)-846 6010D (ICP-Atomic Emission Spectroscopy [AES]), ASTM D2974, SW-846 7470A, and SW-846 7471B (mercury) is included in the metals checklist. The DV for the ABA (EPA 600/2-78-054) is included in the general chemistry checklist. One Level A/B Assessment was completed for the 2021 sampling event (Attachment B).

2.1 Field Quality Control Samples

Field duplicate samples were collected at a rate greater than 1 in 20 and met the requirements listed in Section B5.1 Field QC Samples of the WSSOU RI QAPP. Field blank samples were not collected per the WSSOU RI QAPP because all sampling equipment was one-use (disposable).

The analytical reporting limits reported by Pace were used to evaluate the field duplicates. The field duplicate QC criteria assessment is in Table 2. Any qualifications required based on the field QC sample results are detailed in the DV checklists (Attachment A), listed in Table 1, and discussed in Section 4.1.

Field QC sample (field duplicate samples) results are used to assess the data quality of natural samples. Please note that although the field QC samples may receive a qualifier during the DV process, the enforcement and screening quality summaries and the precision and accuracy

assessment summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summaries.

2.2 Laboratory Quality Control Samples

The laboratory QC sample types vary depending on analytical method. The QC criteria used during DV to evaluate the applicable laboratory QC samples are listed in Attachment C.

The Stage 4 DV includes the evaluation of the following laboratory QC items as applicable per analytical method:

- Holding Times.
- Preservation.
- Tuning.
- Calibration.
- Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) Standards.
- Low Level Initial Calibration Verification Standards (LLICV) (referred to as the Contract Required Detection Limit [CRDL] standards in Pace laboratory reports).
- Initial Calibration Blank (ICB) and Continuing Calibration Blank (CCB) Standards.
- Method Blanks (MB).
- Interference Check Samples (ICS).
- Laboratory Control Sample (LCS) and LCS Duplicates.
- Laboratory Duplicate Samples.
- Laboratory Matrix Spike (LMS), LMS Duplicates (LMSD), and Post Digestion Spike Samples.
- Serial Dilution (SD).
- Internal Standards.

The laboratory method detection limits (MDLs) were used for the data review and validation of laboratory method blanks and field blanks; and the laboratory instrument detection limits were used for the data review and validation of the laboratory instrument blanks (initial and CCBs) as discussed in the CFRSSI QAPP (ARCO, 1992b).

The appropriate laboratory QC samples were analyzed. Any qualifications required based on the laboratory QC sample results are detailed in the DV checklists (Attachment A) and are listed in Table 1. Also refer to Section 4.1 and Section 4.2.

3.0 LEVEL A/B ASSESSMENT

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality data. Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet Level A or B criteria are designated as unusable.

One Level A/B checklist for all analytical samples submitted for the 2021 sampling event is included in Attachment B. All sample collection information, including sample collection date, location, identification, and collection method, was recorded in the field logbook. This information was reviewed for Level A/B criteria. As shown in Attachment B, all the samples met both Level A and Level B criteria. No data were designated screening quality or rejected based on the results of Level A/B criteria.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, COMPARABILITY, AND SENSITIVITY DATA SUMMARY

Data generated in March and April of 2021 from WSSOU RI soil samples collected from archived cores originally collected in June and July of 2020 were examined to ensure that project objectives were met. The data quality objectives for this investigation are listed in Section A7 of the WSSOU RI QAPP. The Stage 4 DV was completed for each laboratory sample delivery group.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. Acceptance or rejection of precision measurements is based on the relative percent difference (RPD) of the laboratory and field duplicates. For example, perfect precision would be a 0% RPD between duplicate samples (both samples have the same analytical result) for results that are greater than 5 times the laboratory reporting limit (RL). For soil samples, the control limit of an RPD less than 35% was used when sample results were greater than 5 times the RL. If 1 or both of the sample results were less than 5 times the RL, the control limit used was a difference between sample results less than 2 times the RL. This precision requirement is from the WSSOU RI QAPP. For these sampling events, precision was assessed based on laboratory prepared and field duplicate sample analysis.

There were 27 instances where the field duplicate pair results did not meet the control limit. This resulted in the qualification of 27 natural data points due to poor field precision because no other samples were considered sufficiently similar enough based on the variability of soil matrices to require additional qualifications.

The natural samples qualified for poor field precision (DV Reason Code = FD) are listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Aluminum	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Antimony	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Cadmium	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Copper	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Lead	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Magnesium	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Manganese	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Molybdenum	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Zinc, SPLP	J	H, FD
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 7471B	Mercury	J	H, Pres, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	ASTM D2974	Percent Moisture	J	FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Barium	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Cadmium	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Iron	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Iron, SPLP	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Manganese	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Manganese, SPLP	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Silver	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Vanadium	J	H, FD
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 7471B	Mercury	J	H, Pres, FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	Acid Base	J	FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	Acid/Base Potential	J	FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	HCL Extract Sulfur (Sulfate Sulfur)	J	FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	Hot Water Sulfur - LECO	J	FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	Neutralization Potential	J	FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	Pyritic Sulfur Acid Base	J	FD
S2103084-004	20WS-0297-SO6080-8.0-13.7-N-062420	EPA600/2-78-054	Pyritic Sulfur Acid Base Potential	J	FD

The natural samples qualified for poor laboratory precision (DV Reason Code = D%) are listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Manganese	J	H, D%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Molybdenum	J	H, SD, S%, D%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Lead	J	H, D%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Manganese	J	H, D%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Silver	J	H, S%, D%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Zinc	J	H, D%
S2103084-014	20WS-0179-SO6252-4.0-5.4-N-070820	EPA600/2-78-054	Acid/Base Potential	J	D%
S2103084-014	20WS-0179-SO6252-4.0-5.4-N-070820	EPA600/2-78-054	Neutralization Potential	J	D%

Of the 1,826 data points derived from the natural samples, 27 data points were qualified due to poor field precision, and 8 samples were qualified due to poor laboratory precision. As a result, 98% of the 1,826 data points associated with the natural samples collected met the precision requirements.

This resulted in 35 (2%) of the 1,826 natural data points associated with the natural samples collected that did not meet the precision requirements, and 1,791 (98%) of the 1,826 natural data points that did meet the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. Accuracy is assessed based on the percent recovery (%R) and percent difference (%D) of various laboratory samples. Perfect %R is 100% and perfect %D is 0% (the analysis result is exactly the known concentration of the QC sample).

Laboratory blanks were analyzed to assess artifacts introduced during analyses that may affect the accuracy of the data. In accordance with the CFRSSI QAPP (ARCO, 1992b), a data point is qualified as "U" if it is less than 5 times an associated blank result (ICB, CCB, MB) that does not meet the control limit.

For SW-846 6010D (ICP-AES) analysis, the %R of ICV samples, LLICV samples (which are CRDL Check Samples), CCV samples, LCS, LMS samples, and ICS; the %D for the SD samples; the detection of analytes in the ICB, CCB, or MB; and the detection of analytes in the ICS are used as indicators of accuracy. Additionally, for the ICS, the detection of analytes do not present in the ICS solution with an absolute value above the MDL measures the accuracy of analytes with concentrations that approximate those levels found in the ICS for samples with comparable or higher levels of interferents. Positive detections in the ICS solutions indicate the possibility of false positive results, and negative detections in the ICS indicate the possibility of false negative results for samples with high levels of interferents.

For SW-846 7470A and SW-846 7471B (mercury) analyses, the %R of ICV samples, LLICV samples, CCV samples, LCS, and LMS samples; and the detections of analytes in the ICB, CCB, or MB are used as indicators of accuracy.

For EPA 600/2-78-054 (ABA) analysis, the %R of LCS is used as the indicator of accuracy.

Specific accuracy requirements for the QC samples are listed in Attachment C.

There were 37 natural data points qualified due to a detection in the CCB (Reason Code = CCB) or a detection in the MB (Reason Code = MB) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023005	20WS-0003-SO6011-6.5-7.3-N-061920	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023007	20WS-0003-SO6037-4.0-4.6-N-062320	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023008	20WS-0003-SO6042-12.0-12.6-N-062320	SW-846 6010D	Manganese, SPLP	UJ	H, CCB
10550023008	20WS-0003-SO6042-12.0-12.6-N-062320	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023009	20WS-0010-SO6051-12.0-13.0-N-062320	SW-846 6010D	Sodium, SPLP	UJ	H, MB

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023010	20WS-0010-SO6069-8.0-9.2-N-062420	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023025	20WS-0288-SO6189-0.0-4.0-N-070220	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023027	20WS-0288-SO6195-0.0-1.6-N-070220	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023011	20WS-0297-SO6074-12.0-12.7-N-062420	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023012	20WS-0297-SO6080-8.0-13.7-N-062420	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023013	20WS-0297-SO6082-4.0-4.5-N-062420	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023014	20WS-0297-SO6090-4.0-4.6-N-062420	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023029	20WS-0289-SO6216-12.0-12.8-N-070220	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB
10550023029	20WS-0289-SO6216-12.0-12.8-N-070220	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023036	20WS-0315-SO6272-4.0-8.0-N-070920	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB
10550023036	20WS-0315-SO6272-4.0-8.0-N-070920	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023037	20WS-0315-SO6280-0.0-4.3-N-070920	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023034	20WS-0179-SO6252-4.0-5.4-N-070820	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB, ICS
10550023034	20WS-0179-SO6252-4.0-5.4-N-070820	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB, ICS
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023038	20WS-0246-SO6109-8.0-12.0-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023018	20WS-0246-SO6119-0.0-4.8-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023019	20WS-0246-SO6123-8.0-8.7-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023021	20WS-0016-SO6162-12.0-12.7-N-070120	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB, ICS
10550023021	20WS-0016-SO6162-12.0-12.7-N-070120	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023023	20WS-0016-SO6169-0.0-4.0-N-070120	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023033	20WS-0138-SO6246-8.0-9.5-N-070620	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023015	20WS-0285-SO6092-0.0-4.0-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023016	20WS-0285-SO6096-4.0-8.4-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023020	20WS-1150-SO6133-16.0-20.5-N-062520	SW-846 6010D	Sodium, SPLP	UJ	H, MB
10550023024	20WS-1150-SO6186-20.0-24.0-N-070120	SW-846 6010D	Sodium, SPLP	UJ	H, MB

There were 41 natural data points qualified for an ICS detection (Reason Code = ICS) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023034	20WS-0179-SO6252-4.0-5.4-N-070820	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB, ICS
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB, ICS
10550023021	20WS-0016-SO6162-12.0-12.7-N-070120	SW-846 6010D	Beryllium, SPLP	UJ	H, CCB, ICS
10550023005	20WS-0043-SO6011-6.5-7.3-N-061920	SW-846 6010D	Beryllium, SPLP	J	H, ICS
10550023005	20WS-0043-SO6011-6.5-7.3-N-061920	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023005	20WS-0043-SO6011-6.5-7.3-N-061920	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023005	20WS-0043-SO6011-6.5-7.3-N-061920	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023007	20WS-0003-SO6037-4.0-4.6-N-062320	SW-846 6010D	Cadmium, SPLP	UJ	H, ICS
10550023007	20WS-0003-SO6037-4.0-4.6-N-062320	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	SW-846 6010D	Molybdenum, SPLP	J	H, ICS
10550023009	20WS-0010-SO6051-12.0-13.0-N-062320	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023009	20WS-0010-SO6051-12.0-13.0-N-062320	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023009	20WS-0010-SO6051-12.0-13.0-N-062320	SW-846 6010D	Molybdenum, SPLP	J	H, ICS
10550023010	20WS-0010-SO6069-8.0-9.2-N-062420	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023010	20WS-0010-SO6069-8.0-9.2-N-062420	SW-846 6010D	Molybdenum, SPLP	J	H, ICS
10550023010	20WS-0010-SO6069-8.0-9.2-N-062420	SW-846 6010D	Thallium, SPLP	J	H, ICS
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023001	20WS-0043-SO5987-5.0-10.3-N-061820	SW-846 6010D	Molybdenum, SPLP	J	H, ICS
10550023034	20WS-0179-SO6252-4.0-5.4-N-070820	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023034	20WS-0179-SO6252-4.0-5.4-N-070820	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023030	20WS-0162-SO6228-0.0-12.0-N-070620	SW-846 6010D	Molybdenum, SPLP	J	H, ICS
10550023021	20WS-0016-SO6162-12.0-12.7-N-070120	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023021	20WS-0016-SO6162-12.0-12.7-N-070120	SW-846 6010D	Molybdenum, SPLP	J	H, ICS
10550023021	20WS-0016-SO6162-12.0-12.7-N-070120	SW-846 6010D	Thallium, SPLP	J	H, ICS
10550023023	20WS-0016-SO6169-0.0-4.0-N-070120	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023023	20WS-0016-SO6169-0.0-4.0-N-070120	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023033	20WS-0138-SO6246-8.0-9.5-N-070620	SW-846 6010D	Cadmium, SPLP	J-	H, ICS
10550023033	20WS-0138-SO6246-8.0-9.5-N-070620	SW-846 6010D	Cobalt, SPLP	J	H, ICS
10550023033	20WS-0138-SO6246-8.0-9.5-N-070620	SW-846 6010D	Lead, SPLP	J	H, ICS
10550023024	20WS-1150-SO6186-20.0-24.0-N-070120	SW-846 6010D	Cobalt, SPLP	J	H, ICS

There were 10 natural data points qualified due to an exceedance of the %R for the LMS and/or LMSD (Reason Code = S%) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Aluminum	J	H, S%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Copper	J	H, S%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Antimony	J	H, S%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Aluminum	J	H, S%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Potassium	J	H, S%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Silver	J	H, S%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Antimony	J	H, S%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Silver	J	H, S%, D%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Arsenic	J	H, SD, S%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Molybdenum	J	H, SD, S%, D%

There were 15 natural data points qualified due to an exceedance of the %D for the SD (Reason Code = SD) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10550023016	20WS-0285-SO6096-4.0-8.4-N-062520	SW-846 6010D	Aluminum	J	H, SD
10550023016	20WS-0285-SO6096-4.0-8.4-N-062520	SW-846 6010D	Iron	J	H, SD
10550023016	20WS-0285-SO6096-4.0-8.4-N-062520	SW-846 6010D	Lead	J	H, SD
10550023016	20WS-0285-SO6096-4.0-8.4-N-062520	SW-846 6010D	Zinc	J	H, SD
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Arsenic	J	H, SD, S%
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Cadmium	J	H, SD
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Cobalt	J	H, SD
10550023017	20WS-0285-SO6106-0.0-1.3-N-062520	SW-846 6010D	Molybdenum	J	H, SD, S%, D%
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Barium	J	H, SD
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Cadmium	J	H, SD
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Cobalt	J	H, SD
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Magnesium	J	H, SD
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Molybdenum	J	H, SD
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Potassium	J	H, SD
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	SW-846 6010D	Vanadium	J	H, SD

Note that there were 5 data points qualified for more than 1 indicator of accuracy ([SD, S%] and [CCB, ICS])

This resulted in 98 (5%) of the 1,826 natural data points associated with the natural samples collected that did not meet the accuracy requirements, and 1,728 (95%) of the 1,826 natural data points that did meet the accuracy requirements.

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper sampling program design. The laboratory results were reviewed, and a Stage 4 DV completed. Holding time criteria was not met for 1,608 natural data points. Preservation criteria was not met for 67 natural data points. The samples were collected from archived cores with the understanding that holding times and preservation requirements would not be met for some analyses. These data points are considered usable as screening quality data. Chain of custody forms were complete and are included in the data packages. The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report includes soil samples collected by Pioneer and analyzed by Pace.

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and laboratory analytical methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in the SOPs and equipment use. Proper chain of custody and sample handling were observed during sample collection, delivery to the laboratory, and analysis. The analytical laboratories performed the sample analysis using industry standard methods.

Consequently, data from past and future soil sampling events at WSSOU using comparable sampling and analytical methods may be used in concert with this data set.

4.5 Completeness

Completeness is assessed to determine if enough valid data have been collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 90% or greater as designated in the WSSOU RI QAPP.

In total, 1,826 natural data points were generated by the sampling event. All natural data points were usable as no sample results were rejected, and all the planned data points were collected. Therefore, the completeness was 100% and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the detection limit (laboratory RL or the laboratory MDL, as applicable) of non-detect results to the project-specific sensitivity requirements. The reporting limits in Table B-5 of the WSSOU RI QAPP were used to evaluate sensitivity for soil analyses, and the reporting limits in Table B-4 were used to evaluate sensitivity for SPLP analyses.

For the ABA analyses, the detection limit was the laboratory RL, which met the RLs listed in Table B-5 of the WSSOU RI QAPP for non-detect results.

For SPLP analyses, the detection limits were the laboratory MDLs, which met the RLs listed in Table B-4 of the WSSOU RI QAPP for non-detect results except for antimony, arsenic, lead, selenium, and zinc. The laboratory MDL for each of these analytes was greater than the RL listed in Table B-4 of the WSSOU RI QAPP as listed below.

Analyte	Non-Detect Results (<MDL)	RL in Table B-4, WSSOU RI QAPP
Antimony, SPLP	<0.007 mg/L	0.002 mg/L
Arsenic, SPLP	<0.0038 mg/L	0.001 mg/L
Selenium, SPLP	<0.0058 mg/L	0.005 mg/L
Lead, SPLP	<0.002 mg/L	0.001 mg/L
Zinc, SPLP	<0.0068 mg/L	0.002 mg/L

mg/L = milligrams per Liter.

All non-detect results for these analytes are considered usable with the recognition that the detection limits are higher than the RLs listed in Table B-4 of the WSSOU RI QAPP.

For total metals, the detection limits were the laboratory MDLs, which met the RLs listed in Table B-5 of the WSSOU RI QAPP for non-detect results except for the analytes in the list below. The laboratory MDLs for these non-detect results were adjusted for the dilution factor. Pace qualified these results as "*D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.*"

Laboratory ID	Field Sample ID	Analyte	Result (<adjusted MDL)	Dilution Factor	RL in Table B-5, WSSOU RI QAPP
10550023002	20WS-0043-SO5987-5.0-10.3-D-061820	Selenium	<9.1 mg/kg	25	3.5 mg/kg
10550023002	20WS-0043-SO5987-5.0-10.3-D-061820	Thallium	<7.1 mg/kg	25	2.5 mg/kg
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	Selenium	<8.3 mg/kg	25	3.5 mg/kg
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	Thallium	<6.5 mg/kg	25	2.5 mg/kg
10550023003	20WS-0006-SO5990-5.0-5.7-N-061820	Chromium	<2.5 mg/kg	25	1 mg/kg
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	Selenium	<8.6 mg/kg	25	3.5 mg/kg
10550023004	20WS-0006-SO6001-10.0-11.1-N-061920	Thallium	<6.7 mg/kg	25	2.5 mg/kg
10550023006	20WS-0043-SO6020-10.0-15.0-N-061920	Selenium	<8.8 mg/kg	25	3.5 mg/kg
10550023006	20WS-0043-SO6020-10.0-15.0-N-061920	Thallium	<6.9 mg/kg	25	2.5 mg/kg
10550023007	20WS-0003-SO6037-4.0-4.6-N-062320	Selenium	<8 mg/kg	25	3.5 mg/kg
10550023007	20WS-0003-SO6037-4.0-4.6-N-062320	Thallium	<6.3 mg/kg	25	2.5 mg/kg
10550023010	20WS-0010-SO6069-8.0-9.2-N-062420	Thallium	<2.6 mg/kg	10	2.5 mg/kg
10550023014	20WS-0288-SO6090-4.0-4.6-N-062420	Selenium	<8.4 mg/kg	25	3.5 mg/kg
10550023014	20WS-0288-SO6090-4.0-4.6-N-062420	Thallium	<6.6 mg/kg	25	2.5 mg/kg
10550023014	20WS-0288-SO6090-4.0-4.6-N-062420	Antimony	<9.6 mg/kg	25	6 mg/kg
10550023014	20WS-0288-SO6090-4.0-4.6-N-062420	Nickel	<4.4 mg/kg	25	4 mg/kg
10550023014	20WS-0288-SO6090-4.0-4.6-N-062420	Chromium	<2.6 mg/kg	25	1 mg/kg
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	Selenium	<7.8 mg/kg	25	3.5 mg/kg
10550023028	20WS-0288-SO6197-0.0-0.7-N-070220	Chromium	<2.4 mg/kg	25	1 mg/kg

mg/kg = milligrams per kilogram.

These data points are considered usable with the recognition that the detection limits are higher than the RLs listed in Table B-5 of the WSSOU RI QAPP.

4.7 Overall Data Summary

During the 2021 sampling event, the 40 natural samples collected by Pioneer and analyzed by Pace generated 1,826 data points. Of these, 1,618 data points were qualified as J, J- or UJ. No data points were rejected. Data were also evaluated using the Level A/B Checklist (Attachment B). All samples met both the Level A and Level B criteria defined in the CFRSSI DM/DV Plan (ARCO, 1992a) and addendum (AERL, 2000).

Based on the qualifications assigned during the DV process, and the results of the Level A/B assessment, 1,618 natural data points (89%) were classified as screening quality, 208 natural data points (11%) were classified as enforcement quality, and no data points were rejected.

5.0 REFERENCES

AERL, 2000. Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation (DM/DV) Plan Addendum. Prepared for ARCO by Exponent, Lake Oswego, Oregon. June 2000.

ARCO, 1992a. Clark Fork River Superfund Site Investigations Data Management/Data Validation Plan, Atlantic Richfield Company, 1992.

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EPA, 1989. U.S. Environmental Protection Agency Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), EPA/540/1-89/002, December 1989.

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TABLES

Table 1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Table 1a. Metals in Soil.
Table 1b. SPLP.
Table 1c. ABA.

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

Table 3. Sample Identification.

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0043-SO5987-5.0-10.3-N-061820					20WS-0006-SO5990-5.0-5.7-N-061820					20WS-0006-SO6001-10.0-11.1-N-061920					20WS-0043-SO6011-6.5-7.3-N-061920					20WS-0043-SO6020-10.0-15.0-N-061920				
		Lab Sample ID	10550023001					10550023003					10550023004					10550023005					10550023006				
		Sample Date	6/18/2020					6/18/2020					6/19/2020					6/19/2020					6/19/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	6,000	H3	J	S	H, FD	1,030	H3	J-	S	H	5,710	H3	J-	S	H	7,450	H3	J-	S	H	3,150	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	12.2	H3	J	S	H, FD	1.8	H3	J-	S	H	24.3	H3	J-	S	H	0.69	J,H3	J-	S	H	6.2	H3	J-	S	H
Arsenic	SW-846 6010D	mg/kg	103	H3	J-	S	H	137	H3	J-	S	H	151	H3	J-	S	H	71.2	H3	J-	S	H	105	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	46.2	H3	J-	S	H	4.1	H3	J-	S	H	108	H3	J-	S	H	77.7	H3	J-	S	H	12	H3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.2	J,H3	J-	S	H	0.099	J,H3	J-	S	H	0.21	J,H3	J-	S	H	0.12	J,H3	J-	S	H	0.23	J,H3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	3.9	H3	J	S	H, FD	0.92	H3	J-	S	H	7.7	H3	J-	S	H	0.38	H3	J-	S	H	10.6	H3	J-	S	H
Calcium	SW-846 6010D	mg/kg	7,240	H3	J-	S	H	4,930	H3	J-	S	H	13,500	H3	J-	S	H	6,240	H3	J-	S	H	12,600	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	2.7	H3	J-	S	H	<2.5	U,H3,D3	UJ	S	H	5.2	J,H3,D3	J-	S	H	3.1	H3	J-	S	H	4.1	J,H3,D3	J-	S	H
Cobalt	SW-846 6010D	mg/kg	7	H3	J-	S	H	5	H3	J-	S	H	7.1	H3	J-	S	H	7.6	H3	J-	S	H	7.5	H3	J-	S	H
Copper	SW-846 6010D	mg/kg	316	H3	J	S	H, FD	27.3	H3	J-	S	H	590	H3	J-	S	H	27.4	H3	J-	S	H	96.7	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	34,200	H3	J-	S	H	21,300	H3	J-	S	H	37,600	H3	J-	S	H	26,900	H3	J-	S	H	26,400	H3	J-	S	H
Lead	SW-846 6010D	mg/kg	1,320	H3	J	S	H, FD	187	H3	J-	S	H	4,260	H3	J-	S	H	155	H3	J-	S	H	488	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	1,710	H3	J	S	H, FD	1,030	H3	J-	S	H	2,540	H3	J-	S	H	3,110	H3	J-	S	H	2,700	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	24,000	H3	J	S	H, FD	66,800	H3	J-	S	H	66,100	H3	J-	S	H	5,280	H3	J-	S	H	47,300	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	0.25	H3	J	S	H, Pres, FD	0.018	J,H3	J-	S	H, Pres	1.2	H3	J-	S	H, Pres	0.047	H3	J-	S	H, Pres	0.026	H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	12.7	H3	J	S	H, FD	0.64	J,H3	J-	S	H	12.1	H3	J-	S	H	1.9	H3	J-	S	H	2.2	H3	J-	S	H
Nickel	SW-846 6010D	mg/kg	4.3	H3	J-	S	H	3.4	H3	J-	S	H	4.7	H3	J-	S	H	3.7	H3	J-	S	H	6.1	H3	J-	S	H
Potassium	SW-846 6010D	mg/kg	1,100	H3	J-	S	H	845	H3	J-	S	H	2,200	H3	J-	S	H	1,940	H3	J-	S	H	1,140	H3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<1.7	U,H3,D3	UJ	S	H	<8.3	U,H3,D3	UJ	S	H	<8.6	U,H3,D3	UJ	S	H	<0.35	U,H3	UJ	S	H	<8.8	U,H3,D3	UJ	S	H
Silver	SW-846 6010D	mg/kg	284	H3	J-	S	H	15.6	H3	J-	S	H	213	H3	J-	S	H	7.3	H3	J-	S	H	30	H3	J-	S	H
Sodium	SW-846 6010D	mg/kg	46.2	J,H3	J-	S	H	13.1	J,H3	J-	S	H	127	H3	J-	S	H	54.3	H3	J-	S	H	24.3	J,H3	J-	S	H
Thallium	SW-846 6010D	mg/kg	<1.3	U,H3,D3	UJ	S	H	<6.5	U,H3,D3	UJ	S	H	<6.7	U,H3,D3	UJ	S	H	0.42	J,H3	J-	S	H	<6.9	U,H3,D3	UJ	S	H
Vanadium	SW-846 6010D	mg/kg	26	H3	J-	S	H	3.2	H3	J-	S	H	32.2	H3	J-	S	H	28.5	H3	J-	S	H	6.8	H3	J-	S	H
Zinc	SW-846 6010D	mg/kg	1,620	H3	J-	S	H	401	H3	J-	S	H	1,410	H3	J-	S	H	212	H3	J-	S	H	4,990	H3	J-	S	H
Percent Moisture	ASTM D2974	%	12.5	N2		E		4.4	N2		E		10.4	N2		E		8.8	N2		E		10.4	N2		E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

Abbreviations:

mg/kg = milligram per kilogram

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0003-SO6037-4.0-4.6-N-062320					20WS-0003-SO6042-12.0-12.6-N-062320					20WS-0010-SO6051-12.0-13.0-N-062320					20WS-0010-SO6069-8.0-9.2-N-062420					20WS-0297-SO6074-12.0-12.7-N-062420				
		Lab Sample ID	10550023007					10550023008					10550023009					10550023010					10550023011				
		Sample Date	6/23/2020					6/23/2020					6/23/2020					6/24/2020					6/24/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	2,460	H3	J-	S	H	9,370	H3	J-	S	H	2,580	H3	J-	S	H	3,880	H3	J-	S	H	874	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	1.1	H3	J-	S	H	<2	U,H3,D3	UJ	S	H	0.4	J,H3	J-	S	H	2.2	H3	J-	S	H	<1.9	U,H3,D3	UJ	S	H
Arsenic	SW-846 6010D	mg/kg	90.5	H3	J-	S	H	11	H3	J-	S	H	48	H3	J-	S	H	156	H3	J-	S	H	68.5	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	1.8	H3	J-	S	H	124	H3	J-	S	H	6.1	H3	J-	S	H	18.1	H3	J-	S	H	2.5	J,H3,D3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.061	J,H3	J-	S	H	0.37	J,H3,D3	J-	S	H	0.22	J,H3	J-	S	H	0.068	J,H3	J-	S	H	0.15	J,H3,D3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	<0.029	U,H3	UJ	S	H	0.52	J,H3,D3	J-	S	H	7.4	H3	J-	S	H	10	H3	J-	S	H	2.4	H3	J-	S	H
Calcium	SW-846 6010D	mg/kg	3,130	H3	J-	S	H	12,100	H3	J-	S	H	4,790	H3	J-	S	H	11,700	H3	J-	S	H	300	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	5	J,H3,D3	J-	S	H	10.5	H3	J-	S	H	1.5	J,H3,D3	J-	S	H	1.5	J,H3,D3	J-	S	H	<0.51	U,H3,D3	UJ	S	H
Cobalt	SW-846 6010D	mg/kg	2.7	H3	J-	S	H	8.1	H3	J-	S	H	4.7	H3	J-	S	H	10	H3	J-	S	H	0.23	J,H3,D3	J-	S	H
Copper	SW-846 6010D	mg/kg	14.6	H3	J-	S	H	14.2	H3	J-	S	H	40.9	H3	J-	S	H	439	H3	J-	S	H	21.1	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	34,300	H3	J-	S	H	21,000	H3	J-	S	H	15,900	H3	J-	S	H	49,600	H3	J-	S	H	2,880	H3	J-	S	H
Lead	SW-846 6010D	mg/kg	28.8	H3,B	J-	S	H	56.3	H3	J-	S	H	1,460	H3	J-	S	H	2,570	H3	J-	S	H	554	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	1,640	H3	J-	S	H	5,130	H3	J-	S	H	1,660	H3	J-	S	H	1,350	H3	J-	S	H	75	J,H3,D3	J-	S	H
Manganese	SW-846 6010D	mg/kg	91,500	H3	J-	S	H	3,310	H3	J-	S	H	21,500	H3	J-	S	H	23,700	H3	J-	S	H	3,860	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	0.027	H3	J-	S	H, Pres	0.068	H3	J-	S	H, Pres	0.22	H3	J-	S	H, Pres	0.39	H3	J-	S	H, Pres	0.66	H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	16.9	H3	J-	S	H	2.1	J,H3,D3	J-	S	H	2.2	H3	J-	S	H	4.5	H3	J-	S	H	6.7	H3	J-	S	H
Nickel	SW-846 6010D	mg/kg	3.7	H3	J-	S	H	6.3	H3	J-	S	H	3.5	H3	J-	S	H	5.7	H3	J-	S	H	<0.86	U,H3,D3	UJ	S	H
Potassium	SW-846 6010D	mg/kg	1,660	H3	J-	S	H	2,830	H3	J-	S	H	912	H3	J-	S	H	992	H3	J-	S	H	597	J,H3,D3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<8	U,H3,D3	UJ	S	H	<1.8	U,H3,D3	UJ	S	H	<1.7	U,H3,D3	UJ	S	H	<3.3	U,H3,D3	UJ	S	H	<1.7	U,H3,D3	UJ	S	H
Silver	SW-846 6010D	mg/kg	4.9	J,H3,D3	J-	S	H	3.7	H3	J-	S	H	15.4	H3	J-	S	H	99.5	H3	J-	S	H	23.3	H3	J-	S	H
Sodium	SW-846 6010D	mg/kg	207	H3	J-	S	H	98.1	J,H3,D3	J-	S	H	75.8	H3	J-	S	H	18.9	J,H3	J-	S	H	<50.7	U,H3,D3	UJ	S	H
Thallium	SW-846 6010D	mg/kg	<6.3	U,H3,D3	UJ	S	H	<1.4	U,H3,D3	UJ	S	H	<1.3	U,H3,D3	UJ	S	H	<2.6	U,H3,D3	UJ	S	H	<1.3	U,H3,D3	UJ	S	H
Vanadium	SW-846 6010D	mg/kg	27.5	H3	J-	S	H	34.5	H3	J-	S	H	5.8	H3	J-	S	H	7.8	H3	J-	S	H	3.2	J,H3,D3	J-	S	H
Zinc	SW-846 6010D	mg/kg	177	H3	J-	S	H	202	H3	J-	S	H	3,300	H3	J-	S	H	5,070	H3	J-	S	H	605	H3	J-	S	H
Percent Moisture	ASTM D2974	%	4.5	N2		E		13	N2		E		2.3	N2		E		3.9	N2		E		3.3	N2		E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Screening/Enforcement Quality (S/E)

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Data Validation Reason Codes (Reason Code)

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Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0297-SO6080-8.0-13.7-N-062420					20WS-0297-SO6082-4.0-4.5-N-062420					20WS-0288-SO6090-4.0-4.6-N-062420					20WS-0285-SO6092-0.0-4.0-N-062520					20WS-0285-SO6096-4.0-8.4-N-062520				
		Lab Sample ID	10550023012					10550023013					10550023014					10550023015					10550023016				
		Sample Date	6/24/2020					6/24/2020					6/24/2020					6/25/2020					6/25/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,140	H3	J-	S	H	1,350	H3	J-	S	H	1,050	H3	J-	S	H	1,210	H3	J-	S	H	1,800	H3	J	S	H, SD
Antimony	SW-846 6010D	mg/kg	<1.8	U,H3,D3	UJ	S	H	1.3	H3	J-	S	H	<9.6	U,H3,D3	UJ	S	H	9.4	J,H3,D3	J-	S	H	6.1	H3	J-	S	H
Arsenic	SW-846 6010D	mg/kg	9.4	H3	J-	S	H	123	H3	J-	S	H	801	H3	J-	S	H	82.1	H3	J-	S	H	295	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	1.1	J,H3,D3	J-	S	H	25.7	H3	J-	S	H	2.7	J,H3,D3	J-	S	H	4.5	J,H3,D3	J-	S	H	3.5	H3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.25	J,H3,D3	J-	S	H	<0.015	U,H3	UJ	S	H	<0.38	U,H3,D3	UJ	S	H	0.88	J,H3,D3	J-	S	H	0.14	J,H3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	0.28	J,H3,D3	J-	S	H	9.7	H3	J-	S	H	11.2	H3	J-	S	H	5.7	H3	J-	S	H	5.7	H3	J-	S	H
Calcium	SW-846 6010D	mg/kg	2,020	H3	J-	S	H	24.7	H3	J-	S	H	265	J,H3,D3	J-	S	H	<86.1	U,H3,D3	UJ	S	H	329	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	<0.49	U,H3,D3	UJ	S	H	1.1	H3	J-	S	H	<2.6	U,H3,D3	UJ	S	H	<0.98	U,H3,D3	UJ	S	H	7.4	H3	J-	S	H
Cobalt	SW-846 6010D	mg/kg	0.35	J,H3,D3	J-	S	H	0.17	J,H3	J-	S	H	1.5	J,H3,D3	J-	S	H	<0.29	U,H3,D3	UJ	S	H	0.28	J,H3	J-	S	H
Copper	SW-846 6010D	mg/kg	2	J,H3,D3	J-	S	H	50.9	H3	J-	S	H	43.3	H3	J-	S	H	57.2	H3	J-	S	H	161	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	1,160	H3	J-	S	H	7,390	H3	J-	S	H	27,500	H3	J-	S	H	14,900	H3	J-	S	H	21,600	H3	J	S	H, SD
Lead	SW-846 6010D	mg/kg	13.6	H3	J-	S	H	4,320	H3	J-	S	H	3,860	H3	J-	S	H	631	H3	J-	S	H	5,610	H3	J	S	H, SD
Magnesium	SW-846 6010D	mg/kg	209	H3	J-	S	H	163	H3	J-	S	H	125	J,H3,D3	J-	S	H	67.5	J,H3,D3	J-	S	H	100	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	1,580	H3	J-	S	H	1,440	H3	J-	S	H	60,100	H3	J-	S	H	5,130	H3	J-	S	H	21,300	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	0.014	J,H3	J-	S	H, Pres	0.12	H3	J-	S	H, Pres	0.4	H3	J-	S	H, Pres	<0.0076	U,H3	UJ	S	H, Pres	1.5	H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	3.3	J,H3,D3	J-	S	H	15.1	H3	J-	S	H	41	H3	J-	S	H	28.4	H3	J-	S	H	25.5	H3	J-	S	H
Nickel	SW-846 6010D	mg/kg	<0.83	U,H3,D3	UJ	S	H	0.57	J,H3	J-	S	H	<4.4	U,H3,D3	UJ	S	H	<1.7	U,H3,D3	UJ	S	H	0.86	J,H3	J-	S	H
Potassium	SW-846 6010D	mg/kg	309	J,H3,D3	J-	S	H	780	H3	J-	S	H	1,920	J,H3,D3	J-	S	H	686	J,H3,D3	J-	S	H	1,680	H3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<1.6	U,H3,D3	UJ	S	H	0.44	J,H3	J-	S	H	<8.4	U,H3,D3	UJ	S	H	<3.2	U,H3,D3	UJ	S	H	4.3	H3	J-	S	H
Silver	SW-846 6010D	mg/kg	<0.18	U,H3,D3	UJ	S	H	116	H3	J-	S	H	32.1	H3	J-	S	H	4.9	H3	J-	S	H	36.7	H3	J-	S	H
Sodium	SW-846 6010D	mg/kg	<48.9	U,H3,D3	UJ	S	H	16.9	J,H3	J-	S	H	<256	U,H3,D3	UJ	S	H	<97.5	U,H3,D3	UJ	S	H	<40.1	U,H3	UJ	S	H
Thallium	SW-846 6010D	mg/kg	<1.3	U,H3,D3	UJ	S	H	<0.25	U,H3	UJ	S	H	<6.6	U,H3,D3	UJ	S	H	<2.5	U,H3,D3	UJ	S	H	5.6	H3	J-	S	H
Vanadium	SW-846 6010D	mg/kg	0.83	J,H3,D3	J-	S	H	5.5	H3	J-	S	H	6.8	J,H3,D3	J-	S	H	17.3	H3	J-	S	H	2.7	J,H3	J-	S	H
Zinc	SW-846 6010D	mg/kg	183	H3	J-	S	H	3,710	H3	J-	S	H	2,840	H3	J-	S	H	619	H3	J-	S	H	957	H3	J	S	H, SD
Percent Moisture	ASTM D2974	%	0.68	N2		E		0.99	N2		E		3.3	N2		E		0.44	N2		E		0.34	N2		E	

Notes:

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E = Enforcement quality.

S = Screening quality.

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H = Qualified due to analysis holding time exceedance.

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Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0285-SO6106-0.0-1.3-N-062520					20WS-0246-SO6109-8.0-12.0-N-062520					20WS-0246-SO6119-0.0-4.8-N-062520					20WS-0246-SO6123-8.0-8.7-N-062520					20WS-1150-SO6133-16.0-20.5-N-062520				
		Lab Sample ID	10550023017					10550023038					10550023018					10550023019					10550023020				
		Sample Date	6/25/2020					6/25/2020					6/25/2020					6/25/2020					6/25/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,010	H3,M6	J	S	H, S%	1,100	H3	J-	S	H	1,330	H3	J-	S	H	2,090	H3	J-	S	H	1,040	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	9.4	H3,M1	J	S	H, S%	4.6	H3	J-	S	H	3.6	H3	J-	S	H	2	H3	J-	S	H	0.68	J,H3	J-	S	H
Arsenic	SW-846 6010D	mg/kg	181	H3,M1	J	S	H, SD, S%	89.2	H3	J-	S	H	338	H3	J-	S	H	90.7	H3	J-	S	H	28.1	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	2.3	H3	J-	S	H	9.8	H3	J-	S	H	3.7	H3	J-	S	H	28.7	H3	J-	S	H	6.8	H3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.14	J,H3,D3	J-	S	H	0.41	H3	J-	S	H	0.2	J,H3,D3	J-	S	H	0.076	J,H3	J-	S	H	0.061	J,H3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	13.3	H3	J	S	H, SD	1.8	H3	J-	S	H	2.3	H3	J-	S	H	0.3	H3	J-	S	H	7.8	H3	J-	S	H
Calcium	SW-846 6010D	mg/kg	127	J,H3,D3	J-	S	H	576	H3	J-	S	H	2,090	H3	J-	S	H	684	H3	J-	S	H	1,350	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	<0.99	U,H3,D3	UJ	S	H	0.77	J,H3,D3	J-	S	H	1.4	J,H3,D3	J-	S	H	1.8	H3	J-	S	H	1.8	H3	J-	S	H
Cobalt	SW-846 6010D	mg/kg	3.4	H3	J	S	H, SD	0.78	H3	J-	S	H	2.9	H3	J-	S	H	1.3	H3	J-	S	H	0.22	J,H3	J-	S	H
Copper	SW-846 6010D	mg/kg	402	H3,P6	J-	S	H	85.5	H3	J-	S	H	47.4	H3	J-	S	H	31.4	H3	J-	S	H	25.3	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	27,800	H3,M6	J-	S	H	7,380	H3	J-	S	H	27,400	H3	J-	S	H	8,710	H3	J-	S	H	5,320	H3	J-	S	H
Lead	SW-846 6010D	mg/kg	4,310	H3,M6,R1	J-	S	H	941	H3	J-	S	H	1,720	H3	J-	S	H	388	H3	J-	S	H	1,290	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	114	H3	J-	S	H	553	H3	J-	S	H	398	H3	J-	S	H	603	H3	J-	S	H	182	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	29,800	H3,M6,R1	J	S	H, D%	11,800	H3	J-	S	H	42,400	H3	J-	S	H	990	H3	J-	S	H	1,250	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	2.9	H3,M1,R1	J-	S	H, Pres	0.09	H3	J-	S	H, Pres	0.24	H3	J-	S	H, Pres	0.15	H3	J-	S	H, Pres	0.15	H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	27.2	H3,M1,R1	J	S	H, SD, S%, D%	1.6	H3	J-	S	H	1.9	H3	J-	S	H	2.7	H3	J-	S	H	2.4	H3	J-	S	H
Nickel	SW-846 6010D	mg/kg	0.76	J,H3,D3	J-	S	H	0.83	J,H3	J-	S	H	3.6	H3	J-	S	H	1.3	H3	J-	S	H	0.33	J,H3	J-	S	H
Potassium	SW-846 6010D	mg/kg	800	H3,M1	J	S	H, S%	606	H3	J-	S	H	1,220	H3	J-	S	H	1,210	H3	J-	S	H	658	H3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<3.2	U,H3,D3	UJ	S	H	<1.6	U,H3,D3	UJ	S	H	<3.1	U,H3,D3	UJ	S	H	<0.37	U,H3	UJ	S	H	<0.34	U,H3	UJ	S	H
Silver	SW-846 6010D	mg/kg	89.3	H3	J	S	H, S%	248	H3	J-	S	H	232	H3	J-	S	H	32.4	H3	J-	S	H	11.2	H3	J-	S	H
Sodium	SW-846 6010D	mg/kg	<19.8	U,H3,D3	UJ	S	H	<10	U,H3	UJ	S	H	<19.2	U,H3,D3	UJ	S	H	154	H3	J-	S	H	67	H3	J-	S	H
Thallium	SW-846 6010D	mg/kg	<2.5	U,H3,D3	UJ	S	H	<1.3	U,H3,D3	UJ	S	H	3.2	J,H3,D3	J-	S	H	<0.29	U,H3	UJ	S	H	<0.27	U,H3	UJ	S	H
Vanadium	SW-846 6010D	mg/kg	1.2	J,H3,D3	J-	S	H	4	H3	J-	S	H	1.4	J,H3,D3	J-	S	H	6.9	H3	J-	S	H	1.5	H3	J-	S	H
Zinc	SW-846 6010D	mg/kg	4,850	H3,M6,R1	J-	S	H	831	H3	J-	S	H	981	H3	J-	S	H	196	H3	J-	S	H	3,040	H3	J-	S	H
Percent Moisture	ASTM D2974	%	4.7	N2		E		0.33	N2		E		2.5	N2		E		15.7	N2		E		5.4	N2		E	

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Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0016-SO6162-12.0-12.7-N-070120					20WS-0016-SO6166-8.0-12.0-N-070120					20WS-0016-SO6169-0.0-4.0-N-070120					20WS-1150-SO6186-20.0-24.0-N-070120					20WS-0288-SO6189-0.0-4.0-N-070220				
		Lab Sample ID	10550023021					10550023022					10550023023					10550023024					10550023025				
		Sample Date	7/1/2020					7/1/2020					7/1/2020					7/1/2020					7/2/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,470	H3	J-	S	H	4,950	H3	J-	S	H	4,150	H3	J-	S	H	1,110	H3	J-	S	H	954	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	1.5	H3	J-	S	H	<0.36	U,H3	UJ	S	H	2	H3	J-	S	H	6.1	H3	J-	S	H	3.9	H3	J-	S	H
Arsenic	SW-846 6010D	mg/kg	128	H3	J-	S	H	9.5	H3	J-	S	H	114	H3	J-	S	H	34.1	H3	J-	S	H	76.5	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	25.2	H3	J-	S	H	97	H3	J-	S	H	43.6	H3	J-	S	H	10	H3	J-	S	H	14.5	H3	J	S	H, FD
Beryllium	SW-846 6010D	mg/kg	0.053	J,H3	J-	S	H	0.15	J,H3	J-	S	H	0.17	J,H3	J-	S	H	0.11	J,H3,D3	J-	S	H	0.057	J,H3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	58	H3	J-	S	H	1.2	H3	J-	S	H	31.7	H3	J-	S	H	51.5	H3	J-	S	H	2.4	H3	J	S	H, FD
Calcium	SW-846 6010D	mg/kg	8,020	H3	J-	S	H	8,120	H3	J-	S	H	16,100	H3	J-	S	H	1,140	H3	J-	S	H	145	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	3.4	H3	J-	S	H	7.4	H3	J-	S	H	4.9	H3	J-	S	H	2.1	J,H3,D3	J-	S	H	0.47	J,H3	J-	S	H
Cobalt	SW-846 6010D	mg/kg	2	H3	J-	S	H	7.8	H3	J-	S	H	7.2	H3	J-	S	H	1.3	J,H3,D3	J-	S	H	0.25	J,H3	J-	S	H
Copper	SW-846 6010D	mg/kg	103	H3	J-	S	H	10.4	H3	J-	S	H	277	H3	J-	S	H	89.7	H3	J-	S	H	34.1	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	26,200	H3	J-	S	H	14,600	H3	J-	S	H	27,900	H3	J-	S	H	5,000	H3	J-	S	H	6,380	H3	J	S	H, FD
Lead	SW-846 6010D	mg/kg	3,680	H3	J-	S	H	244	H3	J-	S	H	1,420	H3	J-	S	H	8,260	H3	J-	S	H	1,590	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	654	H3	J-	S	H	4,800	H3	J-	S	H	2,100	H3	J-	S	H	420	H3	J-	S	H	86.6	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	3,700	H3	J-	S	H	2,780	H3	J-	S	H	17,300	H3	J-	S	H	5,860	H3	J-	S	H	3,280	H3	J	S	H, FD
Mercury	SW-846 7471B	mg/kg	0.15	H3	J-	S	H, Pres	0.27	H3	J-	S	H, Pres	0.075	H3	J-	S	H, Pres	0.43	H3	J-	S	H, Pres	0.18	H3	J	S	H, Pres, FD
Molybdenum	SW-846 6010D	mg/kg	1.6	H3	J-	S	H	0.95	H3	J-	S	H	1.2	H3	J-	S	H	2	J,H3,D3	J-	S	H	14.2	H3	J-	S	H
Nickel	SW-846 6010D	mg/kg	1.7	H3	J-	S	H	4.7	H3	J-	S	H	5	H3	J-	S	H	<0.8	U,H3,D3	UJ	S	H	0.21	J,H3	J-	S	H
Potassium	SW-846 6010D	mg/kg	1,660	H3	J-	S	H	2,520	H3	J-	S	H	1,840	H3	J-	S	H	584	J,H3,D3	J-	S	H	680	H3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<0.33	U,H3	UJ	S	H	<0.31	U,H3	UJ	S	H	<1.6	U,H3,D3	UJ	S	H	<1.5	U,H3,D3	UJ	S	H	<0.32	U,H3	UJ	S	H
Silver	SW-846 6010D	mg/kg	8.6	H3	J-	S	H	0.63	H3	J-	S	H	5.6	H3	J-	S	H	324	H3	J-	S	H	125	H3	J	S	H, FD
Sodium	SW-846 6010D	mg/kg	367	H3	J-	S	H	97.1	H3	J-	S	H	51.7	H3	J-	S	H	59.5	J,H3,D3	J-	S	H	10.8	J,H3	J-	S	H
Thallium	SW-846 6010D	mg/kg	<0.26	U,H3	UJ	S	H	0.52	J,H3	J-	S	H	<1.2	U,H3,D3	UJ	S	H	<1.2	U,H3,D3	UJ	S	H	0.37	J,H3	J-	S	H
Vanadium	SW-846 6010D	mg/kg	4.7	H3	J-	S	H	22.6	H3	J-	S	H	15.6	H3	J-	S	H	1.1	J,H3,D3	J-	S	H	1.7	H3	J	S	H, FD
Zinc	SW-846 6010D	mg/kg	18,900	H3	J-	S	H	541	H3	J-	S	H	14,700	H3	J-	S	H	16,200	H3	J-	S	H	953	H3	J-	S	H
Percent Moisture	ASTM D2974	%	4.8	N2		E		0.51	N2		E		1.1	N2		E		1.1	N2		E		3.8	N2	J	S	FD

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P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0288-SO6195-0.0-1.6-N-070220					20WS-0288-SO6197-0.0-0.7-N-070220					20WS-0289-SO6216-12.0-12.8-N-070220					20WS-0162-SO6228-0.0-12.0-N-070620					20WS-0162-SO6233-8.0-12.0-N-070620				
		Lab Sample ID	10550023027					10550023028					10550023029					10550023030					10550023031				
		Sample Date	7/2/2020					7/2/2020					7/2/2020					7/6/2020					7/6/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,180	H3	J-	S	H	1,240	H3,M6	J	S	H, S%	1,900	H3	J-	S	H	9,670	H3	J-	S	H	12,300	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	3.9	J,H3,D3	J-	S	H	7.2	H3,M1	J	S	H, S%	2.5	J,H3,D3	J-	S	H	1.9	H3	J-	S	H	1	J,H3	J-	S	H
Arsenic	SW-846 6010D	mg/kg	210	H3	J-	S	H	845	H3,P6,R1	J-	S	H	97.6	H3	J-	S	H	33.6	H3	J-	S	H	68.7	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	12.2	H3	J-	S	H	11.1	H3	J	S	H, SD	1.8	J,H3,D3	J-	S	H	38.4	H3	J-	S	H	86.4	H3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.12	J,H3,D3	J-	S	H	0.11	J,H3	J-	S	H	<0.073	U,H3,D3	UJ	S	H	0.32	H3	J-	S	H	0.42	H3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	10	H3	J-	S	H	3.1	H3	J	S	H, SD	0.32	J,H3,D3	J-	S	H	4.6	H3	J-	S	H	1.1	H3	J-	S	H
Calcium	SW-846 6010D	mg/kg	378	H3	J-	S	H	424	J,H3,D3	J-	S	H	365	H3	J-	S	H	27,500	H3	J-	S	H	24,700	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	3.3	H3	J-	S	H	<2.4	U,H3,D3	UJ	S	H	<0.49	U,H3,D3	UJ	S	H	5.2	H3	J-	S	H	5.4	H3	J-	S	H
Cobalt	SW-846 6010D	mg/kg	0.53	J,H3,D3	J-	S	H	1.6	H3	J	S	H, SD	1.2	J,H3,D3	J-	S	H	6.2	H3	J-	S	H	8.4	H3	J-	S	H
Copper	SW-846 6010D	mg/kg	85.4	H3	J-	S	H	48.6	H3,M1,R1	J	S	H, S%	36.9	H3	J-	S	H	685	H3	J-	S	H	145	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	9,860	H3	J-	S	H	18,400	H3,P6	J-	S	H	5,370	H3	J-	S	H	21,500	H3	J-	S	H	21,700	H3	J-	S	H
Lead	SW-846 6010D	mg/kg	2,740	H3	J-	S	H	1,020	H3,M6,R1	J	S	H, D%	200	H3	J-	S	H	2,090	H3	J-	S	H	377	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	272	H3	J-	S	H	72.3	H3	J	S	H, SD	95.2	J,H3,D3	J-	S	H	7,840	H3	J-	S	H	6,570	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	17,700	H3	J-	S	H	65,000	H3,M6,R1	J	S	H, D%	3,300	H3	J-	S	H	17,800	H3	J-	S	H	18,300	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	0.36	H3	J-	S	H, Pres	0.026	H3	J-	S	H, Pres	0.029	H3	J-	S	H, Pres	0.14	H3	J-	S	H, Pres	0.018	J,H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	6.1	H3	J-	S	H	18.4	H3	J	S	H, SD	1.8	J,H3,D3	J-	S	H	2.6	H3	J-	S	H	1.4	H3	J-	S	H
Nickel	SW-846 6010D	mg/kg	<0.85	U,H3,D3	UJ	S	H	1.1	H3	J-	S	H	<0.84	U,H3,D3	UJ	S	H	5.1	H3	J-	S	H	6.8	H3	J-	S	H
Potassium	SW-846 6010D	mg/kg	649	H3	J-	S	H	5,310	H3,P6,R1	J	S	H, SD	516	J,H3,D3	J-	S	H	2,270	H3	J-	S	H	3,280	H3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<1.6	U,H3,D3	UJ	S	H	<7.8	U,H3,D3	UJ	S	H	<1.6	U,H3,D3	UJ	S	H	<1.7	U,H3,D3	UJ	S	H	<1.8	U,H3,D3	UJ	S	H
Silver	SW-846 6010D	mg/kg	143	H3	J-	S	H	86.2	H3,M1,R1	J	S	H, S%, D%	4.3	H3	J-	S	H	26.9	H3	J-	S	H	37.2	H3	J-	S	H
Sodium	SW-846 6010D	mg/kg	<49.8	U,H3	UJ	S	H	114	H3	J-	S	H	<49.4	U,H3,D3	UJ	S	H	31.5	J,H3	J-	S	H	75.1	H3	J-	S	H
Thallium	SW-846 6010D	mg/kg	<1.3	U,H3,D3	UJ	S	H	8.2	J,H3,D3	J-	S	H	<1.3	U,H3,D3	UJ	S	H	1.4	J,H3,D3	J-	S	H	2.1	J,H3,D3	J-	S	H
Vanadium	SW-846 6010D	mg/kg	4.2	H3	J-	S	H	7	H3	J	S	H, SD	0.26	J,H3,D3	J-	S	H	22.5	H3	J-	S	H	28.7	H3	J-	S	H
Zinc	SW-846 6010D	mg/kg	3,230	H3	J-	S	H	862	H3,P6,R1	J	S	H, D%	352	H3	J-	S	H	1,160	H3	J-	S	H	337	H3	J-	S	H
Percent Moisture	ASTM D2974	%	4.3	N2		E		1.6	N2		E		0.79	N2		E		5.6	N2		E		8.8	N2		E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

Abbreviations:

mg/kg = milligram per kilogram

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0138-SO6239-12.0-12.8-N-070620					20WS-0138-SO6246-8.0-9.5-N-070620					20WS-0179-SO6252-4.0-5.4-N-070820					20WS-0179-SO6256-4.0-4.3-N-070820					20WS-0315-SO6272-4.0-8.0-N-070920				
		Lab Sample ID	10550023032					10550023033					10550023034					10550023035					10550023036				
		Sample Date	7/6/2020					7/6/2020					7/8/2020					7/8/2020					7/9/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	6,220	H3	J-	S	H	2,790	H3	J-	S	H	6,230	H3	J-	S	H	6,090	H3	J-	S	H	1,600	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	2.9	H3	J-	S	H	8.2	H3	J-	S	H	6.4	H3	J-	S	H	37.5	H3	J-	S	H	<1.9	U,H3,D3	UJ	S	H
Arsenic	SW-846 6010D	mg/kg	56.3	H3	J-	S	H	111	H3	J-	S	H	93.4	H3	J-	S	H	149	H3	J-	S	H	15.6	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	16.5	H3	J-	S	H	6	H3	J-	S	H	33.3	H3	J-	S	H	40.2	H3	J-	S	H	7.5	H3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.093	J,H3	J-	S	H	0.12	J,H3	J-	S	H	0.034	J,H3	J-	S	H	0.031	J,H3	J-	S	H	0.28	J,H3,D3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	1.1	H3	J-	S	H	2.7	H3	J-	S	H	0.13	J,H3	J-	S	H	0.3	H3	J-	S	H	<0.15	U,H3,D3	UJ	S	H
Calcium	SW-846 6010D	mg/kg	14,600	H3	J-	S	H	12,500	H3	J-	S	H	4,100	H3	J-	S	H	3,240	H3	J-	S	H	813	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	5.6	H3	J-	S	H	4	H3	J-	S	H	3.9	H3	J-	S	H	5.4	H3	J-	S	H	1.3	J,H3,D3	J-	S	H
Cobalt	SW-846 6010D	mg/kg	9.8	H3	J-	S	H	10.3	H3	J-	S	H	2.7	H3	J-	S	H	2.3	H3	J-	S	H	0.35	J,H3,D3	J-	S	H
Copper	SW-846 6010D	mg/kg	176	H3	J-	S	H	150	H3	J-	S	H	93	H3	J-	S	H	126	H3	J-	S	H	16.4	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	27,000	H3	J-	S	H	31,900	H3	J-	S	H	24,600	H3	J-	S	H	34,700	H3	J-	S	H	3,710	H3	J-	S	H
Lead	SW-846 6010D	mg/kg	276	H3	J-	S	H	537	H3	J-	S	H	91.7	H3	J-	S	H	449	H3	J-	S	H	35.8	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	4,310	H3	J-	S	H	1,980	H3	J-	S	H	2,550	H3	J-	S	H	2,610	H3	J-	S	H	245	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	16,700	H3	J-	S	H	19,000	H3	J-	S	H	227	H3	J-	S	H	149	H3	J-	S	H	753	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	0.061	H3	J-	S	H, Pres	0.11	H3	J-	S	H, Pres	2.5	H3	J-	S	H, Pres	2.6	H3	J-	S	H, Pres	0.18	H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	9.2	H3	J-	S	H	2.5	H3	J-	S	H	1.9	H3	J-	S	H	5.9	H3	J-	S	H	1.6	J,H3,D3	J-	S	H
Nickel	SW-846 6010D	mg/kg	6.8	H3	J-	S	H	8.1	H3	J-	S	H	2.1	H3	J-	S	H	3.1	H3	J-	S	H	<0.85	U,H3,D3	UJ	S	H
Potassium	SW-846 6010D	mg/kg	1,080	H3	J-	S	H	1,090	H3	J-	S	H	3,220	H3	J-	S	H	2,820	H3	J-	S	H	552	J,H3,D3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<1.6	U,H3,D3	UJ	S	H	<1.7	U,H3,D3	UJ	S	H	0.71	J,H3	J-	S	H	<0.32	U,H3	UJ	S	H	<1.6	U,H3,D3	UJ	S	H
Silver	SW-846 6010D	mg/kg	10	H3	J-	S	H	46.9	H3	J-	S	H	19.3	H3	J-	S	H	205	H3	J-	S	H	6.2	H3	J-	S	H
Sodium	SW-846 6010D	mg/kg	26.3	J,H3	J-	S	H	12.9	J,H3	J-	S	H	239	H3	J-	S	H	381	H3	J-	S	H	<49.8	U,H3,D3	UJ	S	H
Thallium	SW-846 6010D	mg/kg	<1.2	U,H3,D3	UJ	S	H	<1.3	U,H3,D3	UJ	S	H	0.72	J,H3	J-	S	H	6	H3	J-	S	H	<1.3	U,H3,D3	UJ	S	H
Vanadium	SW-846 6010D	mg/kg	29.3	H3	J-	S	H	12.5	H3	J-	S	H	25.8	H3	J-	S	H	30.7	H3	J-	S	H	3.4	J,H3,D3	J-	S	H
Zinc	SW-846 6010D	mg/kg	359	H3	J-	S	H	750	H3	J-	S	H	188	H3	J-	S	H	147	H3	J-	S	H	62.6	H3	J-	S	H
Percent Moisture	ASTM D2974	%	1.2	N2		E		2.8	N2		E		9.3	N2		E		2.6	N2		E		1.6	N2		E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

Abbreviations:

mg/kg = milligram per kilogram

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

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Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10550023				
		Field Sample ID	20WS-0315-SO6280-0.0-4.3-N-070920				
		Lab Sample ID	10550023037				
		Sample Date	7/9/2020				
		Sample Type	Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum	SW-846 6010D	mg/kg	1,260	H3	J-	S	H
Antimony	SW-846 6010D	mg/kg	<1.8	U,H3,D3	UJ	S	H
Arsenic	SW-846 6010D	mg/kg	28.3	H3	J-	S	H
Barium	SW-846 6010D	mg/kg	10.5	H3	J-	S	H
Beryllium	SW-846 6010D	mg/kg	0.21	J,H3,D3	J-	S	H
Cadmium	SW-846 6010D	mg/kg	<0.15	U,H3,D3	UJ	S	H
Calcium	SW-846 6010D	mg/kg	513	H3	J-	S	H
Chromium	SW-846 6010D	mg/kg	<0.49	U,H3,D3	UJ	S	H
Cobalt	SW-846 6010D	mg/kg	0.87	J,H3,D3	J-	S	H
Copper	SW-846 6010D	mg/kg	25.8	H3	J-	S	H
Iron	SW-846 6010D	mg/kg	3,320	H3	J-	S	H
Lead	SW-846 6010D	mg/kg	36.4	H3	J-	S	H
Magnesium	SW-846 6010D	mg/kg	155	H3	J-	S	H
Manganese	SW-846 6010D	mg/kg	2,030	H3	J-	S	H
Mercury	SW-846 7471B	mg/kg	0.15	H3	J-	S	H, Pres
Molybdenum	SW-846 6010D	mg/kg	3.1	J,H3,D3	J-	S	H
Nickel	SW-846 6010D	mg/kg	<0.83	U,H3,D3	UJ	S	H
Potassium	SW-846 6010D	mg/kg	700	H3	J-	S	H
Selenium	SW-846 6010D	mg/kg	<1.6	U,H3,D3	UJ	S	H
Silver	SW-846 6010D	mg/kg	0.36	J,H3,D3	J-	S	H
Sodium	SW-846 6010D	mg/kg	<48.7	U,H3,D3	UJ	S	H
Thallium	SW-846 6010D	mg/kg	<1.2	U,H3,D3	UJ	S	H
Vanadium	SW-846 6010D	mg/kg	0.98	J,H3,D3	J-	S	H
Zinc	SW-846 6010D	mg/kg	58.2	H3	J-	S	H
Percent Moisture	ASTM D2974	%	0.26	N2		E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

D% = Qualified due to laboratory duplicate results outside control limits.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

SD = Qualified due to percent difference of serial dilution outside control limit.

Abbreviations:

mg/kg = milligram per kilogram

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 = Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

R1 = RPD value was outside control limits.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0043-SO5987-5.0-10.3-N-061820					20WS-0006-SO5990-5.0-5.7-N-061820					20WS-0006-SO6001-10.0-11.1-N-061920					20WS-0043-SO6011-6.5-7.3-N-061920					20WS-0003-SO6037-4.0-4.6-N-062320				
		Lab Sample ID	10550023001					10550023003					10550023004					10550023005					10550023007				
		Sample Date	6/18/2020					6/18/2020					6/19/2020					6/19/2020					6/23/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	<0.026	U,H2	UJ	S	H	<0.026	U,H2	UJ	S	H	<0.026	U,H2	UJ	S	H	0.86	H2	J-	S	H	<0.026	U,H2	UJ	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.0071	J,H2	J-	S	H	0.0014	J,H2	J-	S	H	0.0088	J,H2	J-	S	H	0.051	H2	J-	S	H	<0.00067	U,H2	UJ	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	0.0024	J,H2	J	S	H, ICS	<0.00028	U,H2	UJ	S	H
Cadmium, SPLP	SW-846 6010D	mg/L	0.0018	J,H2	J-	S	H, ICS	0.0041	H2	J-	S	H, ICS	0.00035	J,H2	J-	S	H, ICS	0.0029	J,H2	J-	S	H, ICS	<0.00031	U,H2	UJ	S	H, ICS
Calcium, SPLP	SW-846 6010D	mg/L	118	H2	J-	S	H	68.5	H2	J-	S	H	244	H2	J-	S	H	142	H2	J-	S	H	99.2	H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	S	H	0.007	J,H2	J-	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	0.0007	J,H2	J	S	H, ICS	0.0049	J,H2	J	S	H, ICS	0.00069	J,H2	J	S	H, ICS	0.0079	J,H2	J	S	H, ICS	0.00089	J,H2	J	S	H, ICS
Copper, SPLP	SW-846 6010D	mg/L	0.0015	J,H2	J-	S	H	0.0032	J,H2	J-	S	H	0.0014	J,H2	J-	S	H	0.0099	J,H2	J-	S	H	<0.0012	U,H2	UJ	S	H
Iron, SPLP	SW-846 6010D	mg/L	<0.014	U,H2	UJ	S	H	0.04	J,H2	J-	S	H	<0.014	U,H2	UJ	S	H	<0.014	U,H2	UJ	S	H	<0.014	U,H2	UJ	S	H
Lead, SPLP	SW-846 6010D	mg/L	0.0028	J,H2	J	S	H, ICS	0.0027	J,H2	J	S	H, ICS	0.0025	J,H2	J	S	H, ICS	0.003	J,H2	J	S	H, ICS	<0.002	U,H2	UJ	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	15.9	H2	J-	S	H	2.7	H2	J-	S	H	18	H2	J-	S	H	15	H2	J-	S	H	5.1	H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	11.2	H2	J-	S	H	44.7	H2	J-	S	H	0.24	H2	J-	S	H	16.8	H2	J-	S	H	29.4	H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	0.13	J,H3	J-	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0028	J,H2	J	S	H, ICS	<0.0015	U,H2	UJ	S	H	0.0076	J,H2	J	S	H, ICS	<0.0015	U,H2	UJ	S	H	<0.0015	U,H2	UJ	S	H
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U,H2	UJ	S	H	0.014	J,H2	J-	S	H	<0.0014	U,H2	UJ	S	H	0.011	J,H2	J-	S	H	0.0041	J,H2	J-	S	H
Potassium, SPLP	SW-846 6010D	mg/L	2.3	J,H2	J-	S	H	2.7	H2	J-	S	H	2.9	H2	J-	S	H	5.1	H2	J-	S	H	2.6	H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	0.00085	J,H2	J-	S	H	0.0012	J,H2	J-	S	H	<0.00058	U,H2	UJ	S	H	<0.00058	U,H2	UJ	S	H	0.00089	J,H2	J-	S	H
Sodium, SPLP	SW-846 6010D	mg/L	2.8	B,H2	UJ	S	H, MB	2.6	B,H2	UJ	S	H, MB	3	B,H2	UJ	S	H, MB	3.9	B,H2	UJ	S	H, MB	3	B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H
Vanadium, SPLP	SW-846 6010D	mg/L	0.00077	J,H2	J-	S	H	0.00044	J,H2	J-	S	H	0.00079	J,H2	J-	S	H	<0.00043	U,H2	UJ	S	H	<0.00043	U,H2	UJ	S	H
Zinc, SPLP	SW-846 6010D	mg/L	0.39	H2	J	S	H, FD	1.7	H2	J-	S	H	0.015	J,H2	J-	S	H	0.7	H2	J-	S	H	0.034	H2	J-	S	H

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

H2 = Extraction or preparation was conducted outside of the recognized method holding time.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

CCB = Qualified due to detections in the Continuing Calibration Blank.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

mg/L = milligram per liter

ug/L = microgram per liter

Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0003-SO6042-12.0-12.6-N-062320					20WS-0010-SO6051-12.0-13.0-N-062320					20WS-0010-SO6069-8.0-9.2-N-062420					20WS-0297-SO6074-12.0-12.7-N-062420					20WS-0297-SO6080-8.0-13.7-N-062420				
		Lab Sample ID	10550023008					10550023009					10550023010					10550023011					10550023012				
		Sample Date	6/23/2020					6/23/2020					6/24/2020					6/24/2020					6/24/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	0.63	H2	J-	S	H	<0.026	U,H2	UJ	S	H	0.03	J,H2	J-	S	H	0.31	H2	J-	S	H	0.7	H2	J-	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	0.0051	J,H2	J-	S	H	<0.0038	U,H2	UJ	S	H	0.013	J,H2	J-	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.0049	J,H2	J-	S	H	0.0019	J,H2	J-	S	H	0.025	H2	J-	S	H	0.0038	J,H2	J-	S	H	0.0025	J,H2	J-	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H
Cadmium, SPLP	SW-846 6010D	mg/L	<0.00031	U,H2	UJ	S	H	0.00085	J,H2	J-	S	H, ICS	0.096	H2	J-	S	H	0.0034	H2	J-	S	H	0.00057	J,H2	J-	S	H
Calcium, SPLP	SW-846 6010D	mg/L	5.1	H2	J-	S	H	53.4	H2	J-	S	H	560	H2	J-	S	H	2.2	H2	J-	S	H	4.6	H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	<0.00061	U,H2	UJ	S	H	0.00066	J,H2	J	S	H, ICS	0.021	H2	J	S	H, ICS	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H
Copper, SPLP	SW-846 6010D	mg/L	<0.0012	U,H2	UJ	S	H	<0.0012	U,H2	UJ	S	H	0.099	H2	J-	S	H	0.0029	J,H2	J-	S	H	0.0014	J,H2	J-	S	H
Iron, SPLP	SW-846 6010D	mg/L	0.31	H2	J-	S	H	<0.014	U,H2	UJ	S	H	<0.014	U,H2	UJ	S	H	0.19	H2	J-	S	H	0.29	H2	J-	S	H
Lead, SPLP	SW-846 6010D	mg/L	<0.002	U,H2	UJ	S	H	<0.002	U,H2	UJ	S	H	1.5	H2	J-	S	H	0.025	H2	J-	S	H	0.0043	J,H2	J-	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	1.5	H2	J-	S	H	15.7	H2	J-	S	H	21.6	H2	J-	S	H	0.39	J,H2	J-	S	H	0.66	H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	0.033	H2	UJ	S	H, CCB	0.8	H2	J-	S	H	76.8	H2	J-	S	H	3.5	H2	J-	S	H	0.14	H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	0.09	J,H3	J-	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0046	J,H2	J-	S	H	0.002	J,H2	J	S	H, ICS	0.003	J,H2	J	S	H, ICS	<0.0015	U,H2	UJ	S	H	<0.0015	U,H2	UJ	S	H
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H	0.015	J,H2	J-	S	H	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H
Potassium, SPLP	SW-846 6010D	mg/L	0.98	J,H2	J-	S	H	2.8	H2	J-	S	H	4.8	H2	J-	S	H	1.4	J,H2	J-	S	H	1.1	J,H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	<0.00058	U,H2	UJ	S	H	<0.00058	U,H2	UJ	S	H	0.0019	J,H2	J-	S	H	0.0014	J,H2	J-	S	H	<0.00058	U,H2	UJ	S	H
Sodium, SPLP	SW-846 6010D	mg/L	3.4	B,H2	UJ	S	H, MB	4.2	B,H2	UJ	S	H, MB	0.35	J,B,H2	UJ	S	H, MB	0.77	J,B,H2	UJ	S	H, MB	1.1	B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	0.0056	J,H2	J	S	H, ICS	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H
Vanadium, SPLP	SW-846 6010D	mg/L	0.0039	J,H2	J-	S	H	0.00059	J,H2	J-	S	H	0.00088	J,H2	J-	S	H	<0.00043	U,H2	UJ	S	H	0.003	J,H2	J-	S	H
Zinc, SPLP	SW-846 6010D	mg/L	<0.0068	U,H2	UJ	S	H	0.014	J,H2	J-	S	H	23	H2	J-	S	H	0.81	H2	J-	S	H	0.071	H2	J-	S	H

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

H2 = Extraction or preparation was conducted outside of the recognized method holding time.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

CCB = Qualified due to detections in the Continuing Calibration Blank.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

mg/L = milligram per liter

ug/L = microgram per liter

Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0297-SO6082-4.0-4.5-N-062420					20WS-0288-SO6090-4.0-4.6-N-062420					20WS-0285-SO6092-0.0-4.0-N-062520					20WS-0285-SO6096-4.0-8.4-N-062520					20WS-0285-SO6106-0.0-1.3-N-062520				
		Lab Sample ID	10550023013					10550023014					10550023015					10550023016					10550023017				
		Sample Date	6/24/2020					6/24/2020					6/25/2020					6/25/2020					6/25/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	0.15	J,H2	J-	S	H	0.1	J,H2	J-	S	H	0.85	H2	J-	S	H	0.65	H2	J-	S	H	<0.026	U,H2	UJ	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	0.009	J,H2	J-	S	H	0.0042	J,H2	J-	S	H	<0.0038	U,H2	UJ	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.039	H2	J-	S	H	0.0017	J,H2	J-	S	H	0.0019	J,H2	J-	S	H	0.0012	J,H2	J-	S	H	0.00083	J,H2	J-	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H
Cadmium, SPLP	SW-846 6010D	mg/L	0.034	H2	J-	S	H	0.0034	H2	J-	S	H	<0.00031	U,H2	UJ	S	H	<0.00031	U,H2	UJ	S	H	0.016	H2	J-	S	H
Calcium, SPLP	SW-846 6010D	mg/L	0.58	H2	J-	S	H	0.7	H2	J-	S	H	0.13	J,H2	J-	S	H	0.19	J,H2	J-	S	H	1.2	H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	0.00076	J,H2	J-	S	H	0.00081	J,H2	J-	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H
Copper, SPLP	SW-846 6010D	mg/L	0.035	H2	J-	S	H	0.0027	J,H2	J-	S	H	0.0056	J,H2	J-	S	H	0.003	J,H2	J-	S	H	0.0026	J,H2	J-	S	H
Iron, SPLP	SW-846 6010D	mg/L	0.13	H2	J-	S	H	0.11	H2	J-	S	H	1.2	H2	J-	S	H	0.38	H2	J-	S	H	0.061	H2	J-	S	H
Lead, SPLP	SW-846 6010D	mg/L	12.5	H2	J-	S	H	0.0092	J,H2	J-	S	H	0.069	H2	J-	S	H	0.072	H2	J-	S	H	0.023	H2	J-	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	0.12	J,H2	J-	S	H	0.13	J,H2	J-	S	H	0.075	J,H2	J-	S	H	0.087	J,H2	J-	S	H	0.54	H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	0.78	H2	J-	S	H	1.3	H2	J-	S	H	0.11	H2	J-	S	H	0.1	H2	J-	S	H	22.3	P6,H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	0.13	J,H3	J-	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0015	U,H2	UJ	S	H	0.0035	J,H2	J-	S	H	0.002	J,H2	J-	S	H	<0.0015	U,H2	UJ	S	H	0.0047	J,H2	J-	S	H
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H
Potassium, SPLP	SW-846 6010D	mg/L	2	J,H2	J-	S	H	1.3	J,H2	J-	S	H	1.1	J,H2	J-	S	H	1.5	J,H2	J-	S	H	1.7	J,H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	0.0036	J,H2	J-	S	H	0.0014	J,H2	J-	S	H	<0.00058	U,H2	UJ	S	H	<0.00058	U,H2	UJ	S	H	<0.00058	U,H2	UJ	S	H
Sodium, SPLP	SW-846 6010D	mg/L	0.77	J,B,H2	UJ	S	H, MB	3.2	B,H2	UJ	S	H, MB	3.2	B,H2	UJ	S	H, MB	2.9	B,H2	UJ	S	H, MB	0.39	J,B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U,H2	UJ	S	H	<0.00043	U,H2	UJ	S	H	0.0019	J,H2	J-	S	H	<0.00043	U,H2	UJ	S	H	<0.00043	U,H2	UJ	S	H
Zinc, SPLP	SW-846 6010D	mg/L	11.2	H2	J-	S	H	1	H2	J-	S	H	0.059	H2	J-	S	H	0.022	H2	J-	S	H	0.97	H2	J-	S	H

Notes:

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P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

CCB = Qualified due to detections in the Continuing Calibration Blank.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

mg/L = milligram per liter

ug/L = microgram per liter

Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0246-SO6109-8.0-12.0-N-062520					20WS-0246-SO6119-0.0-4.8-N-062520					20WS-0246-SO6123-8.0-8.7-N-062520					20WS-1150-SO6133-16.0-20.5-N-062520					20WS-0016-SO6162-12.0-12.7-N-070120				
		Lab Sample ID	10550023038					10550023018					10550023019					10550023020					10550023021				
		Sample Date	6/25/2020					6/25/2020					6/25/2020					6/25/2020					7/1/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	<0.026	U,H2	UJ	S	H	<0.026	U,H2	UJ	S	H	1.6	H2	J-	S	H	0.049	J,H2	J-	S	H	0.027	J,H2	J-	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	0.048	H2	J-	S	H	<0.0038	U,H2	UJ	S	H	0.0039	J,H2	J-	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.0066	J,H2	J-	S	H	0.0031	J,H2	J-	S	H	0.015	H2	J-	S	H	0.02	H2	J-	S	H	0.036	H2	J-	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	0.00064	J,H2	J-	S	H	0.00046	J,H2	UJ	S	H, CCB, ICS
Cadmium, SPLP	SW-846 6010D	mg/L	0.0041	H2	J-	S	H	0.0085	H2	J-	S	H	0.0016	J,H2	J-	S	H	0.041	H2	J-	S	H	0.095	H2	J-	S	H
Calcium, SPLP	SW-846 6010D	mg/L	25	H2	J-	S	H	18.5	H2	J-	S	H	6.2	H2	J-	S	H	21.4	H2	J-	S	H	275	H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	0.0008	J,H2	J-	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	0.0016	J,H2	J-	S	H	0.0039	J,H2	J-	S	H	0.0042	J,H2	J-	S	H	0.0024	J,H2	J-	S	H	0.014	H2	J	S	H, ICS
Copper, SPLP	SW-846 6010D	mg/L	0.0018	J,H2	J-	S	H	0.0012	J,H2	J-	S	H	0.021	H2	J-	S	H	0.027	H2	J-	S	H	0.0017	J,H2	J-	S	H
Iron, SPLP	SW-846 6010D	mg/L	<0.014	U,H2	UJ	S	H	0.025	J,H2	J-	S	H	3.9	H2	J-	S	H	0.036	J,H2	J-	S	H	0.071	B,H2	J-	S	H
Lead, SPLP	SW-846 6010D	mg/L	0.007	J,H2	J-	S	H	0.013	H2	J-	S	H	0.18	H2	J-	S	H	3.7	H2	J-	S	H	0.16	H2	J-	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	3.1	H2	J-	S	H	1.6	H2	J-	S	H	0.95	H2	J-	S	H	0.59	H2	J-	S	H	14	H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	28.1	H2	J-	S	H	51.2	H2	J-	S	H	11.5	H2	J-	S	H	16.6	H2	J-	S	H	43.2	H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0034	J,H2	J-	S	H	<0.0015	U,H2	UJ	S	H	0.0051	J,H2	J-	S	H	0.0018	J,H2	J-	S	H	0.0017	J,H2	J	S	H, ICS
Nickel, SPLP	SW-846 6010D	mg/L	0.0029	J,H2	J-	S	H	0.0037	J,H2	J-	S	H	0.0024	J,H2	J-	S	H	0.0031	J,H2	J-	S	H	0.014	J,H2	J-	S	H
Potassium, SPLP	SW-846 6010D	mg/L	2.2	J,H2	J-	S	H	2.8	H2	J-	S	H	2.7	H2	J-	S	H	2.4	J,H2	J-	S	H	3.7	H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	<0.00058	U,H2	UJ	S	H	0.0024	J,H2	J-	S	H	0.013	H2	J-	S	H	0.00066	J,H2	J-	S	H	0.0024	J,H2	J-	S	H
Sodium, SPLP	SW-846 6010D	mg/L	0.32	J,B,H2	UJ	S	H, MB	0.68	J,B,H2	UJ	S	H, MB	3.6	B,H2	UJ	S	H, MB	2.8	B,H2	UJ	S	H, MB	2.3	B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	0.0068	J,H2	J	S	H, ICS
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U,H2	UJ	S	H	<0.00043	U,H2	UJ	S	H	0.0028	J,H2	J-	S	H	<0.00043	U,H2	UJ	S	H	0.00098	J,H2	J-	S	H
Zinc, SPLP	SW-846 6010D	mg/L	0.69	H2	J-	S	H	3.2	H2	J-	S	H	0.69	H2	J-	S	H	13.6	H2	J-	S	H	15.6	H2	J-	S	H

Notes:

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P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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Screening/Enforcement Quality (S/E)

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Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

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Abbreviations:

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Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0016-SO6169-0.0-4.0-N-070120					20WS-1150-SO6186-20.0-24.0-N-070120					20WS-0288-SO6189-0.0-4.0-N-070220					20WS-0288-SO6195-0.0-1.6-N-070220					20WS-0288-SO6197-0.0-0.7-N-070220				
		Lab Sample ID	10550023023					10550023024					10550023025					10550023027					10550023028				
		Sample Date	7/1/2020					7/1/2020					7/2/2020					7/2/2020					7/2/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	<0.026	U,H2	UJ	S	H	0.055	J,H2	J-	S	H	0.062	J,H2	J-	S	H	0.24	H2	J-	S	H	8.8	H2	J-	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	0.0052	J,H2	J-	S	H	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	0.13	H2	J-	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.017	H2	J-	S	H	0.0074	J,H2	J-	S	H	0.006	J,H2	J-	S	H	0.0028	J,H2	J-	S	H	0.0065	J,H2	J-	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H	<0.00028	U,H2	UJ	S	H
Cadmium, SPLP	SW-846 6010D	mg/L	0.025	H2	J-	S	H	0.15	H2	J-	S	H	0.012	H2	J-	S	H	0.0032	H2	J-	S	H	<0.00031	U,H2	UJ	S	H
Calcium, SPLP	SW-846 6010D	mg/L	236	H2	J-	S	H	61.4	H2	J-	S	H	1.6	H2	J-	S	H	3.8	H2	J-	S	H	0.45	J,H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	0.00094	J,B,H2	J-	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	0.0027	J,H2	J	S	H, ICS	0.01	H2	J	S	H, ICS	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H	<0.00061	U,H2	UJ	S	H
Copper, SPLP	SW-846 6010D	mg/L	0.003	J,H2	J-	S	H	0.0026	J,H2	J-	S	H	<0.0012	U,H2	UJ	S	H	<0.0012	U,H2	UJ	S	H	0.011	H2	J-	S	H
Iron, SPLP	SW-846 6010D	mg/L	<0.014	U,H2	UJ	S	H	0.034	J,B,H2	J-	S	H	0.048	J,B,H2	J	S	H, FD	0.1	B,H2	J-	S	H	4.3	H2	J-	S	H
Lead, SPLP	SW-846 6010D	mg/L	0.012	H2	J	S	H, ICS	2.8	H2	J-	S	H	0.26	H2	J-	S	H	0.027	H2	J-	S	H	0.18	H2	J-	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	7.3	H2	J-	S	H	4.1	H2	J-	S	H	0.25	J,H2	J-	S	H	1.3	H2	J-	S	H	0.6	H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	13.8	H2	J-	S	H	31.8	H2	J-	S	H	7.7	H2	J	S	H, FD	9.3	H2	J-	S	H	0.43	H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0015	U,H2	UJ	S	H	<0.0015	U,H2	UJ	S	H	<0.0015	U,H2	UJ	S	H	<0.0015	U,H2	UJ	S	H	0.003	J,H2	J-	S	H
Nickel, SPLP	SW-846 6010D	mg/L	0.004	J,H2	J-	S	H	0.0084	J,H2	J-	S	H	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H	<0.0014	U,H2	UJ	S	H
Potassium, SPLP	SW-846 6010D	mg/L	3.9	H2	J-	S	H	2	J,H2	J-	S	H	1.7	J,H2	J-	S	H	1	J,H2	J-	S	H	3.8	H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	0.00099	J,H2	J-	S	H	0.0026	J,H2	J-	S	H	<0.00058	U,H2	UJ	S	H	0.00067	J,H2	J-	S	H	0.0031	J,H2	J-	S	H
Sodium, SPLP	SW-846 6010D	mg/L	2.9	B,H2	UJ	S	H, MB	5.1	B,H2	UJ	S	H, MB	2.6	B,H2	UJ	S	H, MB	2.6	B,H2	UJ	S	H, MB	2.5	B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H
Vanadium, SPLP	SW-846 6010D	mg/L	0.00074	J,H2	J-	S	H	0.00045	J,H2	J-	S	H	<0.00043	U,H2	UJ	S	H	<0.00043	U,H2	UJ	S	H	0.003	J,H2	J-	S	H
Zinc, SPLP	SW-846 6010D	mg/L	1.6	H2	J-	S	H	40.8	H2	J-	S	H	2.7	H2	J-	S	H	0.81	H2	J-	S	H	0.19	H2	J-	S	H

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Abbreviations:

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Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023					10550023					10550023					10550023					10550023				
		Field Sample ID	20WS-0289-SO6216-12.0-12.8-N-070220					20WS-0162-SO6228-0.0-12.0-N-070620					20WS-0138-SO6246-8.0-9.5-N-070620					20WS-0179-SO6252-4.0-5.4-N-070820					20WS-0315-SO6272-4.0-8.0-N-070920				
		Lab Sample ID	10550023029					10550023030					10550023033					10550023034					10550023036				
		Sample Date	7/2/2020					7/6/2020					7/6/2020					7/8/2020					7/9/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	0.062	J,H2	J-	S	H	0.07	J,H2	J-	S	H	<0.026	U,H2	UJ	S	H	3.5	H2	J-	S	H	2.3	H2	J-	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	<0.007	U,H2	UJ	S	H	0.007	J,H2	J-	S	H	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	<0.0038	U,H2	UJ	S	H	0.0044	J,H2	J-	S	H	0.0096	J,H2	J-	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.001	J,H2	J-	S	H	0.0073	J,H2	J-	S	H	0.0011	J,H2	J-	S	H	0.0022	J,H2	J-	S	H	0.011	H2	J-	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	0.0005	J,H2	UJ	S	H, CCB	0.00034	J,H2	UJ	S	H, CCB, ICS	<0.00028	U,H2	UJ	S	H	0.0016	J,H2	UJ	S	H, CCB, ICS	0.00083	J,H2	UJ	S	H, CCB
Cadmium, SPLP	SW-846 6010D	mg/L	0.00085	J,H2	J-	S	H	0.00081	J,H2	J-	S	H, ICS	0.0027	J,H2	J-	S	H, ICS	0.003	J,H2	J-	S	H, ICS	0.0011	J,H2	J-	S	H
Calcium, SPLP	SW-846 6010D	mg/L	8.1	H2	J-	S	H	115	H2	J-	S	H	295	H2	J-	S	H	124	H2	J-	S	H	3.3	H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	0.00079	J,B,H2	J-	S	H	<0.00066	U,H2	UJ	S	H	<0.00066	U,H2	UJ	S	H	0.0011	J,B,H2	J-	S	H	0.0011	J,B,H2	J-	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	0.00065	J,H2	J-	S	H	0.00089	J,H2	J	S	H, ICS	0.00088	J,H2	J	S	H, ICS	0.015	H2	J	S	H, ICS	<0.00061	U,H2	UJ	S	H
Copper, SPLP	SW-846 6010D	mg/L	0.0022	J,H2	J-	S	H	<0.0012	U,H2	UJ	S	H	0.0013	J,H2	J-	S	H	0.17	H2	J-	S	H	0.019	H2	J-	S	H
Iron, SPLP	SW-846 6010D	mg/L	0.049	J,B,H2	J-	S	H	0.056	B,H2	J-	S	H	<0.014	U,H2	UJ	S	H	0.5	H2	J-	S	H	1.1	H2	J-	S	H
Lead, SPLP	SW-846 6010D	mg/L	0.0079	J,H2	J-	S	H	0.017	H2	J	S	H, ICS	0.015	H2	J	S	H, ICS	0.28	H2	J-	S	H	0.013	H2	J-	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	0.98	H2	J-	S	H	14.2	H2	J-	S	H	22	H2	J-	S	H	3.4	H2	J-	S	H	0.66	H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	6.8	H2	J-	S	H	0.21	H2	J-	S	H	15.7	H2	J-	S	H	3.2	H2	J-	S	H	0.49	H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	<0.08	U,H3	UJ	S	H, Pres	0.25	H3	J-	S	H, Pres	1.8	H3	J-	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0015	U,H2	UJ	S	H	0.0032	J,H2	J	S	H, ICS	<0.0015	U,H2	UJ	S	H	<0.0015	U,H2	UJ	S	H	0.002	J,H2	J-	S	H
Nickel, SPLP	SW-846 6010D	mg/L	0.002	J,H2	J-	S	H	<0.0014	U,H2	UJ	S	H	0.0044	J,H2	J-	S	H	0.0079	J,H2	J-	S	H	<0.0014	U,H2	UJ	S	H
Potassium, SPLP	SW-846 6010D	mg/L	1.4	J,H2	J-	S	H	4.2	H2	J-	S	H	3.2	H2	J-	S	H	0.87	J,H2	J-	S	H	1.6	J,H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	<0.00058	U,H2	UJ	S	H	<0.00058	U,H2	UJ	S	H	0.00074	J,H2	J-	S	H	0.0036	J,H2	J-	S	H	<0.00058	U,H2	UJ	S	H
Sodium, SPLP	SW-846 6010D	mg/L	2.4	B,H2	UJ	S	H, MB	3	B,H2	UJ	S	H, MB	2.7	B,H2	UJ	S	H, MB	2.8	B,H2	UJ	S	H, MB	2.9	B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H	<0.0055	U,H2	UJ	S	H
Vanadium, SPLP	SW-846 6010D	mg/L	0.00055	J,H2	J-	S	H	0.001	J,H2	J-	S	H	0.00084	J,H2	J-	S	H	0.00067	J,H2	J-	S	H	0.0033	J,H2	J-	S	H
Zinc, SPLP	SW-846 6010D	mg/L	2.5	H2	J-	S	H	0.042	H2	J-	S	H	0.19	H2	J-	S	H	0.5	H2	J-	S	H	0.092	H2	J-	S	H

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

H2 = Extraction or preparation was conducted outside of the recognized method holding time.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

CCB = Qualified due to detections in the Continuing Calibration Blank.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

mg/L = milligram per liter

ug/L = microgram per liter

Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10550023				
		Field Sample ID	20WS-0315-SO6280-0.0-4.3-N-070920				
		Lab Sample ID	10550023037				
		Sample Date	7/9/2020				
		Sample Type	Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code
Aluminum, SPLP	SW-846 6010D	mg/L	1	H2	J-	S	H
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	S	H
Arsenic, SPLP	SW-846 6010D	mg/L	0.0068	J,H2	J-	S	H
Barium, SPLP	SW-846 6010D	mg/L	0.0045	J,H2	J-	S	H
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	S	H
Cadmium, SPLP	SW-846 6010D	mg/L	<0.00031	U,H2	UJ	S	H
Calcium, SPLP	SW-846 6010D	mg/L	0.28	J,H2	J-	S	H
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	S	H
Cobalt, SPLP	SW-846 6010D	mg/L	<0.00061	U,H2	UJ	S	H
Copper, SPLP	SW-846 6010D	mg/L	0.0054	J,H2	J-	S	H
Iron, SPLP	SW-846 6010D	mg/L	0.69	H2	J-	S	H
Lead, SPLP	SW-846 6010D	mg/L	0.0094	J,H2	J-	S	H
Magnesium, SPLP	SW-846 6010D	mg/L	0.11	J,H2	J-	S	H
Manganese, SPLP	SW-846 6010D	mg/L	0.27	H2	J-	S	H
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	S	H, Pres
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0015	U,H2	UJ	S	H
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U,H2	UJ	S	H
Potassium, SPLP	SW-846 6010D	mg/L	1.2	J,H2	J-	S	H
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	S	H
Silver, SPLP	SW-846 6010D	mg/L	<0.00058	U,H2	UJ	S	H
Sodium, SPLP	SW-846 6010D	mg/L	0.95	J,B,H2	UJ	S	H, MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	S	H
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U,H2	UJ	S	H
Zinc, SPLP	SW-846 6010D	mg/L	0.014	J,H2	J-	S	H

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

H2 = Extraction or preparation was conducted outside of the recognized method holding time.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

CCB = Qualified due to detections in the Continuing Calibration Blank.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

mg/L = milligram per liter

ug/L = microgram per liter

Table 1c. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - ABA

		Work Order	10549759					10549759					10549759					10549759					10549759				
		Field Sample ID	20WS-0006-SO5990-5.0-5.7-N-061820					20WS-0003-SO6036-0.0-4.0-N-062320					20WS-0010-SO6069-8.0-9.2-N-062420					20WS-0297-SO6080-8.0-13.7-N-062420					20WS-0297-SO6081-0.0-4.0-N-062420				
		Lab Sample ID	S2103084-001					S2103084-002					S2103084-003					S2103084-004					S2103084-006				
		Sample Date	6/18/2020					6/23/2020					6/24/2020					6/24/2020					6/24/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
Acid Base	EPA600/2-78-054	tons/1000	41.5			E		11.5			E		132			E		0.58		J	S	FD	11.9			E	
Acid/Base Potential	EPA600/2-78-054	tons/1000	-23			E		-4.68			E		-75.8			E		10.5		J	S	FD	-9.8			E	
Neutralization Potential	EPA600/2-78-054	tons/1000	18.6			E		6.78			E		56.4			E		11.1		J	S	FD	2.11			E	
Pyritic Sulfur Acid Base	EPA600/2-78-054	tons/1000	23.8			E		5.31			E		73.8			E		11.1		J	S	FD	0.94			E	
Pyritic Sulfur Acid Base Potential	EPA600/2-78-054	tons/1000	-5.16			E		1.47			E		-17.4			E		11.1		J	S	FD	1.17			E	
HCL Extract Sulfur (Sulfate Sulfur)	EPA600/2-78-054	%	0.2			E		0.06			E		0.37			E		0.04		J	S	FD	0.18			E	
HNO3 Extract Sulfur (Pyritic Sulfur)	EPA600/2-78-054	%	0.76			E		0.17			E		2.36			E		<0.01	ND		E		0.03			E	
Hot Water Extract Sulfur (H2O Sol. SO4)	EPA600/2-78-054	%	0.29			E		0.13			E		0.75			E		<0.01	ND		E		0.03			E	
HNO3 Sulfur (Non-Ext. Sulfur)	EPA600/2-78-054	%	0.08			E		0.01			E		0.75			E		0.02			E		0.14			E	
Total Sulfur	EPA600/2-78-054	%	1.33			E		0.37			E		4.23			E		0.02			E		0.38			E	
Hot Water Sulfur - LECO	EPA600/2-78-054	%	1.04			E		0.24			E		3.48			E		0.05		J	S	FD	0.35			E	
HNO3 Sulfur - LECO	EPA600/2-78-054	%	0.08			E		0.01			E		0.75			E		0.02			E		0.14			E	
HCL Sulfur - LECO	EPA600/2-78-054	%	0.84			E		0.18			E		3.11			E		0.01			E		0.17			E	
pH	USDA 60-21a	SU	5.5			E		5			E		5.6			E		8.3			E		4.7			E	

Notes:

< - Not detected at method detection limit (lab qual = U) or reporting limit (lab qual = ND)

Pace Laboratory Flags (Lab Flag)

ND = Not detected at the reporting limit.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

tons/1000 = tons $CaCO_3$/1000 tons

SU = Standard unit

Table 1c. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - ABA

		Work Order	10549759					10549759					10549759					10549759					10549759				
		Field Sample ID	20WS-0285-SO6096-4.0-8.4-N-062520					20WS-0285-SO6100-0.0-1.2-N-062520					20WS-0246-SO6119-0.0-4.8-N-062520					20WS-1150-SO6133-16.0-20.5-N-062520					20WS-0016-SO6161-8.0-12.0-N-070120				
		Lab Sample ID	S2103084-007					S2103084-008					S2103084-009					S2103084-010					S2103084-011				
		Sample Date	6/25/2020					6/25/2020					6/25/2020					6/25/2020					7/1/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
Acid Base	EPA600/2-78-054	tons/1000	2.24			E		14.4			E		49.8			E		14			E		32.7			E	
Acid/Base Potential	EPA600/2-78-054	tons/1000	2.76			E		1			E		0.74			E		-9.01			E		1.69			E	
Neutralization Potential	EPA600/2-78-054	tons/1000	5			E		15.4			E		50.5			E		4.95			E		34.4			E	
Pyritic Sulfur Acid Base	EPA600/2-78-054	tons/1000	1.25			E		2.81			E		37.8			E		1.56			E		16.2			E	
Pyritic Sulfur Acid Base Potential	EPA600/2-78-054	tons/1000	3.75			E		12.6			E		-12.7			E		3.39			E		18.1			E	
HCL Extract Sulfur (Sulfate Sulfur)	EPA600/2-78-054	%	0.01			E		0.1			E		0.31			E		0.06			E		0.09			E	
HNO3 Extract Sulfur (Pyritic Sulfur)	EPA600/2-78-054	%	0.04			E		0.09			E		1.21			E		0.05			E		0.52			E	
Hot Water Extract Sulfur (H2O Sol. SO4)	EPA600/2-78-054	%	0.01			E		0.09			E		0.03			E		0.2			E		0.34			E	
HNO3 Sulfur (Non-Ext. Sulfur)	EPA600/2-78-054	%	0.01			E		0.18			E		0.04			E		0.14			E		0.1			E	
Total Sulfur	EPA600/2-78-054	%	0.07			E		0.46			E		1.59			E		0.45			E		1.05			E	
Hot Water Sulfur - LECO	EPA600/2-78-054	%	0.06			E		0.37			E		1.56			E		0.25			E		0.71			E	
HNO3 Sulfur - LECO	EPA600/2-78-054	%	0.01			E		0.18			E		0.04			E		0.14			E		0.1			E	
HCL Sulfur - LECO	EPA600/2-78-054	%	0.05			E		0.27			E		1.25			E		0.19			E		0.62			E	
pH	USDA 60-21a	SU	5.8			E		5.7			E		5.7			E		5.9			E		7.1			E	

Notes:

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Pace Laboratory Flags (Lab Flag)

ND = Not detected at the reporting limit.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

tons/1000 = tons $CaCO_3$/1000 tons

SU = Standard unit

Table 1c. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - ABA

		Work Order	10549759					10549759					10549759				
		Field Sample ID	20WS-0288-SO6195-0.0-1.6-N-070220					20WS-0138-SO6246-8.0-9.5-N-070620					20WS-0179-SO6252-4.0-5.4-N-070820				
		Lab Sample ID	S2103084-012					S2103084-013					S2103084-014				
		Sample Date	7/2/2020					7/6/2020					7/8/2020				
		Sample Type	Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
Acid Base	EPA600/2-78-054	tons/1000	21.6			E		75.9			E		29.2			E	
Acid/Base Potential	EPA600/2-78-054	tons/1000	21.8			E		-32.4			E		-27.9		J	S	D%
Neutralization Potential	EPA600/2-78-054	tons/1000	43.4			E		43.5			E		1.34		J	S	D%
Pyritic Sulfur Acid Base	EPA600/2-78-054	tons/1000	8.13			E		51.3			E		<0.01	ND		E	
Pyritic Sulfur Acid Base Potential	EPA600/2-78-054	tons/1000	35.3			E		-7.78			E		1.34			E	
HCL Extract Sulfur (Sulfate Sulfur)	EPA600/2-78-054	%	0.21			E		<0.01	ND		E		0.65			E	
HNO3 Extract Sulfur (Pyritic Sulfur)	EPA600/2-78-054	%	0.26			E		1.64			E		<0.01	ND		E	
Hot Water Extract Sulfur (H2O Sol. SO4)	EPA600/2-78-054	%	0.06			E		0.66			E		0.27			E	
HNO3 Sulfur (Non-Ext. Sulfur)	EPA600/2-78-054	%	0.16			E		0.16			E		0.03			E	
Total Sulfur	EPA600/2-78-054	%	0.69			E		2.43			E		0.94			E	
Hot Water Sulfur - LECO	EPA600/2-78-054	%	0.63			E		1.77			E		0.67			E	
HNO3 Sulfur - LECO	EPA600/2-78-054	%	0.16			E		0.16			E		0.03			E	
HCL Sulfur - LECO	EPA600/2-78-054	%	0.42			E		1.8			E		0.02			E	
pH	USDA 60-21a	SU	6.2			E		6.1			E		4.3			E	

Notes:

< - Not detected at method detection limit (lab qual = U) or reporting limit (lab qual = ND)

Pace Laboratory Flags (Lab Flag)

ND = Not detected at the reporting limit.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

D% = Qualified due to laboratory duplicate results outside control limits.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

tons/1000 = tons $CaCO_3$/1000 tons

SU = Standard unit

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order[1]	10550023						10550023									
		Field Sample ID	20WS-0043-SO5987-5.0-10.3-D-061820						20WS-0043-SO5987-5.0-10.3-N-061820									
		Lab Sample ID	10550023002						10550023001									
		Sample Date	6/18/2020						6/18/2020									
		Sample Type	Field Duplicate						Natural									
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Control Limit[2]	ABS DIF	RPD	Meets Control Limit?
Aluminum	SW-846 6010D	mg/kg	4,030	H3	J	H, FD	25	276	6,000	H3	J	H, FD	5	52.4	RPD≤35%		39%	RPD>35%
Antimony	SW-846 6010D	mg/kg	101	H3	J	H, FD	1	1.1	12.2	H3	J	H, FD	1	1	RPD≤35%		157%	RPD>35%
Arsenic	SW-846 6010D	mg/kg	126	H3	J-	H	1	1.1	103	H3	J-	H	1	1	RPD≤35%		20%	Yes
Barium	SW-846 6010D	mg/kg	62.1	H3	J-	H	1	0.55	46.2	H3	J-	H	1	0.52	RPD≤35%		29%	Yes
Beryllium	SW-846 6010D	mg/kg	0.12	J,H3	J-	H	1	0.28	0.2	J,H3	J-	H	1	0.26	ABS DIF≤2xRL	0.08		Yes
Cadmium	SW-846 6010D	mg/kg	8.5	H3	J	H, FD	1	0.17	3.9	H3	J	H, FD	1	0.16	RPD≤35%		74%	RPD>35%
Calcium	SW-846 6010D	mg/kg	6,700	H3	J-	H	25	690	7,240	H3	J-	H	5	131	RPD≤35%		8%	Yes
Chromium	SW-846 6010D	mg/kg	3.1	J,H3,D3	J-	H	25	13.8	2.7	H3	J-	H	5	2.6	ABS DIF≤2xRL	0.4		Yes
Cobalt	SW-846 6010D	mg/kg	5.4	H3	J-	H	1	0.55	7	H3	J-	H	1	0.52	RPD≤35%		26%	Yes
Copper	SW-846 6010D	mg/kg	1,010	H3	J	H, FD	1	0.55	316	H3	J	H, FD	1	0.52	RPD≤35%		105%	RPD>35%
Iron	SW-846 6010D	mg/kg	37,200	H3	J-	H	25	138	34,200	H3	J-	H	5	26.2	RPD≤35%		8%	Yes
Lead	SW-846 6010D	mg/kg	6,100	H3	J	H, FD	25	13.8	1,320	H3	J	H, FD	5	2.6	RPD≤35%		129%	RPD>35%
Magnesium	SW-846 6010D	mg/kg	3,850	H3	J	H, FD	1	27.6	1,710	H3	J	H, FD	1	26.2	RPD≤35%		77%	RPD>35%
Manganese	SW-846 6010D	mg/kg	99,500	H3	J	H, FD	200	110	24,000	H3	J	H, FD	50	26.2	RPD≤35%		122%	RPD>35%
Mercury	SW-846 7471B	mg/kg	0.37	H3	J	H, Pres, FD	1	0.023	0.25	H3	J	H, Pres, FD	1	0.023	RPD≤35%		39%	RPD>35%
Molybdenum	SW-846 6010D	mg/kg	21.9	H3	J	H, FD	1	0.83	12.7	H3	J	H, FD	1	0.79	RPD≤35%		53%	RPD>35%
Nickel	SW-846 6010D	mg/kg	3.9	H3	J-	H	1	1.1	4.3	H3	J-	H	1	1	ABS DIF≤2xRL	0.4		Yes
Potassium	SW-846 6010D	mg/kg	1,140	H3	J-	H	1	138	1,100	H3	J-	H	1	131	RPD≤35%		4%	Yes
Selenium	SW-846 6010D	mg/kg	<9.1	U,H3,D3	UJ	H	25	27.6	<1.7	U,H3,D3	UJ	H	5	5.2	ABS DIF≤2xRL	both U		Yes
Silver	SW-846 6010D	mg/kg	203	H3	J-	H	1	5	284	H3	J-	H	1	5.4	RPD≤35%		33%	Yes
Sodium	SW-846 6010D	mg/kg	52	J,H3	J-	H	1	55.2	46.2	J,H3	J-	H	1	52.4	ABS DIF≤2xRL	5.8		Yes
Thallium	SW-846 6010D	mg/kg	<7.1	U,H3,D3	UJ	H	25	27.6	<1.3	U,H3,D3	UJ	H	5	5.2	ABS DIF≤2xRL	both U		Yes
Vanadium	SW-846 6010D	mg/kg	18.6	H3	J-	H	1	0.83	26	H3	J-	H	1	0.79	RPD≤35%		33%	Yes
Zinc	SW-846 6010D	mg/kg	2,230	H3	J-	H	1	2.2	1,620	H3	J-	H	1	2.1	RPD≤35%		32%	Yes
Percent Moisture	ASTM D2974	%w/w	14.6	N2			1	0.1	12.5	N2			1	0.1	RPD≤35%		15%	Yes
Aluminum, SPLP	SW-846 6010D	mg/L	<0.026	U,H2	UJ	H	1	0.2	<0.026	U,H2	UJ	H	1	0.2	ABS DIF≤2xRL	both U		Yes
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	H	1	0.02	<0.007	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	H	1	0.02	<0.0038	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Barium, SPLP	SW-846 6010D	mg/L	0.0049	J,H2	J-	H	1	0.01	0.0071	J,H2	J-	H	1	0.01	ABS DIF≤2xRL	0.0022		Yes
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	H	1	0.005	<0.00028	U,H2	UJ	H	1	0.005	ABS DIF≤2xRL	both U		Yes
Cadmium, SPLP	SW-846 6010D	mg/L	0.0014	J,H2	J-	H, ICS	1	0.003	0.0018	J,H2	J-	H, ICS	1	0.003	ABS DIF≤2xRL	0.0004		Yes
Calcium, SPLP	SW-846 6010D	mg/L	104	H2	J-	H	1	0.5	118	H2	J-	H	1	0.5	RPD≤35%		13%	Yes
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	H	1	0.01	<0.00066	U,H2	UJ	H	1	0.01	ABS DIF≤2xRL	both U		Yes
Cobalt, SPLP	SW-846 6010D	mg/L	0.00084	J,H2	J	H, ICS	1	0.01	0.0007	J,H2	J	H, ICS	1	0.01	ABS DIF≤2xRL	0.00014		Yes
Copper, SPLP	SW-846 6010D	mg/L	0.0013	J,H2	J-	H	1	0.01	0.0015	J,H2	J-	H	1	0.01	ABS DIF≤2xRL	0.0002		Yes
Iron, SPLP	SW-846 6010D	mg/L	<0.014	U,H2	UJ	H	1	0.05	<0.014	U,H2	UJ	H	1	0.05	ABS DIF≤2xRL	both U		Yes
Lead, SPLP	SW-846 6010D	mg/L	0.003	J,H2	J	H, ICS	1	0.01	0.0028	J,H2	J	H, ICS	1	0.01	ABS DIF≤2xRL	0.0002		Yes
Magnesium, SPLP	SW-846 6010D	mg/L	14.1	H2	J-	H	1	0.5	15.9	H2	J-	H	1	0.5	RPD≤35%		12%	Yes
Manganese, SPLP	SW-846 6010D	mg/L	9.9	H2	J-	H	1	0.005	11.2	H2	J-	H	1	0.005	RPD≤35%		12%	Yes
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	H, Pres	1	0.2	<0.08	U,H3	UJ	H, Pres	1	0.2	ABS DIF≤2xRL	both U		Yes
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0016	J,H2	J	H, ICS	1	0.015	0.0028	J,H2	J	H, ICS	1	0.015	ABS DIF≤2xRL	0.0012		Yes
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U,H2	UJ	H	1	0.02	<0.0014	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Potassium, SPLP	SW-846 6010D	mg/L	2.2	J,H2	J-	H	1	2.5	2.3	J,H2	J-	H	1	2.5	ABS DIF≤2xRL	0.1		Yes
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	H	1	0.02	<0.0058	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Silver, SPLP	SW-846 6010D	mg/L	<0.00058	U,H2	UJ	H	1	0.01	0.00085	J,H2	J-	H	1	0.01	ABS DIF≤2xRL	0.00027		Yes
Sodium, SPLP	SW-846 6010D	mg/L	2.8	B,H2	UJ	H, MB	1	1	2.8	B,H2	UJ	H, MB	1	1	ABS DIF≤2xRL	0		Yes
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	H	1	0.02	<0.0055	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U,H2	UJ	H	1	0.015	0.00077	J,H2	J-	H	1	0.015	ABS DIF≤2xRL	0.00034		Yes
Zinc, SPLP	SW-846 6010D	mg/L	0.27	H2	J	H, FD	1	0.02	0.39	H2	J	H, FD	1	0.02	RPD≤35%		36%	RPD>35%

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

The qualifications made to the field duplicate samples (DV Flag/Reason Code) are not included in the summary of qualifications made to natural samples discussed in the Data Validation Report.

Footnotes:

[1]Work order 10550023 has total and SPLP metals, and work order 10549759 has ABA analyses.

[2] If the control limit is an absolute difference less than the repoting limit, the minimum reporting limit will be used if the samples have varying dilution factors.

Abbreviations:

DF = dilution factor

RL = reporting limit

ABS DIF = absolute difference

RPD = relative percent difference

mg/L = milligram per liter

mg/kg = milligram per kilogram

ug/L = microgram per liter

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

H2 = Extraction or preparation was conducted outside of the recognized method holding time.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order[1]	10550023						10550023									
		Field Sample ID	20WS-0288-SO6189-0.0-4.0-D-070220						20WS-0288-SO6189-0.0-4.0-N-070220									
		Lab Sample ID	10550023026						10550023025									
		Sample Date	7/2/2020						7/2/2020									
		Sample Type	Field Duplicate						Natural									
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Control Limit[2]	ABS DIF	RPD	Meets Control Limit?
Aluminum	SW-846 6010D	mg/kg	768	H3	J-	H	5	47.9	954	H3	J-	H	1	9.9	RPD≤35%		22%	Yes
Antimony	SW-846 6010D	mg/kg	2.1	H3	J-	H	1	0.96	3.9	H3	J-	H	1	0.99	ABS DIF≤2xRL	1.8		Yes
Arsenic	SW-846 6010D	mg/kg	56.2	H3	J-	H	1	0.96	76.5	H3	J-	H	1	0.99	RPD≤35%		31%	Yes
Barium	SW-846 6010D	mg/kg	2.8	H3	J	H, FD	1	0.48	14.5	H3	J	H, FD	1	0.49	RPD≤35%		135%	RPD>35%
Beryllium	SW-846 6010D	mg/kg	0.052	J,H3	J-	H	1	0.24	0.057	J,H3	J-	H	1	0.25	ABS DIF≤2xRL	0.005		Yes
Cadmium	SW-846 6010D	mg/kg	3.8	H3	J	H, FD	1	0.14	2.4	H3	J	H, FD	1	0.15	RPD≤35%		45%	RPD>35%
Calcium	SW-846 6010D	mg/kg	140	H3	J-	H	5	120	145	H3	J-	H	1	24.7	ABS DIF≤2xRL	5		Yes
Chromium	SW-846 6010D	mg/kg	1.1	J,H3,D3	J-	H	5	2.4	0.47	J,H3	J-	H	1	0.49	ABS DIF≤2xRL	0.63		Yes
Cobalt	SW-846 6010D	mg/kg	0.35	J,H3	J-	H	1	0.48	0.25	J,H3	J-	H	1	0.49	ABS DIF≤2xRL	0.1		Yes
Copper	SW-846 6010D	mg/kg	30.5	H3	J-	H	1	0.48	34.1	H3	J-	H	1	0.49	RPD≤35%		11%	Yes
Iron	SW-846 6010D	mg/kg	4,280	H3	J	H, FD	1	4.8	6,380	H3	J	H, FD	1	4.9	RPD≤35%		39%	RPD>35%
Lead	SW-846 6010D	mg/kg	2,040	H3	J-	H	5	2.4	1,590	H3	J-	H	1	0.49	RPD≤35%		25%	Yes
Magnesium	SW-846 6010D	mg/kg	55	H3	J-	H	1	23.9	86.6	H3	J-	H	1	24.7	ABS DIF≤2xRL	31.6		Yes
Manganese	SW-846 6010D	mg/kg	14,400	H3	J	H, FD	25	12	3,280	H3	J	H, FD	5	2.5	RPD≤35%		126%	RPD>35%
Mercury	SW-846 7471B	mg/kg	0.054	H3	J	H, Pres, FD	1	0.018	0.18	H3	J	H, Pres, FD	1	0.021	ABS DIF≤2xRL	0.126		ABS DIFF>2xRL
Molybdenum	SW-846 6010D	mg/kg	14.3	H3	J-	H	1	0.72	14.2	H3	J-	H	1	0.74	RPD≤35%		1%	Yes
Nickel	SW-846 6010D	mg/kg	0.38	J,H3	J-	H	1	0.96	0.21	J,H3	J-	H	1	0.99	ABS DIF≤2xRL	0.17		Yes
Potassium	SW-846 6010D	mg/kg	958	H3	J-	H	1	120	680	H3	J-	H	1	124	RPD≤35%		34%	Yes
Selenium	SW-846 6010D	mg/kg	<1.6	U,H3,D3	UJ	H	5	4.8	<0.32	U,H3	UJ	H	1	0.99	ABS DIF≤2xRL	both U		Yes
Silver	SW-846 6010D	mg/kg	79.1	H3	J	H, FD	1	4.8	125	H3	J	H, FD	1	4.6	RPD≤35%		45%	RPD>35%
Sodium	SW-846 6010D	mg/kg	41.3	J,H3	J-	H	1	47.9	10.8	J,H3	J-	H	1	49.5	ABS DIF≤2xRL	30.5		Yes
Thallium	SW-846 6010D	mg/kg	<1.2	U,H3,D3	UJ	H	5	4.8	0.37	J,H3	J-	H	1	0.99	ABS DIF≤2xRL	0.83		Yes
Vanadium	SW-846 6010D	mg/kg	3.4	H3	J	H, FD	1	0.72	1.7	H3	J	H, FD	1	0.74	ABS DIF≤2xRL	1.7		ABS DIFF>2xRL
Zinc	SW-846 6010D	mg/kg	1,180	H3	J-	H	1	1.9	953	H3	J-	H	1	2	RPD≤35%		21%	Yes
Percent Moisture	ASTM D2974	%w/w	2.4	N2	J	FD	1	0.1	3.8	N2	J	FD	1	0.1	RPD≤35%		45%	RPD>35%
Aluminum, SPLP	SW-846 6010D	mg/L	0.37	H2	J-	H	1	0.2	0.062	J,H2	J-	H	1	0.2	ABS DIF≤2xRL	0.308		Yes
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U,H2	UJ	H	1	0.02	<0.007	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0038	U,H2	UJ	H	1	0.02	<0.0038	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Barium, SPLP	SW-846 6010D	mg/L	0.0038	J,H2	J-	H	1	0.01	0.006	J,H2	J-	H	1	0.01	ABS DIF≤2xRL	0.0022		Yes
Beryllium, SPLP	SW-846 6010D	mg/L	<0.00028	U,H2	UJ	H	1	0.005	<0.00028	U,H2	UJ	H	1	0.005	ABS DIF≤2xRL	both U		Yes
Cadmium, SPLP	SW-846 6010D	mg/L	0.0082	H2	J-	H	1	0.003	0.012	H2	J-	H	1	0.003	ABS DIF≤2xRL	0.0038		Yes
Calcium, SPLP	SW-846 6010D	mg/L	1.1	H2	J-	H	1	0.5	1.6	H2	J-	H	1	0.5	ABS DIF≤2xRL	0.5		Yes
Chromium, SPLP	SW-846 6010D	mg/L	<0.00066	U,H2	UJ	H	1	0.01	<0.00066	U,H2	UJ	H	1	0.01	ABS DIF≤2xRL	both U		Yes
Cobalt, SPLP	SW-846 6010D	mg/L	<0.00061	U,H2	UJ	H	1	0.01	<0.00061	U,H2	UJ	H	1	0.01	ABS DIF≤2xRL	both U		Yes
Copper, SPLP	SW-846 6010D	mg/L	0.0034	J,H2	J-	H	1	0.01	<0.0012	U,H2	UJ	H	1	0.01	ABS DIF≤2xRL	0.0022		Yes
Iron, SPLP	SW-846 6010D	mg/L	0.21	H2	J	H, FD	1	0.05	0.048	J,B,H2	J	H, FD	1	0.05	ABS DIF≤2xRL	0.162		ABS DIFF>2xRL
Lead, SPLP	SW-846 6010D	mg/L	0.27	H2	J-	H	1	0.01	0.26	H2	J-	H	1	0.01	RPD≤35%		4%	Yes
Magnesium, SPLP	SW-846 6010D	mg/L	0.19	J,H2	J-	H	1	0.5	0.25	J,H2	J-	H	1	0.5	ABS DIF≤2xRL	0.06		Yes
Manganese, SPLP	SW-846 6010D	mg/L	5.4	H2	J	H, FD	1	0.005	7.7	H2	J	H, FD	1	0.005	RPD≤35%		35%	RPD>35%
Mercury, SPLP	SW-846 7470A	µg/L	<0.08	U,H3	UJ	H, Pres	1	0.2	<0.08	U,H3	UJ	H, Pres	1	0.2	ABS DIF≤2xRL	both U		Yes
Molybdenum, SPLP	SW-846 6010D	mg/L	<0.0015	U,H2	UJ	H	1	0.015	<0.0015	U,H2	UJ	H	1	0.015	ABS DIF≤2xRL	both U		Yes
Nickel, SPLP	SW-846 6010D	mg/L	<0.0014	U,H2	UJ	H	1	0.02	<0.0014	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Potassium, SPLP	SW-846 6010D	mg/L	1.7	J,H2	J-	H	1	2.5	1.7	J,H2	J-	H	1	2.5	ABS DIF≤2xRL	0		Yes
Selenium, SPLP	SW-846 6010D	mg/L	<0.0058	U,H2	UJ	H	1	0.02	<0.0058	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Silver, SPLP	SW-846 6010D	mg/L	<0.00058	U,H2	UJ	H	1	0.01	<0.00058	U,H2	UJ	H	1	0.01	ABS DIF≤2xRL	both U		Yes
Sodium, SPLP	SW-846 6010D	mg/L	2.9	B,H2	UJ	H, MB	1	1	2.6	B,H2	UJ	H, MB	1	1	ABS DIF≤2xRL	0.3		Yes
Thallium, SPLP	SW-846 6010D	mg/L	<0.0055	U,H2	UJ	H	1	0.02	<0.0055	U,H2	UJ	H	1	0.02	ABS DIF≤2xRL	both U		Yes
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00043	U,H2	UJ	H	1	0.015	<0.00043	U,H2	UJ	H	1	0.015	ABS DIF≤2xRL	both U		Yes
Zinc, SPLP	SW-846 6010D	mg/L	2	H2	J-	H	1	0.02	2.7	H2	J-	H	1	0.02	RPD≤35%		30%	Yes

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

The qualifications made to the field duplicate samples (DV Flag/Reason Code) are not included in the summary of qualifications made to natural samples discussed in the Data Validation Report.

Footnotes:

[1]Work order 10550023 has total and SPLP metals, and work order 10549759 has ABA analyses.

[2] If the control limit is an absolute difference less than the repoting limit, the minimum reporting limit will be used if the samples have varying dilution factors.

Abbreviations:

DF = dilution factor

RL = reporting limit

ABS DIF = absolute difference

RPD = relative percent difference

mg/L = milligram per liter

mg/kg = milligram per kilogram

ug/L = microgram per liter

Pace Laboratory Flags (Lab Flag)

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

H3 = Sample was received or analysis requested beyond the recognized method holding time.

H2 = Extraction or preparation was conducted outside of the recognized method holding time.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

Data Validation Reason Codes (Reason Code)

H = Qualified due to analysis holding time exceedance.

Pres = Qualified because preservation requirement was not met.

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

ICS = Qualified due to detections in the Interference Check Sample.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order[1]	10549759						10549759									
		Field Sample ID	20WS-0297-SO6080-8.0-13.7-D-062420						20WS-0297-SO6080-8.0-13.7-N-062420									
		Lab Sample ID	S2103084-005						S2103084-004									
		Sample Date	6/24/2020						6/24/2020									
		Sample Type	Field Duplicate						Natural									
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Control Limit[2]	ABS DIF	RPD	Meets Control Limit?
Acid Base	EPA600/2-78-054	tons/1000	<0.01	ND	UJ	FD	1	0.01	0.58		J	FD	1	0.01	ABS DIF≤RL	0.57		ABS DIFF>RL
Acid/Base Potential	EPA600/2-78-054	tons/1000	2.47		J	FD	1		10.5		J	FD	1		RPD≤35%		124%	RPD>35%
Neutralization Potential	EPA600/2-78-054	tons/1000	2.47		J	FD	1		11.1		J	FD	1		RPD≤35%		127%	RPD>35%
HCL Extract Sulfur (Sulfate Sulfur)	EPA600/2-78-054	%	<0.01	ND	UJ	FD	1	0.01	0.04		J	FD	1	0.01	ABS DIF≤RL	0.03		ABS DIFF>RL
HNO3 Extract Sulfur (Pyritic Sulfur)	EPA600/2-78-054	%	<0.01	ND			1	0.01	<0.01	ND			1	0.01	ABS DIF≤RL	both ND		Yes
Hot Water Extract Sulfur (H2O Sol. SO4)	EPA600/2-78-054	%	<0.01	ND			1	0.01	<0.01	ND			1	0.01	ABS DIF≤RL	both ND		Yes
HNO3 Sulfur (Non-Ext. Sulfur)	EPA600/2-78-054	%	<0.01	ND			1	0.01	0.02				1	0.01	ABS DIF≤RL	0.01		Yes
Total Sulfur	EPA600/2-78-054	%	<0.01	ND			1	0.01	0.02				1	0.01	ABS DIF≤RL	0.01		Yes
Hot Water Sulfur - LECO	EPA600/2-78-054	%	<0.01	ND	UJ	FD	1	0.01	0.05		J	FD	1	0.01	ABS DIF≤RL	0.04		ABS DIFF>RL
HNO3 Sulfur - LECO	EPA600/2-78-054	%	<0.01	ND			1	0.01	0.02				1	0.01	ABS DIF≤RL	0.01		Yes
HCL Sulfur - LECO	EPA600/2-78-054	%	<0.01	ND			1	0.01	0.01				1	0.01	ABS DIF≤RL	0		Yes
pH	USDA 60-21a	SU	8.4				1	0.1	8.3				1	0.1	RPD≤35%		1%	Yes
Pyritic Sulfur Acid Base	EPA600/2-78-054	tons/1000	2.47		J	FD	1	0.01	11.1		J	FD	1	0.01	RPD≤35%		127%	RPD>35%
Pyritic Sulfur Acid Base Potential	EPA600/2-78-054	tons/1000	2.47		J	FD	1		11.1		J	FD	1		RPD≤35%		127%	RPD>35%

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

The qualifications made to the field duplicate samples (DV Flag/Reason Code) are not included in the summary of qualifications made to natural samples discussed in the Data Validation Report.

Footnotes:

[1]Work order 10550023 has total and SPLP metals, and work order 10549759 has ABA analyses.

[2] If the control limit is an absolute difference less than the repoting limit, the minimum reporting limit will be used if the samples have varying dilution factors.

Abbreviations:

DF = dilution factor

RL = reporting limit

ABS DIF = absolute difference

RPD = relative percent difference

tons/1000 = tons $CaCO_3$/1000 tons

SU = Standard unit

Pace Laboratory Flags (Lab Flag)

ND = Not detected at the reporting limit.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was analyzed for, but was not detected. The reported qualitation limit is approximate and may be inaccurate or imprecise.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

Table 3. Sample Identification

Field Sample ID[1]	Sample Type	Station	Depth Interval [ft]	Work Order[2]	Lab ID[2]	Sample Date	Total Metals[3]	SPLP[3]	ABA[3]
20WS-0043-SO5987-5.0-10.3-N-061820 (20WS-0043-SO5987-5.0-10.3-N-06)	Natural	SO5987	5.0-10.3	10550023	10550023001	6/18/2020	X	X	
20WS-0043-SO5987-5.0-10.3-D-061820 (20WS-0043-SO5987-5.0-10.3-D-06)	Field Duplicate	SO5987	5.0-10.3	10550023	10550023002	6/18/2020	X	X	
20WS-0006-SO5990-5.0-5.7-N-061820 (20WS-0006-SO5990-5.0-5.7-N-061)	Natural	SO5990	5.0-5.7	10550023	10550023003	6/18/2020	X	X	
				10549759	S2103084-001	6/18/2020			X
20WS-0006-SO6001-10.0-11.1-N-061920 (20WS-0006-SO6001-10.0-11.1-N-0)	Natural	SO6001	10.0-11.1	10550023	10550023004	6/19/2020	X	X	
20WS-0043-SO6011-6.5-7.3-N-061920 (20WS-0043-SO6011-6.5-7.3-N-06)	Natural	SO6011	6.5-7.3	10550023	10550023005	6/19/2020	X	X	
20WS-0043-SO6020-10.0-15.0-N-061920 (20WS-0043-SO6020-10.0-15.0-N-0)	Natural	SO6020	10.0-15.0	10550023	10550023006	6/19/2020	X		
20WS-0003-SO6036-0.0-4.0-N-062320	Natural	SO6036	0.0-4.0	10549759	S2103084-002	6/23/2020			X
20WS-0003-SO6037-4.0-4.6-N-062320 (20WS-0003-SO6037-4.0-4.6-N-062)	Natural	SO6037	4.0-4.6	10550023	10550023007	6/23/2020	X	X	
20WS-0003-SO6042-12.0-12.6-N-062320 (20WS-0003-SO6042-12.0-12.6-N-0)	Natural	SO6042	12.0-12.6	10550023	10550023008	6/23/2020	X	X	
20WS-0010-SO6051-12.0-13.0-N-062320 (20WS-0010-SO6051-12.0-13.0-N-0)	Natural	SO6051	12.0-13.0	10550023	10550023009	6/23/2020	X	X	
20WS-0010-SO6069-8.0-9.2-N-062420 (20WS-0010-SO6069-8.0-9.2-N-062)	Natural	SO6069	8.0-9.2	10550023	10550023010	6/24/2020	X	X	
				10549759	S2103084-003	6/24/2020			X
20WS-0297-SO6074-12.0-12.7-N-062420 (20WS-0297-SO6074-12.0-12.7-N-0)	Natural	SO6074	12.0-12.7	10550023	10550023011	6/24/2020	X	X	
20WS-0297-SO6080-8.0-13.7-N-062420 (20WS-0297-SO6080-8.0-13.7-N-06)	Natural	SO6080	8.0-13.7	10550023	10550023012	6/24/2020	X	X	
				10549759	S2103084-004	6/24/2020			X
20WS-0297-SO6080-8.0-13.7-D-062420	Field Duplicate	SO6080	8.0-13.7	10549759	S2103084-005	6/24/2020			X
20WS-0297-SO6081-0.0-4.0-N-062420	Natural	SO6081	0.0-4.0	10549759	S2103084-006	6/24/2020			X
20WS-0297-SO6082-4.0-4.5-N-062420 (20WS-0297-SO6082-4.0-4.5-N-062)	Natural	SO6082	4.0-4.5	10550023	10550023013	6/24/2020	X	X	
20WS-0288-SO6090-4.0-4.6-N-062420 (20WS-0288-SO6090-4.0-4.6-N-062)	Natural	SO6090	4.0-4.6	10550023	10550023014	6/24/2020	X	X	
20WS-0285-SO6092-0.0-4.0-N-062520 (20WS-0285-SO6092-0.0-4.0-N-062)	Natural	SO6092	0.0-4.0	10550023	10550023015	6/25/2020	X	X	
20WS-0285-SO6096-4.0-8.4-N-062520 (20WS-0285-SO6096-4.0-8.4-N-062)	Natural	SO6096	4.0-8.4	10550023	10550023016	6/25/2020	X	X	
				10549759	S2103084-007	6/25/2020			X
20WS-0285-SO6100-0.0-1.2-N-062520	Natural	SO6100	0.0-1.2	10549759	S2103084-008	6/25/2020			X
20WS-0285-SO6106-0.0-1.3-N-062520 (20WS-0285-SO6106-0.0-1.3-N-062)	Natural	SO6106	0.0-1.3	10550023	10550023017	6/25/2020	X	X	
20WS-0246-SO6109-8.0-12.0-N-062520 (20WS-0246-SO6109-8.0-12.0-N-06)	Natural	SO6109	8.0-12.0	10550023	10550023038	6/25/2020	X	X	
20WS-0246-SO6119-0.0-4.8-N-062520 (20WS-0246-SO6119-0.0-4.8-N-062)	Natural	SO6119	0.0-4.8	10550023	10550023018	6/25/2020	X	X	
				10549759	S2103084-009	6/25/2020			X
20WS-0246-SO6123-8.0-8.7-N-062520 (20WS-0246-SO6123-8.0-8.7-N-062)	Natural	SO6123	8.0-8.7	10550023	10550023019	6/25/2020	X	X	
20WS-1150-SO6133-16.0-20.5-N-062520 (20WS-1150-SO6133-16.0-20.5-N-0)	Natural	SO6133	16.0-20.5	10550023	10550023020	6/25/2020	X	X	
				10549759	S2103084-010	6/25/2020			X
20WS-0016-SO6161-8.0-12.0-N-070120	Natural	SO6161	8.0-12.0	10549759	S2103084-011	7/1/2020			X
20WS-0016-SO6162-12.0-12.7-N-070120 (20WS-0016-SO6162-12.0-12.7-N-0)	Natural	SO6162	12.0-12.7	10550023	10550023021	7/1/2020	X	X	
20WS-0016-SO6166-8.0-12.0-N-070120 (20WS-0016-SO6166-8.0-12.0-N-07)	Natural	SO6166	8.0-12.0	10550023	10550023022	7/1/2020	X		
20WS-0016-SO6169-0.0-4.0-N-070120 (20WS-0016-SO6169-0.0-4.0-N-070)	Natural	SO6169	0.0-4.0	10550023	10550023023	7/1/2020	X	X	
20WS-1150-SO6186-20.0-24.0-N-070120 (20WS-1150-SO6186-20.0-24.0-N-0)	Natural	SO6186	20.0-24.0	10550023	10550023024	7/1/2020	X	X	
20WS-0288-SO6189-0.0-4.0-N-070220 (20WS-0288-SO6189-0.0-4.0-N-070)	Natural	SO6189	0.0-4.0	10550023	10550023025	7/2/2020	X	X	
20WS-0288-SO6189-0.0-4.0-D-070220 (20WS-0288-SO6189-0.0-4.0-D-070)	Field Duplicate	SO6189	0.0-4.0	10550023	10550023026	7/2/2020	X	X	
20WS-0288-SO6195-0.0-1.6-N-070220 (20WS-0288-SO6195-0.0-1.6-N-070)	Natural	SO6195	0.0-1.6	10550023	10550023027	7/2/2020	X	X	
				10549759	S2103084-012	7/2/2020			X
20WS-0288-SO6197-0.0-0.7-N-070220 (20WS-0288-SO6197-0.0-0.7-N-070)	Natural	SO6197	0.0-0.7	10550023	10550023028	7/2/2020	X	X	
20WS-0289-SO6216-12.0-12.8-N-070220 (20WS-0289-SO6216-12.0-12.8-N-0)	Natural	SO6216	12.0-12.8	10550023	10550023029	7/2/2020	X	X	
20WS-0162-SO6228-0.0-12.0-N-070620 (20WS-0162-SO6228-0.0-12.0-N-07)	Natural	SO6228	0.0-12.0	10550023	10550023030	7/6/2020	X	X	
20WS-0162-SO6233-8.0-12.0-N-070620 (20WS-0162-SO6233-8.0-12.0-N-07)	Natural	SO6233	8.0-12.0	10550023	10550023031	7/6/2020	X		
20WS-0138-SO6239-12.0-12.8-N-070620 (20WS-0138-SO6239-12.0-12.8-N-0)	Natural	SO6239	12.0-12.8	10550023	10550023032	7/6/2020	X		
20WS-0138-SO6246-8.0-9.5-N-070620 (20WS-0138-SO6246-8.0-9.5-N-070)	Natural	SO6246	8.0-9.5	10550023	10550023033	7/6/2020	X	X	
				10549759	S2103084-013	7/6/2020			X
20WS-0179-SO6252-4.0-5.4-N-070820 (20WS-0179-SO6252-4.0-5.4-N-070)	Natural	SO6252	4.0-5.4	10550023	10550023034	7/8/2020	X	X	
				10549759	S2103084-014	7/8/2020			X
20WS-0179-SO6256-4.0-4.3-N-070820 (20WS-0179-SO6256-4.0-4.3-N-070)	Natural	SO6256	4.0-4.3	10550023	10550023035	7/8/2020	X		
20WS-0315-SO6272-4.0-8.0-N-070920 (20WS-0315-SO6272-4.0-8.0-N-070)	Natural	SO6272	4.0-8.0	10550023	10550023036	7/9/2020	X	X	
20WS-0315-SO6280-0.0-4.3-N-070920 (20WS-0315-SO6280-0.0-4.3-N-070)	Natural	SO6280	0.0-4.3	10550023	10550023037	7/9/2020	X	X	

Footnotes:

[1]Field sample IDs that exceeded the laboratory maximum character limit were reduced to 30 characters (listed in parentheses).

[2]Total metals and SPLP were analyzed by Pace in Minneapolis, MN on work order 10550023. Acid Base Accounting (ABA) was analyzed by Pace in Sheridan, WY on work order 10549759, and the Lab IDs begin with S2103084.

[3]

Category:	Method:	Analytes:
Total Metals	ASTM D2974	Percent Moisture
	SW-846 6010D	Aluminum, Iron, Lead, Magnesium, Potassium, Silver, Sodium, Arsenic, Cadmium, Copper, Calcium, Selenium, Manganese, Zinc, Thallium, Antimony, Barium, Beryllium, Cobalt, Nickel, Chromium, Molybdenum, Vanadium
	SW-846 7471B	Mercury
SPLP	SW-846 6010D	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
	SW-846 7470A	Mercury
ABA	EPA600/2-78-054	Acid/Base Potential, Neutralization Potential, Total Sulfur, Acid Base, Hot Water Sulfur - LECO, Hot Water Extract Sulfur (H2O Sol. SO4), HCL Sulfur - LECO, HCL Extract Sulfur (Sulfate Sulfur), HNO3 Sulfur - LECO, HNO3 Sulfur (Non-Ext. Sulfur), HNO3 Extract Sulfur (Pyritic Sulfur), Pyritic Sulfur Acid Base, Pyritic Sulfur Acid Base Potential
	USDA 60-21a	pH

Abbreviations: ft = feet

Attachment A
Data Validation Checklists

Stage 4 Data Validation Checklist for General Chemistry Sample Analysis

Site: West Side Soils Operable Unit	**Case No:** 10549759 (S2103084)	**Laboratory:** Pace Analytical
Project: WSSOU RI Sampling - 2021	**Sample Matrix:** Soil	**Analyses:** Total Sulfur, Acid Base, Neutralization Potential Acid Base Potential, Hot Water Sulfur – LECO, Hot Water Extract Sulfur (H2O Sol. SO4), HCL Sulfur – LECO, HCL Extract Sulfur (Sulfate Sulfur), HNO3 Sulfur – LECO, HNO3 Sulfur (Non-Ext. Sulfur), HNO3 Extract Sulfur (Pyritic Sulfur), Pyritic Sulfur Acid Base, and Pyritic Sulfur Acid Base Potential
Sample Date(s): 6/18/2020, 6/23/2020, 6/24/2020, 6/25/2020, 7/1/2020, 7/2/2020, 7/6/2020, 7/8/2020	**Analysis Date(s):** 3/12/2021, 3/18/2021, 3/24/2021, 4/1/2021	
Data Validator: Josie M.	**Validation Date(s):** 5/17/2021, 6/22/2021, 6/23/2021	

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Acid Base; Acid/Base Potential	Pace (Sheridan, WY)	Soil	EPA600/2-78-054	None	6/18/2020, 6/23/2020, 6/24/2020, 6/25/2020, 7/1/2020, 7/2/2020, 7/6/2020, 7/8/2020	4/1/2021	N/A	N/A
Neutralization Potential						3/18/2021		
Hot Water Sulfur – LECO; Hot Water Extract Sulfur (H2O Sol. SO4); HCL Sulfur – LECO; HCL Extract Sulfur (Sulfate Sulfur); HNO3 Sulfur – LECO; HNO3 Sulfur (Non-Ext. Sulfur); HNO3 Extract Sulfur (Pyritic Sulfur); Pyritic Sulfur Acid Base; and Pyritic Sulfur Acid Base Potential						3/12/2021, 3/24/2021, 4/1/2021		

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature was not reported by the laboratory. An email from Pace dated 6/2/2020 stated, "ABA does not have a temperature requirement." Email correspondence was included in 10519814, which was a WSSOU 2020 analytical data package. No qualifications were required.

Samples on this Work Order (WO) were assigned a WO of 10549759, and the Pace Network lab in Pace Sheridan, WY assigned a Lab Order number of S2103084 to this sample delivery group (SDG).

2. Instrument Calibration

Was Instrument successfully calibrated at the correct frequency?	Y	X	N		
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N		
Was Initial Calibration Verification sample analyzed?	Y		N	X	
Was ICV and Continuing Calibration Verifications (ICV) results within the control window?	Y		N		N/A
Were any data flagged because of calibration problems?	Y		N		N/A

Describe Any Actions Taken: None required

Comments: For Method EPA600/2-78-054, an email from Pace dated 6/14/2021 stated that the Pace lab in Sheridan, WY "does not analyze ICV/CCV for this method" and provided "calibration reports for both of their instruments used during analysis." Email correspondences are included in the 10549759 analytical data package. No qualifications were required.

3. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y	X	N	
Were any data flagged because of blank problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: For Method EPA600/2-78-054, total sulfur was reported non-detect. MB results for neutralization potential (NP) were included in the revising analytical data package for 10549759 and were within control limits.

4. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y [X]	N [ ]
What was the source of the LCS?	Unknown	
Were LCS results within the control window?	Y [X]	N [ ]
Were any data flagged because of LCS problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments: The LCS results were within control limits.

5. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y [ ]	N [X]
Were LDS results within the control window?	Y [ ]	N [X]
Were any data flagged because of LDS problems?	Y [X]	N [ ]

Describe Any Actions Taken: For Method EPA600/2-78-054, NP, sample 20WS-0179-SO6252-4.0-5.4-N-070820 was used to generate the LDS. The RPD was outside control limits (35.1%); therefore, the NP result for the parent sample was qualified "J". By extension, the Acid/Base Potential result for this sample, 20WS-0179-SO6252-4.0-5.4-N-070820, was also qualified "J".

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: Sample 20WS-0297-SO6080-8.0-13.7-N-062420 was used to generate an additional LDS for Method EPA600/2-78-054, NP. The RPD was within control limits; therefore, no qualifications were required.

There was no Laboratory Duplicate Samples (LDS) sample for sulfur by Method EPA600/2-78-054 on this work order (WO). However, a Field duplicate sample pair was submitted on this WO as discussed in Section 8 of this DV Checklist and was assessed for precision. Applying professional judgement, no qualifications were made for the lack of an LDS sample.

An email from Pace dated 6/14/2021 stated Pace lab in Sheridan, WY "there is not a duplicate analyzed in the Leco analysis." Email correspondences are included in the 10549759 analytical data package. No qualifications were necessary due to lack of LDS.

6. Matrix Spike Sample Results

Were Laboratory Matrix Spike (LMS) samples analyzed at the frequency of 1 per batch?	Y [ ]	N [ ]	N/A [X]
Were LMS results within the control window?	Y [ ]	N [ ]	N/A [X]
Were any data flagged because of LMS problems?	Y [ ]	N [ ]	N/A [X]

Describe Any Actions Taken: None required

Comments: LMS samples are not performed for the EPA600/2-78-054 method.

7. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y [ ]	N [ ]	N/A [X]
Were field blanks within the control window?	Y [ ]	N [ ]	N/A [X]
Were any data qualified because of field blank problems?	Y [ ]	N [ ]	N/A [X]

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

8. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate and parent sample results for the following analytes were greater than 5 times the Contract Required Quantitation Limit (CRQL) and had a Relative Percent Difference (RPD) outside the control limits (35%). Therefore, the following table lists analytes that had field duplicate results outside the control limits. The parent sample and field duplicate samples were qualified as indicated:

Analyte	RPD	DV flag	Field duplicate sample	Parent sample
Pyritic Sulfur Acid Base	127%	J	20WS-0297-SO6080-8.0-13.7-D-062420	20WS-0297-SO6080-8.0-13.7-D-062420
Pyritic Sulfur Acid Base Potential	127%	J		
Acid/Base Potential	124%	J		
Neutralization Potential	127%	J		

The field duplicate and parent sample results for the following analytes were less than 5 times the CRQL and the absolute difference between the original and duplicate results were greater than 2 times the CRQL. Therefore, the following table lists analytes that had field duplicate results outside the control limits. The parent sample and field duplicate samples were qualified as indicated. For results that were reported non-detect, the results were qualified “UJ”.

Analyte	CRQL (mg/kg)	Absolute Difference (mg/kg)	DV flag	Field duplicate sample	Parent sample
Acid Base	0.01	0.57	J	20WS-0297-SO6080-8.0-13.7-D-062420	20WS-0297-SO6080-8.0-13.7-N-062420
HCL Extract Sulfur (Sulfate Sulfur)	0.01	0.03	UJ/J		
Hot Water Sulfur - LECO	0.5	1.4	UJ/J		

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments:

9. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On WO 10549759 (S2103084), the following qualifications were made:

Natural Samples:

Field ID	Analyte	Final Qualification	Reason Code
20WS-0179-SO6252-4.0-5.4-N-070820	Acid/Base Potential	J	D%
20WS-0179-SO6252-4.0-5.4-N-070820	Neutralization Potential	J	D%
20WS-0297-SO6080-8.0-13.7-N-062420	Acid Base	J	FD
20WS-0297-SO6080-8.0-13.7-N-062420	Acid/Base Potential	J	FD
20WS-0297-SO6080-8.0-13.7-N-062420	HCL Extract Sulfur (Sulfate Sulfur)	J	FD
20WS-0297-SO6080-8.0-13.7-N-062420	Hot Water Sulfur - LECO	J	FD
20WS-0297-SO6080-8.0-13.7-N-062420	Neutralization Potential	J	FD
20WS-0297-SO6080-8.0-13.7-N-062420	Pyritic Sulfur Acid Base	J	FD
20WS-0297-SO6080-8.0-13.7-N-062420	Pyritic Sulfur Acid Base Potential	J	FD

Field Duplicate Samples:

Field ID	Analyte	Final Qualification	Reason Code
20WS-0297-SO6080-8.0-13.7-D-062420	Acid Base	UJ	FD
20WS-0297-SO6080-8.0-13.7-D-062420	Neutralization Potential	J	FD
20WS-0297-SO6080-8.0-13.7-D-062420	Acid/Base Potential	J	FD
20WS-0297-SO6080-8.0-13.7-D-062420	Hot Water Sulfur - LECO	UJ	FD
20WS-0297-SO6080-8.0-13.7-D-062420	HCL Extract Sulfur (Sulfate Sulfur)	UJ	FD
20WS-0297-SO6080-8.0-13.7-D-062420	Pyritic Sulfur Acid Base	J	FD
20WS-0297-SO6080-8.0-13.7-D-062420	Pyritic Sulfur Acid Base Potential	J	FD

Reason for qualification:
FD = field duplicate D% = laboratory duplicate

Comments:

10. Authorization of Data Validation

Data Validator

Name: Josie McElroy **Reviewed by:** Shelby Green

Signature: Josie McElroy

Date: 6/23/2021 8/18/2021

From: Stewart Smith
To: Jennifer Anderson
Cc: Pat Sampson
Subject: RE: Samples Received West Side Soils Pace Project 10519814
Date: Tuesday, June 2, 2020 7:05:23 PM
Attachments: image001.png
image002.png

Jennifer-

Please analyze the samples submitted on Pace Project 10519814 for all of the requested analytes, including total mercury. Thank you.

Stewart Smith

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Tuesday, June 2, 2020 7:06 AM
To: Stewart Smith <ssmith@pioneer-technical.com>; Pat Sampson <psampson@Pioneer-technical.com>
Subject: RE: Samples Received West Side Soils Pace Project 10519814

Good Morning Stewart,

That is correct, Hg is the only analyte requested that is temperature sensitive. I confirmed with the lab that ABA does not have a temperature requirement.

Since Pace covers the shipping, we do reach out to FedEx regarding delays. Unfortunately, delays are typically caused by issues that are beyond their control. We do ship ground within the state due to it typically being faster than express. Express shipping would ship the coolers from Montana to their Memphis hub, then back to Montana. Ground will transport within the state next day. We did have some other coolers that were shipped express by other consultants within Montana to our Minneapolis location that were also delayed so it was an issue with FedEx unfortunately.

Please let me know if you'd prefer to cancel the Hg analysis.

Have a great day!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

From: Stewart Smith <ssmith@pioneer-technical.com>
Sent: Monday, June 1, 2020 7:26 PM

From: Jennifer Anderson
To: Josie M. McElroy
Cc: Laura Moon; Cole Dallaserra
Subject: RE: Missing Level IV Results
Date: Thursday, June 24, 2021 10:16:10 AM
Attachments: image001.png
10549759_frc.pdf

This sender is trusted.

Good Morning Josie,

Attached is the revised report including the additional documents, these are included at the end of the report.

Please let me know if anything else is needed.

Have a great day!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Pace Analytical will be closed on Monday, July 5th in observance of Independence Day. Please work with your project manager to schedule any rush or short hold analyses around this date.

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Jennifer Anderson
Sent: Wednesday, June 23, 2021 4:56 PM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

My apologies for the delay! I've been in meetings this afternoon, but will work on getting the report revised to include the additional documents.

Hope you're having a nice day too!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Pace Analytical will be closed on Monday, July 5th in observance of Independence Day. Please work with your project manager to schedule any rush or short hold analyses around this date.

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Sent: Wednesday, June 23, 2021 12:23 PM
To: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Jennifer,

Sorry for just getting back to you. I was wondering if you could send the original report revised with the attached documents from Sheridan lab?

Hope you are having a nice day!

Thank you,
Josie

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Monday, June 14, 2021 4:04 PM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

I heard back from the Sheridan lab regarding this information. They do not analyze ICV/CCV or ICB/CCB for these methods, there also is not a duplicate analyzed in the Leco analysis. They were able to provide calibration reports for both of their instruments used during analysis and method

blank reports for the neutralization potential. I've attached these documents, please let me know if it would work best to revise the original report sent to include these as attachments or if they are okay as separate documents.

Please let me know if there is any other information needed.

Hope you're having a great day!

Thanks!
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Jennifer Anderson
Sent: Tuesday, June 1, 2021 10:36 AM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

I hope you had a nice weekend too!

I am still waiting on this from the Sheridan lab, I sent them a request earlier this morning for an update and will let you know what I find out.

My apologies for the delay!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Sent: Tuesday, June 1, 2021 10:34 AM
To: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hello Jennifer,

I hope you had a nice three day weekend. I just wanted to follow up with you on the status of the Level IV report for Pace Project Number 10549759, Project: West Side Soils, from Pace Sheridan, WY.

Thank you,
Josie

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Monday, May 17, 2021 3:20 PM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

I will send this to the Sheridan lab for review and let you know what I find out.

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Pace Analytical Minneapolis will be closed on Monday, May 31st in observance of Memorial Day. Please work with your project manager to schedule any rush or short hold analyses around this date.

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Sent: Monday, May 17, 2021 1:58 PM
To: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>

Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: Missing Level IV Results

Hello Jennifer,

The Level IV report for Pace Project Number 10549759, Project: West Side Soils, from Pace Sheridan, WY is missing some Level IV results for the ABA analysis that was previously provided by Pace Billings lab. Attached is a Pace Billings lab report we received last year that contains samples analyzed for Method Modified Sobek 3.2. The following QC samples/results were missing from the Pace Sheridan, WY lab report that were previously provided by Pace Billings lab:

For Neutralization Potential analyses

- Prep Log Report: For samples and calibration standards
- ICV/CCV- Analyte in Billings Level 4 report was pH at 25 Degrees C
- Method Blank

For Sulfur analyses:

- Low and high Sulfur calibration tables along with the Sulfur Correlation Coefficient Verification Spreadsheet
- ICV/CCV
- ICB/CCB
- Laboratory duplicate Samples

Could you send a revised Level IV report of 10549759, also referred to as S2103084 by Pace Sheridan, WY, to include the missing Level IV results for the ABA analysis?

Thank you,
Josie McElroy

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Site: West Side Soils Operable Unit	**Case No:** 10550023	**Laboratory:** Pace Analytical
Project: WSSOU RI Sampling - 2021	**Sample Matrix:** Soil	**Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury Percent Moisture
Sample Date(s): 6/18/2020, 6/19/2020, 6/23/2020, 6/24/2020, 6/25/2020, 7/1/2020, 7/2/2020, 7/6/2020, 7/8/2020, 7/9/2020	**Analysis Date(s):** 3/8/2021, 3/9/2021, 3/10/2021, 3/11/2021, 3/15/2021, 3/16/2021, 3/17/2021	
Data Validator: Josie M.	**Validation Date(s):** 4/8/2021, 4/9/2021, 4/12/2021	

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	6/18/2020, 6/19/2020, 6/23/2020, 6/24/2020, 6/25/2020, 7/1/2020, 7/2/2020, 7/6/2020, 7/8/2020, 7/9/2020	728213, 728214, 728224, 728225, 728750, 728751, 729152	3/11/2021, 3/15/2021, 3/17/2021	N	Y
Hg			EPA 7471B	28 days		728224, 728225, 728751	3/11/2021, 3/15/2021	N	Y
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		728335, 728348	3/10/2021, 3/15/2021	Y	N
Hg			EPA 7471B	28 days		728336, 728349	3/16/2021	N	Y
Percent Moisture	Pace	Soil	ASTM D2974	None		728228, 728238, 728240, 728506	3/8/2021, 3/9/2021	Y	N

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y [X]	N [ ]
Were any data flagged because of preservation problems?	Y [X]	N [ ]

Describe Any Actions Taken: All analyses were performed outside the applicable hold time. Therefore, all results (except percent moisture) for the 38 samples on this WO have been qualified "J-" for detected results and "UJ" for non-detected results.

The receiving temperature as reported by the Pace Analytical laboratory was 7.9°C. An email from Pace dated 3/5/2021 stated, "*there was a delay by FedEx causing the cooler to not be delivered until today. The samples were noted to arrive over 6 degrees Celsius, the temperature was noted to be 7.9 degrees*." Method SW-846 6010D has no temperature preservation requirements. Method EPA 7471B has a temperature preservation requirement of ≤ 6ºC; therefore, mercury results on this work order have been qualified "J-" for detected results and "UJ" for non-detected results.

Comments: **Please note that due to Pace Analytical' s sample name character limit, in the laboratory report sample names were shortened to the first 30 characters. This data validation checklist refers to the sample names as they appear in the laboratory report. Refer to the Sample Identification table of the Data Validation Report for the full sample names.**

2. Instrument Calibration

Was the Tune analysis performed?	Y [ ]	N [ ]	N/A [X]
Was the peak widths and resolution of the masses within the required control limits?	Y [ ]	N [ ]	N/A [X]
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y [ ]	N [ ]	N/A [X]
Was Instrument successfully calibrated at the correct frequency?	Y [X]	N [ ]	
Was Instrument calibrated with appropriate standards and blanks?	Y [X]	N [ ]	
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y [X]	N [ ]	
Were ICV and CCV results within the control window?	Y [X]	N [ ]	
Were any data flagged because of calibration problems?	Y [X]	N [ ]	

Describe Any Actions Taken:

Comments: All %Rs for ICV and CCV are within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y		N	X
Were any data flagged because of blank problems?	Y	X	N	

Describe Any Actions Taken:

On 3/10/2023 at 13:02, there were detection in a Continuing Calibration Blank (CCB) for Beryllium (0.00065 mg/L) and Manganese (0.0066 mg/L) that were greater than 2 times the instrument detection limit (IDL) (IDL - 0.0003 mg/L and 0.0029 mg/L, respectively). There were no detected Magnesium results less than 5 times the blank detection bracketed by this CCB. The following samples were bracketed by this CCB, had Beryllium, SPLP results less than 5 times the blank detections and were therefore qualified "U" for Beryllium, SPLP with a final qualification of "UJ" due to hold time exceedance:

20WS-0016-SO6162-12.0-12.7-N-0 20WS-0162-SO6228-0.0-12.0-N-07 20WS-0179-SO6252-4.0-5.4-N-070

20WS-0289-SO6216-12.0-12.8-N-0 20WS-0315-SO6272-4.0-8.0-N-070

Both SPLP batches, 728335 and 728348, had detections in the MBs (1.1 mg/L and 1.0 mg/L) and Leachate Blanks (1.0 mg/L and 1.2mg/L) for Sodium, SPLP greater than 2 times the method detection limit (MDL) (MDL - 0.1 mg/L). All Sodium, SPLP results were less than 5 times the blank detections. Therefore, all samples have been qualified "U" for Sodium, SPLP with a final qualification of "UJ" due to hold time exceedance.

Comments:

On 3/10/2021, there was a detection of Molybdenum, SPLP in the ICB and detections of the following SPLP analytes: Barium, Cadmium, Molybdenum and Vanadium in the CCBs. These results were less than 2 times the IDL, respectively.
On 3/11/2021, there were detections of Molybdenum in the CCBs that were less than 2 times the IDL.
On 3/15/2020, a detection in the CCB results for Lead, which was less than 2 times the IDL.
On 3/17/2021, ICV and CCVs were within the control limits.

Batch 728213 had detection of Lead and Manganese in the MB that were less than 2 times the MDL, respectively.
Batch 728214 had detection of Lead and Manganese in the MB that were less than 2 times the MDL, respectively.
Batch 728348 had a detection of Chromium, SPLP in the leachate blank and Iron, SPLP in the MB that were less than 2 times the MDL, respectively.

No qualifications are warranted for ICB and CCB detections less than 2 times the IDL or for MB and Leachate Blank detections less than 2 times the MDL.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y	X	N	

Describe Any Actions Take: The ICS Solution A and AB (ICS A and ICS AB) analyzed on 3/10/2021 for SPLP metals had detections of Beryllium, Cobalt, Lead, Thallium, and Molybdenum greater than the MDL and a negative Cadmium detection with an absolute value greater than the MDL. The levels of interferents (calcium) in the following sample results were comparable to the levels in the ICS solutions and the indicated results in the associated samples were less than 10 times the absolute value of the detection. The following samples were qualified either "J+" if the ICS detection was positive and the sample result was detected, "J-" if the ICS results was negative and the sample result was detected or "UJ" if the ICS results was negative, and the sample result was non-detected:

Analyte	ICS DV Flag	Affected Sample	Comment	Final DV flag
Beryllium, SPLP	J+	20WS-0043-SO6011-6.5-7.3-N-06	"J-" for hold time	J
Beryllium, SPLP	J+	20WS-0016-SO6162-12.0-12.7-N-0	"J-" for hold time and "U" for CCB	UJ
Beryllium, SPLP	J+	20WS-0162-SO6228-0.0-12.0-N-07	"J-" for hold time and "U" for CCB	UJ
Beryllium, SPLP	J+	20WS-0179-SO6252-4.0-5.4-N-070	"J-" for hold time and "U" for CCB	UJ
Cadmium, SPLP	J-	20WS-0043-SO5987-5.0-10.3-N-06	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0043-SO5987-5.0-10.3-D-06	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0006-SO5990-5.0-5.7-N-061	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0006-SO6001-10.0-11.1-N-0	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0043-SO6011-6.5-7.3-N-06	"J-" for hold time	J-
Cadmium, SPLP	UJ	20WS-0003-SO6037-4.0-4.6-N-062	"UJ" for hold time	UJ
Cadmium, SPLP	J-	20WS-0010-SO6051-12.0-13.0-N-0	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0162-SO6228-0.0-12.0-N-07	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0138-SO6246-8.0-9.5-N-070	"J-" for hold time	J-
Cadmium, SPLP	J-	20WS-0179-SO6252-4.0-5.4-N-070	"J-" for hold time	J-
Cobalt, SPLP	J+	20WS-0043-SO5987-5.0-10.3-N-06	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0043-SO5987-5.0-10.3-D-06	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0006-SO5990-5.0-5.7-N-061	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0006-SO6001-10.0-11.1-N-0	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0043-SO6011-6.5-7.3-N-06	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0003-SO6037-4.0-4.6-N-062	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0010-SO6051-12.0-13.0-N-0	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0010-SO6069-8.0-9.2-N-062	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0016-SO6162-12.0-12.7-N-0	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0016-SO6169-0.0-4.0-N-070	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-1150-SO6186-20.0-24.0-N-0	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0162-SO6228-0.0-12.0-N-07	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0138-SO6246-8.0-9.5-N-070	"J-" for hold time	J
Cobalt, SPLP	J+	20WS-0179-SO6252-4.0-5.4-N-070	"J-" for hold time	J
Lead, SPLP	J+	20WS-0043-SO5987-5.0-10.3-N-06	"J-" for hold time	J
Lead, SPLP	J+	20WS-0043-SO5987-5.0-10.3-D-06	"J-" for hold time	J
Lead, SPLP	J+	20WS-0006-SO5990-5.0-5.7-N-061	"J-" for hold time	J
Lead, SPLP	J+	20WS-0006-SO6001-10.0-11.1-N-0	"J-" for hold time	J
Lead, SPLP	J+	20WS-0043-SO6011-6.5-7.3-N-06	"J-" for hold time	J
Lead, SPLP	J+	20WS-0016-SO6169-0.0-4.0-N-070	"J-" for hold time	J
Lead, SPLP	J+	20WS-0162-SO6228-0.0-12.0-N-07	"J-" for hold time	J
Lead, SPLP	J+	20WS-0138-SO6246-8.0-9.5-N-070	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0043-SO5987-5.0-10.3-N-06	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0043-SO5987-5.0-10.3-D-06	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0006-SO6001-10.0-11.1-N-0	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0010-SO6051-12.0-13.0-N-0	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0010-SO6069-8.0-9.2-N-062	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0016-SO6162-12.0-12.7-N-0	"J-" for hold time	J
Molybdenum, SPLP	J+	20WS-0162-SO6228-0.0-12.0-N-07	"J-" for hold time	J
Thallium, SPLP	J+	20WS-0010-SO6069-8.0-9.2-N-062	"J-" for hold time	J
Thallium, SPLP	J+	20WS-0016-SO6162-12.0-12.7-N-0	"J-" for hold time	J

The percent recoveries for the interference check samples (Solutions A and AB) on 3/10/2021 were within control criteria.

Interference Check Samples, continued

Comments: On 3/11/2021, the ICS Solution A at 8:41 had detections of Cobalt, Lead, Thallium, and Vanadium greater than the MDL and negative Cadmium detections with absolute values greater than the MDL. The levels of interferents in the sample results were comparable to the levels in the ICS solutions but the Cobalt, Cadmium, Lead, Thallium, and Vanadium results in the associated samples were greater than 10 times the ICS solution A results; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 3/11/2021, the ICS Solution A at 14:43 had detections of Cobalt and Thallium greater than the MDL. The levels of interferents in the sample results were comparable to the levels in the ICS solutions but the Cobalt and Thallium results in the associated samples were greater than 10 times the ICS solution A results; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 3/11/2021, the ICS Solution A at 16:27 had detections of Cobalt greater than the MDL. The levels of interferents in the sample results were comparable to the levels in the ICS solutions but the Cobalt results in the associated samples were greater than 10 times the ICS solution A results; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 3/15/2021, the ICS Solution A at 9:09 had detections of Beryllium, Cobalt, Lead, Nickel, and Vanadium greater than the MDL and negative Cadmium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 3/15/2021, the ICS Solution A at 14:24 had detections of Cobalt, Lead, Nickel, and Vanadium greater than the MDL and negative Cadmium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 3/17/2021, the ICS Solution A at 9:15 had detections of Cobalt and Nickel greater than the MDL and negative Vanadium detection with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 3/17/2021, the ICS Solution A and/or ICS Solution AB at 12:52 had detections of Cobalt and Lead greater than the MDL and negative Vanadium and Cadmium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: All %Rs are within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y		N	X
Were any data flagged because of LDS problems?	Y	X	N	

Describe Any Actions Taken:

For batch 728213, the LDS were created from sample 20WS-0285-SO6106-0.0-1.3-N-062. The LDS RPDs for Manganese (38%) and Molybdenum (80%) were above the control limit (RPD≤35%); therefore, 20WS-0285-SO6106-0.0-1.3-N-062 was qualified with a "J" for these analytes.

For batch 728214, the LDS were created from sample 20WS-0288-SO6197-0.0-0.7-N-070. The LDS RPDs for Lead (57%), Manganese (67%), and Zinc (78%) were above the control limit (RPD≤35%); therefore, 20WS-0288-SO6197-0.0-0.7-N-070 was qualified with a "J" for these analytes.

For batch 729152, the LDS were created from sample 20WS-0288-SO6197-0.0-0.7-N-070. The LDS RPDs for Silver (36%) was above the control limit (RPD≤35%); therefore, 20WS-0288-SO6197-0.0-0.7-N-070 was qualified with a "J" for this analyte.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments:

For Total Metals, one of the LDS was created from an LCS and LCSD sample pair. The data user should be aware that the RPD results were within the control limits. The rest of the LDS results were within control limits. The following table list the LMS and Laboratory Matrix Spike Duplicate (LMSD) parent samples for each EPA 6010D batch on this WO. These samples were used as the LDS.

Batch	Lab ID		Parent Sample ID	Method
728213	3881711MS	3881712MSD	20WS-0285-SO6106-0.0-1.3-N-062	EPA 6010D
728214	3881715MS	3881716 MSD	20WS-0288-SO6197-0.0-0.7-N-070	EPA 6010D
729152	3886404 MS	3886405 MSD	20WS-0285-SO6106-0.0-1.3-N-062	EPA 6010D
729152	3886406MS	3886407MSD	20WS-0288-SO6197-0.0-0.7-N-070	EPA 6010D
728335	3882088MS	3882089MSD	20WS-0285-SO6106-0.0-1.3-N-062	EPA 6010D, SPLP
728348	3882128MS	3882129MSD	20WS-0288-SO6197-0.0-0.7-N-070	EPA 6010D, SPLP

For the Mercury, SPLP, the LDS were created from 20WS-0285-SO6106-0.0-1.3-N-062 and 20WS-0288-SO6197-0.0-0.7-N-070. The RPDs were within the control limits; therefore, no qualifications are required.

For Mercury, the LDS were created from 20WS-0285-SO6106-0.0-1.3-N-062 and 20WS-0288-SO6197-0.0-0.7-N-070. The RPDs were within the control limits; therefore, no qualifications are required.

Also for Mercury, one of the LDS was created from an LCS and LCSD sample pair. The data user should be aware that the RPD results were within the control limits.

For the Percent Moisture, the LDS were created from 20WS-0297-SO6080-8.0-13.7-N-06, 20WS-0285-SO6106-0.0-1.3-N-062, 20WS-0288-SO6197-0.0-0.7-N-070, and four samples not on this WO. The RPDs were within the control limits; therefore, no qualifications are required.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: The following table list the analytes that had %R for the LMS and/or LMSD outside the control limits and the respective Post-Digestion Spike (PDS) result. The parent sample is qualified as indicated.

Analyte	Sample	%R	PDS %R	DV Flag	Batch	Parent Sample
Aluminum	MS	251%	103.2%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
	MSD	298%				
Antimony	MS	57%	79%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
	MSD	49%				
Arsenic	MS	46%	83.1%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Molybdenum	MS	331%	83.3%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Potassium	MSD	131%	86.6%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Aluminum	MS	265%	103.2%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
	MSD	232%				
Copper	MS	145%	88.2%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Antimony	MSD	63%	76%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Silver	MS	135%	93.9%	J	729152	20WS-0288-SO6197-0.0-0.7-N-070

The Molybdenum result for sample 20WS-0285-SO6106-0.0-1.3-N-062 was previously qualified "J" due to laboratory duplicate sample results outside control limits. All these results were qualified "J-" for hold time. The final qualifications for these results are listed above.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For batch 728335, sample 20WS-0285-SO6106-0.0-1.3-N-062 was used to generate an LMS/LMSD sample pair for the SPLP metals. The LMS %R for Manganese (143%) was outside the control limit (75-125%). Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria*." (EPA, 2017). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 728348, sample 20WS-0288-SO6197-0.0-0.7-N-070 was also used to generate an LMS/LMSD sample pair for SPLP metals. The %Rs were within the control limit.

For batch 728213, sample 20WS-0285-SO6106-0.0-1.3-N-062 was used to generate an LMS/LMSD sample pair. The LMS/ LMSD %R for Iron (-277% and -101%), Lead (-323% and 2130%), Manganese (61% and 28000%), and Zinc (1170% and 3760 %), and the LMS for Copper (-20%) were outside the control limit (75-125%). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted. The LMS/LMSD %R for silver (55%, 159%) were also outside the control limit; however, the silver result for 20WS-0285-SO6106-0.0-1.3-N-062 was reported with batch 729152, whose LMS/LMSD %R were within the control limit.

For batch 728214, sample 20WS-0288-SO6197-0.0-0.7-N-070 was used to generate an LMS/LMSD sample pair. The LMS/ LMSD %R for Arsenic (752% and 28%), Iron (1120% and 649%), Lead (2560% and 512%), Manganese (-96900% and -114000%), Potassium (-247% and -305%), Silver (-345% and -418%), and Zinc (760% and -631%) were outside the control limit (75-125%). The original sample concentrations of these analytes were greater than 4 times the added spike, respectively; therefore, no qualifications are warranted.

For batch 729152, sample 20WS-0285-SO6106-0.0-1.3-N-062 and 20WS-0288-SO6197-0.0-0.7-N-070 were used to generate an LMS/LMSD sample pair for silver. Unless stated above the rest of the %R was within the control limit.

For batch 728225, sample 20WS-0288-SO6197-0.0-0.7-N-070 was also used to generate an LMS/LMSD sample pair for mercury. The %Rs were within the control limit.

For batch 728224, sample 20WS-0285-SO6106-0.0-1.3-N-06 was also used to generate an LMS/LMSD sample pair for mercury. The LMS %R for Mercury (302%) was outside the control limit (75-125%). The original sample concentrations of these analytes were greater than 4 times the added spike; therefore, no qualifications are warranted.

For batch 728336, sample 20WS-0285-SO6106-0.0-1.3-N-0 was also used to generate an LMS/LMSD sample pair for the SPLP mercury. The %Rs were within the control limit.

For batch 728349, sample 20WS-0288-SO6197-0.0-0.7-N-070 was also used to generate an LMS/LMSD sample pair for the SPLP mercury. The %Rs were within the control limit.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: Samples 20WS-0285-SO6106-0.0-1.3-N-062, 20WS-0285-SO6096-4.0-8.4-N-062 and 20WS-0288-SO6197-0.0-0.7-N-070 were used for the SD samples.

The following table lists analytes that had SD results outside the control limits (%D>10%, sample concentration >50x MDL, and SD concentration > PQL). The parent sample is qualified as indicated below.

Analyte	Serial Dilution ID	%D	DV Flag	Batch	Parent Sample
Arsenic	3883768SD	12.4%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Cadmium	3883768SD	16.5%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Cobalt	3883768SD	25.4%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Molybdenum	3883768SD	14%	J	728213	20WS-0285-SO6106-0.0-1.3-N-062
Aluminum	3885099SD	11.2%	J	728750	20WS-0285-SO6096-4.0-8.4-N-062
Iron	3885099SD	14.7%	J	728750	20WS-0285-SO6096-4.0-8.4-N-062
Lead	3885099SD	12.5%	J	728750	20WS-0285-SO6096-4.0-8.4-N-062
Zinc	3885099SD	12.7%	J	728750	20WS-0285-SO6096-4.0-8.4-N-062
Barium	3883775SD	18.6%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Cadmium	3883775SD	25.1%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Cobalt	3883775SD	45.3%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Magnesium	3883775SD	16.8%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Molybdenum	3883775SD	15.8%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Potassium	3883775SD	10.3%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070
Vanadium	3883775SD	18.4%	J	728214	20WS-0288-SO6197-0.0-0.7-N-070

For 20WS-0285-SO6106-0.0-1.3-N-062520, arsenic was also qualified for a matrix spike exceedance, and molybdenum was also qualified for matrix spike and laboratory duplicates exceedances. All these results were qualified for hold time. The final qualifications for these results are listed above.

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: For SPLP batch 728335, the serial dilution (3882452SD) had %D for Lead (10.7%) outside the control limits (10%); however, the sample concentration was less than 50 times MDL and/or the SD concentration was less than the PQL. No qualifications were required.

For SPLP batch 728348, the serial dilution had %D for Barium (13%), Copper (39.9%), and Vanadium (31.7%) outside the control limits (10%); however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the PQL. No qualifications were required.

For total metals batch 728213, the serial dilution (3883768SD) had %D for Antimony (19.7%), Barium (15.4%), Beryllium (37.9%), Magnesium (14.3%), and Vanadium (90.5%) outside the control limits (10%); however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the PQL. No qualifications were required.

For total metals batch 728750, the serial dilution (3885099SD) had %D for Calcium (10.9%), Magnesium (12.9%), Molybdenum (13.1%), Selenium (54.2%), Thallium (15.3%), and Vanadium (38.4%) outside the control limits (10%); however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the PQL. No qualifications were required.

For total metals batch 728214, the serial dilution (3883775SD) had %D for Aluminum (39.8%), Beryllium (57.1%), and Nickel (35.9%) outside the control limits (10%); however, the sample concentrations were less than 50 times MDL and/or the SD concentrations were less than the CRQL. No qualifications were required.

For total metals batch 729152, the serial dilutions (3887854SD and 3887854SD) had all %D within the control limit (10%).

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standard used for SW-846 6010D in WO 10550023 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 85.3% to 118.3%.

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate and parent sample results for the following analytes were greater than 5 times the RL and had an RPD outside the control limits (35%). The following table lists analytes that had field duplicate results outside the control limits. The parent sample and field duplicate samples are qualified as indicated.

Analyte	RPD	DV flag	Field duplicate sample	Parent sample
Aluminum	39%	J	20WS-0043-SO5987-5.0-10.3-D-061820	20WS-0043-SO5987-5.0-10.3-N-061820
Antimony	157%	J		
Cadmium	74%	J		
Copper	105%	J		
Lead	129%	J		
Magnesium	77%	J		
Manganese	122%	J		
Mercury	39%	J		
Molybdenum	53%	J		
Zinc, SPLP	36%	J		
Barium	135%	J	20WS-0288-SO6189-0.0-4.0-D-070220	20WS-0288-SO6189-0.0-4.0-N-070220
Cadmium	45%	J		
Iron	39%	J		
Manganese	126%	J		
Silver	45%	J		
Percent Moisture	45%	J		
Manganese, SPLP	35%	J		

The field duplicate and parent sample results for the following analytes were less than 5 times the RL and the absolute difference between the original and duplicate results was greater than 2 times the RL (minimum RL of 2 samples was used). The following table lists analyte that had field duplicate results outside the control limits. The parent sample and field duplicate samples are qualified as indicated.

Analyte	minimum RL	Absolute Difference	DV flag	Field duplicate sample	Parent sample
Mercury (mg/kg)	0.018	0.126	J	20WS-0288-SO6189-0.0-4.0-D-070220	20WS-0288-SO6189-0.0-4.0-N-070220
Vanadium (mg/kg)	0.72	1.7	J		
Iron, SPLP (mg/L)	0.05	0.162	J		

No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments: The data user should be aware that unless noted above the rest of the Field Duplicate results were within the control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10550023, the following qualifications were made:

Natural Samples:

Field ID	Analyte	Final Qualification	Reason Code
20WS-0043-SO6011-6.5-7.3-N-061920	Beryllium, SPLP	J	H, ICS
20WS-0043-SO6011-6.5-7.3-N-061920	Cadmium, SPLP	J-	H, ICS
20WS-0043-SO6011-6.5-7.3-N-061920	Cobalt, SPLP	J	H, ICS
20WS-0043-SO6011-6.5-7.3-N-061920	Lead, SPLP	J	H, ICS
20WS-0043-SO6011-6.5-7.3-N-061920	Sodium, SPLP	UJ	H, MB
20WS-0003-SO6037-4.0-4.6-N-062320	Cadmium, SPLP	UJ	H, ICS
20WS-0003-SO6037-4.0-4.6-N-062320	Cobalt, SPLP	J	H, ICS
20WS-0003-SO6037-4.0-4.6-N-062320	Sodium, SPLP	UJ	H, MB
20WS-0003-SO6042-12.0-12.6-N-062320	Manganese, SPLP	UJ	H, CCB
20WS-0003-SO6042-12.0-12.6-N-062320	Sodium, SPLP	UJ	H, MB
20WS-0006-SO5990-5.0-5.7-N-061820	Cadmium, SPLP	J-	H, ICS
20WS-0006-SO5990-5.0-5.7-N-061820	Cobalt, SPLP	J	H, ICS
20WS-0006-SO5990-5.0-5.7-N-061820	Lead, SPLP	J	H, ICS
20WS-0006-SO5990-5.0-5.7-N-061820	Sodium, SPLP	UJ	H, MB
20WS-0006-SO6001-10.0-11.1-N-061920	Cadmium, SPLP	J-	H, ICS
20WS-0006-SO6001-10.0-11.1-N-061920	Cobalt, SPLP	J	H, ICS
20WS-0006-SO6001-10.0-11.1-N-061920	Lead, SPLP	J	H, ICS
20WS-0006-SO6001-10.0-11.1-N-061920	Molybdenum, SPLP	J	H, ICS
20WS-0006-SO6001-10.0-11.1-N-061920	Sodium, SPLP	UJ	H, MB
20WS-0010-SO6051-12.0-13.0-N-062320	Cadmium, SPLP	J-	H, ICS
20WS-0010-SO6051-12.0-13.0-N-062320	Cobalt, SPLP	J	H, ICS
20WS-0010-SO6051-12.0-13.0-N-062320	Molybdenum, SPLP	J	H, ICS
20WS-0010-SO6051-12.0-13.0-N-062320	Sodium, SPLP	UJ	H, MB
20WS-0010-SO6069-8.0-9.2-N-062420	Cobalt, SPLP	J	H, ICS
20WS-0010-SO6069-8.0-9.2-N-062420	Molybdenum, SPLP	J	H, ICS
20WS-0010-SO6069-8.0-9.2-N-062420	Sodium, SPLP	UJ	H, MB
20WS-0010-SO6069-8.0-9.2-N-062420	Thallium, SPLP	J	H, ICS
20WS-0016-SO6162-12.0-12.7-N-070120	Beryllium, SPLP	UJ	H, CCB, ICS
20WS-0016-SO6162-12.0-12.7-N-070120	Cobalt, SPLP	J	H, ICS
20WS-0016-SO6162-12.0-12.7-N-070120	Molybdenum, SPLP	J	H, ICS
20WS-0016-SO6162-12.0-12.7-N-070120	Sodium, SPLP	UJ	H, MB
20WS-0016-SO6162-12.0-12.7-N-070120	Thallium, SPLP	J	H, ICS
20WS-0016-SO6169-0.0-4.0-N-070120	Cobalt, SPLP	J	H, ICS
20WS-0016-SO6169-0.0-4.0-N-070120	Lead, SPLP	J	H, ICS
20WS-0016-SO6169-0.0-4.0-N-070120	Sodium, SPLP	UJ	H, MB
20WS-0043-SO5987-5.0-10.3-N-061820	Aluminum	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Antimony	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Cadmium	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Copper	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Lead	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Magnesium	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Manganese	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Mercury	J	H, Pres, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Molybdenum	J	H, FD
20WS-0043-SO5987-5.0-10.3-N-061820	Cadmium, SPLP	J-	H, ICS
20WS-0043-SO5987-5.0-10.3-N-061820	Cobalt, SPLP	J	H, ICS
20WS-0043-SO5987-5.0-10.3-N-061820	Lead, SPLP	J	H, ICS
20WS-0043-SO5987-5.0-10.3-N-061820	Molybdenum, SPLP	J	H, ICS
20WS-0043-SO5987-5.0-10.3-N-061820	Sodium, SPLP	UJ	H, MB
20WS-0043-SO5987-5.0-10.3-N-061820	Zinc, SPLP	J	H, FD
20WS-0138-SO6246-8.0-9.5-N-070620	Cadmium, SPLP	J-	H, ICS
20WS-0138-SO6246-8.0-9.5-N-070620	Cobalt, SPLP	J	H, ICS
20WS-0138-SO6246-8.0-9.5-N-070620	Lead, SPLP	J	H, ICS
20WS-0138-SO6246-8.0-9.5-N-070620	Sodium, SPLP	UJ	H, MB
20WS-0162-SO6228-0.0-12.0-N-070620	Beryllium, SPLP	UJ	H, CCB, ICS
20WS-0162-SO6228-0.0-12.0-N-070620	Cadmium, SPLP	J-	H, ICS
20WS-0162-SO6228-0.0-12.0-N-070620	Cobalt, SPLP	J	H, ICS
20WS-0162-SO6228-0.0-12.0-N-070620	Lead, SPLP	J	H, ICS
20WS-0162-SO6228-0.0-12.0-N-070620	Molybdenum, SPLP	J	H, ICS
20WS-0162-SO6228-0.0-12.0-N-070620	Sodium, SPLP	UJ	H, MB

Natural Samples Continued

Field ID	Analyte	Final Qualification	Reason Code
20WS-0179-SO6252-4.0-5.4-N-070820	Beryllium, SPLP	UJ	H, CCB, ICS
20WS-0179-SO6252-4.0-5.4-N-070820	Cadmium, SPLP	J-	H, ICS
20WS-0179-SO6252-4.0-5.4-N-070820	Cobalt, SPLP	J	H, ICS
20WS-0179-SO6252-4.0-5.4-N-070820	Sodium, SPLP	UJ	H, MB
20WS-0246-SO6109-8.0-12.0-N-062520	Sodium, SPLP	UJ	H, MB
20WS-0246-SO6119-0.0-4.8-N-062520	Sodium, SPLP	UJ	H, MB
20WS-0246-SO6123-8.0-8.7-N-062520	Sodium, SPLP	UJ	H, MB
20WS-0285-SO6092-0.0-4.0-N-062520	Sodium, SPLP	UJ	H, MB
20WS-0285-SO6096-4.0-8.4-N-062520	Aluminum	J	H, SD
20WS-0285-SO6096-4.0-8.4-N-062520	Iron	J	H, SD
20WS-0285-SO6096-4.0-8.4-N-062520	Lead	J	H, SD
20WS-0285-SO6096-4.0-8.4-N-062520	Zinc	J	H, SD
20WS-0285-SO6096-4.0-8.4-N-062520	Sodium, SPLP	UJ	H, MB
20WS-0285-SO6106-0.0-1.3-N-062520	Aluminum	J	H, S%
20WS-0285-SO6106-0.0-1.3-N-062520	Antimony	J	H, S%
20WS-0285-SO6106-0.0-1.3-N-062520	Arsenic	J	H, SD, S%
20WS-0285-SO6106-0.0-1.3-N-062520	Cadmium	J	H, SD
20WS-0285-SO6106-0.0-1.3-N-062520	Cobalt	J	H, SD
20WS-0285-SO6106-0.0-1.3-N-062520	Manganese	J	H, D%
20WS-0285-SO6106-0.0-1.3-N-062520	Molybdenum	J	H, SD, S%, D%
20WS-0285-SO6106-0.0-1.3-N-062520	Potassium	J	H, S%
20WS-0285-SO6106-0.0-1.3-N-062520	Silver	J	H, S%
20WS-0285-SO6106-0.0-1.3-N-062520	Sodium, SPLP	UJ	H, MB
20WS-0288-SO6189-0.0-4.0-N-070220	Barium	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Cadmium	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Iron	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Manganese	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Mercury	J	H, Pres, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Percent Moisture	J	FD
20WS-0288-SO6189-0.0-4.0-N-070220	Silver	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Vanadium	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Iron, SPLP	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Manganese, SPLP	J	H, FD
20WS-0288-SO6189-0.0-4.0-N-070220	Sodium, SPLP	UJ	H, MB
20WS-0288-SO6195-0.0-1.6-N-070220	Sodium, SPLP	UJ	H, MB
20WS-0288-SO6197-0.0-0.7-N-070220	Aluminum	J	H, S%
20WS-0288-SO6197-0.0-0.7-N-070220	Antimony	J	H, S%
20WS-0288-SO6197-0.0-0.7-N-070220	Barium	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Cadmium	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Cobalt	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Copper	J	H, S%
20WS-0288-SO6197-0.0-0.7-N-070220	Lead	J	H, D%
20WS-0288-SO6197-0.0-0.7-N-070220	Magnesium	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Manganese	J	H, D%
20WS-0288-SO6197-0.0-0.7-N-070220	Molybdenum	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Potassium	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Silver	J	H, S%, D%
20WS-0288-SO6197-0.0-0.7-N-070220	Vanadium	J	H, SD
20WS-0288-SO6197-0.0-0.7-N-070220	Zinc	J	H, D%
20WS-0288-SO6197-0.0-0.7-N-070220	Sodium, SPLP	UJ	H, MB
20WS-0289-SO6216-12.0-12.8-N-070220	Beryllium, SPLP	UJ	H, CCB
20WS-0289-SO6216-12.0-12.8-N-070220	Sodium, SPLP	UJ	H, MB
20WS-0297-SO6074-12.0-12.7-N-062420	Sodium, SPLP	UJ	H, MB
20WS-0297-SO6080-8.0-13.7-N-062420	Sodium, SPLP	UJ	H, MB
20WS-0297-SO6082-4.0-4.5-N-062420	Sodium, SPLP	UJ	H, MB
20WS-0288-SO6090-4.0-4.6-N-062420	Sodium, SPLP	UJ	H, MB
20WS-0315-SO6272-4.0-8.0-N-070920	Beryllium, SPLP	UJ	H, CCB
20WS-0315-SO6272-4.0-8.0-N-070920	Sodium, SPLP	UJ	H, MB
20WS-0315-SO6280-0.0-4.3-N-070920	Sodium, SPLP	UJ	H, MB
20WS-1150-SO6133-16.0-20.5-N-062520	Sodium, SPLP	UJ	H, MB
20WS-1150-SO6186-20.0-24.0-N-070120	Cobalt, SPLP	J	H, ICS
20WS-1150-SO6186-20.0-24.0-N-070120	Sodium, SPLP	UJ	H, MB

In addition to the 122 natural data points qualified as listed above, the remaining ICP metals and SPLP results were qualified “J-” for holding time exceedance (1,422 additional natural data points), and mercury and SPLP mercury results were qualified “J-” for holding time exceedance and not meeting preservation requirements (65 additional natural data points).

Field Duplicate Samples:

Field ID	Analyte	Final Qualification	Reason Code
20WS-0043-SO5987-5.0-10.3-D-061820	Aluminum	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Lead	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Manganese	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Magnesium	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Molybdenum	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Antimony	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Cadmium	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Copper	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Lead, SPLP	J	H, ICS
20WS-0043-SO5987-5.0-10.3-D-061820	Molybdenum, SPLP	J	H, ICS
20WS-0043-SO5987-5.0-10.3-D-061820	Sodium, SPLP	UJ	H, MB
20WS-0043-SO5987-5.0-10.3-D-061820	Cadmium, SPLP	J-	H, ICS
20WS-0043-SO5987-5.0-10.3-D-061820	Cobalt, SPLP	J	H, ICS
20WS-0043-SO5987-5.0-10.3-D-061820	Zinc, SPLP	J	H, FD
20WS-0043-SO5987-5.0-10.3-D-061820	Mercury	J	H, Pres, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Percent Moisture	J	FD
20WS-0288-SO6189-0.0-4.0-D-070220	Manganese	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Silver	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Iron	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Barium	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Cadmium	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Vanadium	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Iron, SPLP	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Manganese, SPLP	J	H, FD
20WS-0288-SO6189-0.0-4.0-D-070220	Sodium, SPLP	UJ	H, MB
20WS-0288-SO6189-0.0-4.0-D-070220	Mercury	J	H, Pres, FD

In addition to the 26 field QC data points qualified as listed above, the remaining metals and SPLP results were qualified "J-" for holding time exceedance (69 additional field QC data points), except for mercury and SPLP mercury results, which were qualified "J-" for holding time exceedance and not meeting preservation requirements (2 additional field QC data points).

Reason for qualification:

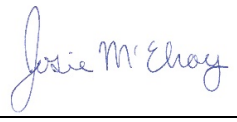
H = hold time	D% = laboratory duplicate
Pres = preservation	S% = matrix spike
CCB = continuing calibration blank	SD = serial dilution
ICS = interference check sample	FD = field duplicate
MB = method blank	

Comments:

13. Authorization of Data Validation

Data Validator

Name: Josie McElroy **Reviewed by:** Laura Moon

Signature:  

Date: 4/13/2021 9/13/2021

Attachment B
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: West Side Soils Operable Unit (WSSOU), Multiple Mining Claims
Project: WSSOU Remedial Investigation Sampling 2021
Client: Atlantic Richfield
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable
2. Level A
3. Level B 10549759 (S2103084) and 10550023

I. **Level A**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Sampling date	Yes	Logbook
2. Sampling team or leader	Yes	Logbook
3. Physical description of sampling location	Yes	Logbook
4. Sample depth (soils)	Yes	Logbook
5. Sample collection technique	Yes	Logbook
6. Field preparation technique	Yes	Logbook
7. Sample preservation technique	Yes	Logbook
8. Sample shipping records	Yes	COC

II**. Level B**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Field instrumentation methods and standardization complete	Yes	Logbook.
2. Sample container preparation	Yes	Logbook
3. Collection of field replicates (1/20 minimum)	Yes	Logbook
4. Proper and decontaminated sampling equipment	Yes	Logbook
6. Field custody documentation	Yes	COC
7. Shipping custody documentation	Yes	COC
8. Traceable sample designation number	Yes	The Field Sample IDs which included a depth interval exceeded the laboratory maximum character limit and were reduced to 30 characters in the laboratory reports. Table 3 includes the full and reduced Field Sample IDs.
9. Field notebook(s), custody records in secure repository	Yes	
10. Completed field forms	Yes	

Attachment C
Data Validation Quality Control Criteria

Data Validation QC Criteria

Field Quality Control Samples							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Field Blank/ Equipment Rinsate Blank	Not required						WSSOU RI QAPP (CDM Smith, 2019)
Field Duplicate	One per 20 samples	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	FD	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2020)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	180 Days	Hold Time > 180 Days	Professional Judgement J-	Professional Judgement UJ or R	H	NFG (EPA, 2020)
Preservation	Every sampling	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ or R	Pres	WSSOU RI QAPP, (CDM Smith, 2019)
			samples received > 6ºC	Professional Judgement J-	Professional Judgement UJ or R		
Calibration	Daily	Mid-level standard and a blank -OR- Three-point curve and a blank with lowest non-zero standard at or below RL with correlation coefficient ≥0.995	Calibration validity tested by ICV and LLICV	See ICV and LLICV	See ICV and LLICV	N/A	BP LaMP, NFG (EPA, 2020)
			If 3-point curve used: correlation coefficient < 0.995	J	UJ	CC	
Linear Range	Linear Range standard(s) analyzed for each calibration run	Linear Range standard %D ± 10%	Linear Range standard %D > 10%	Use highest passing standard as LDR	N/A	CL	Method EPA 6010D, BP LaMP
		Sample raw results ≤ 90% LDR	Sample raw result > 90% LDR	J	N/A		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 90-110%	%R < 75%	Professional Judgement J- or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			%R 75-89%	J-	UJ		
			%R 90-110%	No Qualification	No Qualification		
			%R 111-125%	J+	No Qualification		
			%R > 125%	Professional Judgement J+ or R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	MB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Low Limit Initial Calibration Verification (LLICV)/CRDL Check Sample	After the ICV and ICB	%R 70-130%	%R < 70%	J-	UJ	CS	BP LaMP
			%R 70-130%	No Qualification	No Qualification		
			%R > 130%	J+	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Interference Check Samples (ICS)	At the beginning of each analytical sequence	%R 80-120% -OR- ± 2x the RL (whichever is greater) for analytes and interferents present in ICSA and ICSAB Sample results < MDL for analytes not present in ICSA	ICS not analyzed or not analyzed in proper sequence	Professional Judgement R if not analyzed	Professional Judgement R if not analyzed	ICS	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			ICSAB %R<50%	J-*	R*		
			%R 50-79% -OR- < -2x RL (whichever is greater)	J-*	UJ*		
			%R 80-120% -OR- within ± 2x RL (whichever is greater)	No Qualification	No Qualification		
			%R >120% -OR- > 2x RL (whichever is greater)	J+*	No Qualification		
			%R >150%	Professional Judgement	Professional Judgement		
			Sample results for analytes not present in ICSA ≥ MDL	J+*	No Qualification		
			Negative sample results for analytes not present in the ICS solution A with an absolute value ≥ MDL	J- *	UJ*		
			Note: Associated samples will be qualified if interferents are within 10% or are higher than interferent concentration in the ICS -AND- for detections of analytes not present, if sample results are < 10 times the ICS detection.				
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2020)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria	Matrix Spike %R < 30% Post-digestion spike %R < 75%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			Matrix Spike %R < 30% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R 30-74% Post-digestion Spike %R < 75%	J-*	UJ*		
			Matrix Spike %R 30-74% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R > 125% Post-digestion spike %R > 125%	J+*	No Qualification		
			Matrix Spike %R > 125% Post-digestion spike %R ≤ 125%	J*	No Qualification		
			Matrix Spike %R < 30% No post-digestion spike performed	J-*	R*		
			Matrix Spike %R 30-74% No post-digestion spike performed	J-*	UJ*		
			Matrix Spike %R 75-125% No post-digestion spike is required	No Qualification	No Qualification		
			Matrix Spike %R > 125% No post-digestion spike performed	J+*	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		
Post-digestion Spike (PDS)	When matrix spike %R does not meet acceptance criteria	%R 75-125%	See Matrix Spike	See Matrix Spike	See Matrix Spike	N/A	BP LaMP, NFG (EPA, 2020)
Serial Dilution (SD)	Each analytical batch of samples.	%D ≤ 10% if sample concentration is sufficiently high	Sample >50x MDL and SD ≥ PQL and %D > 10%	J*	No Qualification	SD	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			Sample >50x MDL and SD ≥ PQL and %D ≥ 100%	Professional Judgement	Professional Judgement		
			Sample > 5x PQL and SD < PQL	No Qualification	No Qualification		
			Interferences present	Professional Judgement	Professional Judgement		
Internal Standards	Optional If used, every analysis	%R 60-125%	%R 60-125%	No Qualification	No Qualification	CS	BP LaMP
			%R < 60% or > 125% and original sample reanalyzed at 2-fold dilution	J	UJ		
			%R < 60% or > 125% and original sample not reanalyzed at 2-fold dilution	Professional Judgement J or R	Professional Judgement UJ or R		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 7470A and SW-8466 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	28 Days	Hold Time > 28 Days	Professional Judgement J-	Professional Judgement UJ/R	H	NFG (EPA, 2020)
Preservation	Every sample	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ/R	Pres	NFG (EPA, 2020)
			samples received > 6ºC but ≤ 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
			samples received > 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
Calibration	Daily	A blank and at least five calibration standards shall be used to establish the calibration curve. At least one of the calibration standards shall be at or below RL but above the MDL. Correlation coefficient ≥0.995	Calibration not performed	R	R	Cal	CFRSSI QAPP (ARCO, 1992)
			Calibration incomplete	Professional Judgement J or R	Professional Judgement UJ or R		
			correlation coefficient < 0.995	J	UJ	CC	
Liner Range	Every sample	The sample instrument level of mercury must be within the calibration range.	Raw result > calibration range	J	N/A	CL	BP LaMP
Low Limit Initial Calibration Verification (LLICV)/CRDL Check Sample	After the ICV and ICB	%R 80-120%	%R < 80%	J-	UJ	CS	BP LaMP
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 80-120%	%R < 70%	Professional Judgement J or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			%R 70-79%	J	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R 120-130%	J+	No Qualification		
			%R > 130%	Professional Judgement J+ or R	No Qualification		
			%R > 165%	R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 7470A and SW-8466 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2020)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria	Matrix Spike %R < 30%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			Matrix Spike %R 30-74%	J-*	UJ*		
			Matrix Spike %R 75-125%	No Qualification	No Qualification		
			Matrix Spike %R > 125%	J+*	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

Data Validation QC Criteria

EPA600/2-78-054 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time / Preservation	N/A						WSSOU RI QAPP (CDM Smith, 2019)
Neutralization Potential							
Calibration	Prior to sample analysis	pH buffer check ± 0.2 s.u. true pH value	pH > ± 0.2 s.u	J	UJ	CC	ENV-SOP-SHRT-0062 (Pace, 2015)
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	N/A						ENV-SOP-SHRT-0062 (Pace, 2015)
Method Blank (MB)	MB - Each analytical batch of samples for every 20 (or fewer) samples received.	Blank result ≤ 2x MDL	Blank result > 2x MDL.	Results < 5x the blank detection - U	No Qualification	MB	CFRSSI QAPP (ARCO, 1992)
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	LCS Result ≤ 20% True Value	LCS Result < 20% True Value	J-	UJ	L%	ENV-SOP-SHRT-0062 (Pace, 2015)
			LCS Result > 20% True Value	J+	N/A		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

EPA600/2-78-054 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Total and Extractable Sulfur							
Calibration	Prior to sample analysis	At least three calibration standards shall be used that bracket the expected sample range. Measure values checked against true values.	Calibration not performed	R	R	CC	ENV-SOP-SHRT-0077 (Pace, 2016) LCRM® 502-962 Lot: 1000 LCRM® 502-963 Lot: 1001-2 LCRM® 502-969 Lot: 1001 LCRM® 502-902 Lot: 1001
			Calibration incomplete	Professional Judgement J or R	Professional Judgement UJ or R		
			502-962: Sulfur 0.019 ± 0.004 502-693: Sulfur 2.23 ±0.06 502-699: Sulfur 32.7 ±0.3 502-902: Sulfur 11.99 ± 0.05	J	UJ		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	N/A						ENV-SOP-SHRT-0077 (Pace, 2016)
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x the RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result < 5x the RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2xRL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x the RL and difference between the sample and duplicate > RL (water) or > 2xRL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x the RL and difference between the sample and duplicate ≤ RL (water) or ≤ 2xRL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	LCS Result ≤ 20% True Value	LCS Result < 20% True Value	J-	UJ	L%	ENV-SOP-SHRT-0077 (Pace, 2016)
			LCS Result > 20% True Value	J+	N/A		

Notes:
Acid Potential is calculated from Sulfur, HCl Extractable; Sulfur, HNO3; and Sulfur, Residual and will therefore receive the same qualifications as these analytes.
Acid/Base Potential is calculated from Acid Potential and Neutralization Potential and will therefore receive the same qualifications as these analytes.

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

Appendix B-5

2021 Remedial Investigation Additional Surface Sampling Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2021 Additional Surface Sampling Laboratory Data Validation Report

Atlantic Richfield Company

July 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2021 Additional Surface Sampling Laboratory Data Validation Report

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July 2022

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LIST OF ATTACHMENTS

Attachment A Data Validation Checklists
Attachment B Level A/B Assessment Checklist
Attachment C Data Validation Quality Control Criteria

REVISION SUMMARY

Revision No.	Author	Version	Description	Date
Rev 0	Sara Ward	Draft	Issued for Internal Review	5/18/2022
Rev 0	Josie McElroy	Draft Final	Issued for Internal Review	7/5/2022

1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes analytical results for West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) soil samples collected in September 2021. All data have undergone Stage 4 data verification and data validation (DV) as defined in U.S. Environmental Protection Agency (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009). The DV was conducted in accordance with the Final Quality Assurance Project Plan (QAPP) for WSSOU RI sampling (CDM Smith, 2019) (referred to as WSSOU RI QAPP), the *Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation (DM/DV) Plan* (ARCO, 1992a) and addendum (AERL, 2000), the CFRSSI QAPP (ARCO, 1992b), and EPA *National Functional Guidelines* (NFG) *for Inorganic Superfund Methods Data Review* (EPA, 2020). This report details the evaluation of laboratory-reported data for the purpose of usability.

This document refers to the tables and attachments below.

- Table 1 contains the analytical results of the natural samples with laboratory qualifiers; DV qualifiers; enforcement, screening, and rejected classifications; and DV reason codes.
- Table 1a contains metals in soil results.
- Table 1b contains Synthetic Precipitation Leaching Procedure (SPLP) results.
- Table 1c contains Acid-Base Accounting (ABA) results,
- Table 2 contains the field duplicate sample pairs with results, laboratory flags, DV qualifiers, DV reason codes, and Quality Control (QC) criteria assessment.
- Table 3 contains sample identification information including the field sample names, laboratory sample names, sample dates, and analytical methods.
- Attachment A contains the DV checklists.
- Attachment B contains the Level A/B Assessment Checklist.
- Attachment C contains the QC criteria used in the DV process.

The full data packages, prepared by Pace Analytical Services, LLC (Pace), provided the information needed to perform Stage 4 data verification and DV. All data met the Level A and B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan (ARCO, 1992a), the quality of the data is ranked as enforcement quality, screening quality, or it is rejected. Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A and B criteria (Attachment B) and are not qualified as estimated or rejected after the validation process. Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, remedial investigation/feasibility study, evaluation of alternatives, confirmational purposes, risk assessments, and engineering design. As all data met the Level A and B documentation criteria, all results that were not qualified as estimated or rejected during the DV process were considered “enforcement” quality data and were assigned an “E” in Table 1.

Screening quality data, as defined in the CFRSSI DM/DV Plan (ARCO, 1992a), come from those samples that do not meet the Level B criteria and/or were qualified as estimated (J, J+, J-,

or UJ) during the DV process. Potential uses of screening quality data, depending on their quality, include site characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. The EPA Risk Assessment Guidance, Part A, Sec. 5.4.1 (EPA, 1989) states the following with respect to the use of J or UJ qualified results: *"Basically, the guidance here is to use J-qualified concentrations the same way as positive data that do not have the qualifier. If possible, note potential uncertainties associated with the qualifier, so that if data qualified with a J contribute significantly to the risk, the appropriate caveats can be attached."* As all data met the Level A and B documentation criteria, samples that were qualified as estimated during the validation process were considered "screening" quality data and were assigned an "S" in Table 1. Data rejected during DV cannot be used for any Superfund activities. No results were rejected during the DV process.

Surface samples were collected in September 2021 by Pioneer Technical Services, Inc. (Pioneer) to support developing risk assessments, determining the nature and extent of contamination present, and completing a feasibility study and a record of decision defining remedial action objectives for WSSOU. The EPA identified potential data gaps during the review of the data generated by samples collected from October 2019 through March 2021, so additional surface samples were requested. Samples were collected and data was validated in accordance with the WSSOU RI QAPP.

Soil samples for target analyte list metals and SPLP analyses were sent to Pace in Minneapolis, Minnesota. Soil samples for ABA analysis were sent to Pace in Sheridan, Wyoming. Table 3 lists the methods and analytes for each sample. Fourteen samples were sent to Pace in Minneapolis for metals analysis, and 350 natural data points were generated. Two samples were sent to Pace in Minneapolis for SPLP analysis, and 48 natural data points were generated. Two samples were sent to Pace in Sheridan for ABA analysis, and 28 natural data points were generated. From the 14 natural samples sent to the laboratories in September 2021 (not including field blanks or field duplicate samples), 426 natural data points were generated by Pace. A summary by analysis group is shown below:

Summary of Enforcement and Screening Quality Data Points

Analysis Group	Natural Samples[1]	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
ABA	2	28	2 (7%)	26 (93%)	0 (0%)
Metals	14	350	324 (93%)	26 (7%)	0 (0%)
SPLP	2	48	47 (98%)	1 (2%)	0 (0%)
Grand Total	**14**	**426**	**373 (88%)**	**53 (12%)**	**0 (0%)**

[1]Total number of samples is not a summation of the number of samples for each analytical group because some samples had results for more than one analysis group as listed in Table 3.

Most screening quality data points for ABA analysis were qualified due to multiple QC failures, including calibration issues, Laboratory Control Sample (LCS) Percent Recovery (%R), and failure to meet the QC frequency requirements. Any qualifications required are detailed in the DV checklists (Attachment A) and are listed in Table 1.

Table 1 shows the laboratory qualifiers, DV qualifiers, enforcement or screening designators, and the reason code for the qualification for each natural data point.

2.0 INORGANIC DATA QUALITY ASSURANCE/QUALITY CONTROL

The QC criteria used during the DV process are listed in Attachment C. These QC criteria were derived from the WSSOU RI QAPP, CFRSSI QAPP (ARCO, 1992b), the NFG (EPA, 2020), the internal BP Laboratory Management Program, analytical methods, and method-specific laboratory Standard Operating Procedures (SOPs).

The DV checklists derived from the CFRSSI DM/DV Addendum (AERL, 2000) were completed for each laboratory report (Attachment A). Below are the deviations made to the checklists provided in the CFRSSI DM/DV Addendum guidance document:

- The Laboratory DV Checklist for Metals Analysis by Inductively Coupled Plasma (ICP) or Graphite Furnace Atomic Absorption Spectrometry (GFAA) was revised slightly to more accurately reflect the information provided in the full data package provided by Pace and the requirements listed in the NFG (EPA, 2020). The completed checklists are included in Attachment A.
- The DV Checklist for Field QC was not filled out for each data package. Sections on field blanks and field duplicates were added to each Laboratory DV Checklist worksheet.
- The Laboratory DV Checklist for Metals Analysis by ICP or GFAA was modified for the general chemistry validation. The completed checklists are included in Attachment A. The guidelines for general or wet chemistry laboratory Quality Assurance (QA) and QC listed in Table 11-5 of the CFRSSI QAPP (ARCO, 1992b), along with laboratory QA/QC control limits, were used in evaluating the general chemistry results. The revised checklist more accurately reflects the information provided by the laboratory for these analyses.

The DV for methods Solid Waste (SW)-846 6010D (ICP-Atomic Emission Spectroscopy [AES]), ASTM D2974, SW-846 7470A, and SW-846 7471B (mercury) is included in the metals checklist. The DV for the ABA (EPA 600/2-78-054) is included in the general chemistry checklist. One Level A/B Assessment was completed for the September 2021 sampling event (Attachment B).

2.1 Field Quality Control Samples

Field duplicate samples were collected at a rate greater than 1 in 20 and met the requirements listed in Section B5.1 Field QC Samples of the WSSOU RI QAPP. Field blank samples were not collected per the WSSOU RI QAPP because all sampling equipment was one-use (disposable).

The analytical reporting limits reported by Pace were used to evaluate the field duplicates. The field duplicate QC criteria assessment is in Table 2. Any qualifications required based on the field QC sample results are detailed in the DV checklists (Attachment A), listed in Table 1, and discussed in Section 4.1.

Field QC sample (field duplicate samples) results are used to assess the data quality of natural samples. Please note that although the field QC samples may receive a qualifier during the DV process, the enforcement and screening quality summaries and the precision and accuracy assessment summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summaries.

2.2 Laboratory Quality Control Samples

The laboratory QC sample types vary depending on analytical method. The QC criteria used during DV to evaluate the applicable laboratory QC samples are listed in Attachment C.

The Stage 4 DV includes the evaluation of the following laboratory QC items as applicable per analytical method:

- Holding Times.
- Preservation.
- Tuning.
- Calibration.
- Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) Standards.
- Low Level Initial Calibration Verification Standards (LLICV) (referred to as the Contract Required Detection Limit [CRDL] standards in Pace laboratory reports).
- Initial Calibration Blank (ICB) and Continuing Calibration Blank (CCB) Standards.
- Method Blanks (MB).
- Interference Check Samples (ICS).
- LCS and LCS Duplicates.
- Laboratory Duplicate Samples (LDS).
- Laboratory Matrix Spike (LMS), LMS Duplicates (LMSD), and Post Digestion Spike Samples.
- Serial Dilution (SD).
- Internal Standards.

The laboratory method detection limits (MDLs) were used for the data review and validation of laboratory method blanks and field blanks; and the laboratory instrument detection limits were used for the data review and validation of the laboratory instrument blanks (initial and CCBs) as discussed in the CFRSSI QAPP (ARCO, 1992b).

The appropriate laboratory QC samples were analyzed for metals and SPLP analyses. For all the ABA analytes, MB and LDS samples were not analyzed, which resulted in qualifications for QC sample type frequency deficiencies. Any qualifications required based on the laboratory QC sample results and/or frequency deficiencies are detailed in the DV checklists (Attachment A) and are listed in Table 1. Also refer to Section 4.1 and Section 4.2.

3.0 LEVEL A/B ASSESSMENT

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality data. Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet Level A or B criteria are designated as unusable.

One Level A/B checklist for all analytical samples submitted for the September 2021 sampling event is included in Attachment B. All sample collection information, including sample collection date, location, identification, and collection method, was recorded in the field logbook. This information was reviewed for Level A/B criteria. As shown in Attachment B, all the samples met both Level A and Level B criteria. No data were designated screening quality or rejected based on the results of Level A/B criteria.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, COMPARABILITY, AND SENSITIVITY DATA SUMMARY

Data generated from WSSOU RI soil samples collected in September 2021 were examined to ensure that project objectives were met. The data quality objectives for this investigation are listed in Section A7 of the WSSOU RI QAPP. The Stage 4 DV and data verification was completed for each laboratory sample delivery group.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. Acceptance or rejection of precision measurements is based on the relative percent difference (RPD) of the laboratory and field duplicates. For example, perfect precision would be a 0% RPD between duplicate samples (both samples have the same analytical result) for results that are greater than 5 times the laboratory reporting limit (RL). For soil samples, the control limit of an RPD less than 35% was used when sample results were greater than 5 times the RL. If 1 or both of the sample results were less than 5 times the RL, the control limit used was a difference between sample results less than 2 times the RL. This precision requirement is from the WSSOU RI QAPP. For these sampling events, precision was assessed based on laboratory prepared and field duplicate sample analysis.

There were 8 instances where the field duplicate pair results did not meet the control limit. This resulted in the qualification of 8 natural data points due to poor field precision, because no other samples were considered sufficiently similar enough based on the variability of soil matrices to require additional qualifications.

The natural samples qualified for poor field precision (DV Reason Code = FD) are listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HCL Sulfur - LECO	J	CC, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HCL Extract Sulfur (Sulfate Sulfur)	J	CC, FD
10581049005	21WS-0013-SO6313-N-092121	SW-846 6010D	Arsenic	J	FD
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Lead, SPLP	J	FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Sulfur - LECO	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%, FD

There were no instances where the laboratory duplicate sample results did not meet the control limit.

This resulted in 8 (2%) of the 426 natural data points that did not meet the precision requirements, and 418 (98%) of the 426 natural data points that did meet the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. Accuracy is assessed based on the %R and percent difference (%D) of various laboratory samples. Perfect %R is 100% and perfect %D is 0% (the analysis result is exactly the known concentration of the QC sample).

Laboratory blanks were analyzed to assess artifacts introduced during analyses that may affect the accuracy of the data. In accordance with the CFRSSI QAPP (ARCO, 1992b), a data point is qualified as "U" if it is less than 5 times an associated blank result (ICB, CCB, MB) that does not meet the control limit.

For SW-846 6010D (ICP-AES) analysis, the %R of ICV samples, LLICV samples (which are CRDL Check Samples), CCV samples, LCS, LMS samples, and ICS; the %D for the SD samples; the detection of analytes in the ICB, CCB, or MB; and the detection of analytes in the ICS are used as indicators of accuracy. Additionally, for the ICS, the detection of analytes not present in the ICS solution with an absolute value above the MDL measures the accuracy of analytes with concentrations that approximate those levels found in the ICS for samples with comparable or higher levels of interferents. Positive detections in the ICS solutions indicate the possibility of false positive results, and negative detections in the ICS indicate the possibility of false negative results for samples with high levels of interferents.

For SW-846 7470A and SW-846 7471B (mercury) analyses, the %R of ICV samples, LLICV samples, CCV samples, LCS, and LMS samples; and the detection of analytes in the ICB, CCB, or MB samples are used as indicators of accuracy.

For EPA 600/2-78-054 (ABA) analysis, the calibration standards reading outside the acceptable range and the %R of LCS are used as the indicators of accuracy.

Specific accuracy requirements for the QC samples are listed in Attachment C.

There were 4 natural data points qualified due to a detection in the CCB (Reason Code = CCB) or a detection in the MB (Reason Code = MB) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10581049013	21WS-1116-SO6378-N-092721	SW-846 6010D	Beryllium	U	CCB
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Sodium, SPLP	U	MB
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Barium, SPLP	U	MB
10581049013	21WS-1116-SO6378-N-092721	SW-846 6010D	Sodium, SPLP	U	MB

There were 10 natural data points qualified due to an exceedance of the %R for the LMS and/or LMSD (Reason Code = S%) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Magnesium	J	S%
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Molybdenum	J	S%, SD
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Potassium	J	S%
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Antimony	UJ	S%
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Barium	J	S%
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Cadmium	J	S%, SD
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Copper	J	S%
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Aluminum	J	S%
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Antimony	UJ	S%
10581049003	21WS-0010-SO6302-N-092121	SW-846 7471B	Mercury	J-	S%

There were 17 natural data points qualified due to an exceedance of the %D for the SD (Reason Code = SD) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Iron	J	SD
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Molybdenum	J	S%, SD
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Cadmium	J	S%, SD
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Lead	J	SD

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
10581049003	21WS-0010-SO6302-N-092121	SW-846 6010D	Zinc	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Aluminum	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Lead	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Magnesium	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Manganese	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Nickel	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Arsenic	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Barium	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Chromium	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Cobalt	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Vanadium	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Zinc	J	SD
10581049001	21WS-0002-SO6285-N-092021	SW-846 6010D	Calcium	J	SD

There were 24 natural data points qualified due to calibration standards reading outside the acceptable range (Reason Code = CC) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Total Sulfur	J	CC, MBX
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Acid Base	J	CC, MBX, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Acid/Base Potential	J	CC, MBX, DX, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Hot Water Sulfur - LECO	J	CC, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HCL Sulfur - LECO	J	CC, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HCL Extract Sulfur (Sulfate Sulfur)	J	CC, FD
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HNO3 Sulfur - LECO	J	CC, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Sulfur - LECO	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base	J	CC, MBX, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%, FD
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC, L%

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base	J	CC, MBX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Total Sulfur	J	CC, MBX
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Acid Base	J	CC, MBX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Acid/Base Potential	J	CC, MBX, DX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Hot Water Sulfur - LECO	J	CC, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HCL Sulfur - LECO	J	CC
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HCL Extract Sulfur (Sulfate Sulfur)	UJ	CC

There were 18 natural data points qualified due to %R for the LCS (Reason Code = L%) as listed below:

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Acid Base	J	CC, MBX, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Acid/Base Potential	J	CC, MBX, DX, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Hot Water Sulfur - LECO	J	CC, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%, FD
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HNO3 Sulfur - LECO	J	CC, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Sulfur - LECO	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%, FD
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base	J	CC, MBX, L%
S2110016-001A	21WS-0010-SO6302-N-092121	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%, FD
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC, L%

Laboratory Sample ID	Field Sample ID	Method	Analyte	DV Flag	DV Reason Code
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base	J	CC, MBX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Acid Base	J	CC, MBX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Acid/Base Potential	J	CC, MBX, DX, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Hot Water Sulfur - LECO	J	CC, L%
S2110016-003A	21WS-1116-SO6378-N-092721	M600/2-78-054 NV Mod	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%

Note that there were 20 data points qualified for more than 1 indicator of accuracy ([SD, S%] and [CC, L%]).

This resulted in 53 (12%) of the 426 natural data points that did not meet the accuracy requirements, and 373 (88%) of the 426 natural data points that did meet the accuracy requirements.

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper sampling program design. The laboratory results were reviewed, and a Stage 4 DV and data verification completed. Holding time and preservation criteria were met for all natural data points. Chain of custody forms were complete and are included in the data packages. The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report includes soil samples collected by Pioneer and analyzed by Pace.

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and laboratory analytical methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in the SOPs and equipment use. Proper chain of custody and sample handling were observed during sample collection, delivery to the laboratory, and analysis. The analytical laboratories performed the sample analysis using industry standard methods.

Consequently, data from past and future soil sampling events at WSSOU using comparable sampling and analytical methods may be used in concert with this data set.

4.5 Completeness

Completeness is assessed to determine if enough valid data have been collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 90% or greater as designated in the WSSOU RI QAPP.

In total, 426 natural data points were generated by the sampling event. All natural data points were usable as no sample results were rejected, and all the planned data points were collected. Therefore, the completeness was 100% and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the detection limit (laboratory RL or the laboratory MDL, as applicable) of non-detect results to the project-specific sensitivity requirements. The RL in Table B-5 of the WSSOU RI QAPP were used to evaluate sensitivity for soil analyses, and the RL in Table B-4 were used to evaluate sensitivity for SPLP analyses.

For the ABA analyses, the detection limit was the laboratory RL, which met the RLs listed in Table B-5 of the WSSOU RI QAPP for non-detect results.

For SPLP analyses, the detection limits were the laboratory MDLs, which met the RLs listed in Table B-4 of the WSSOU RI QAPP for non-detect results except for antimony, arsenic, and selenium. The laboratory MDL for each of these analytes was greater than the RL listed in Table B-4 of the WSSOU RI QAPP as listed below.

Analyte	Non-Detect Results (<MDL)	RL in Table B-4, WSSOU RI QAPP
Antimony, SPLP	<0.007 mg/L	0.002 mg/L
Arsenic, SPLP	<0.0035 mg/L	0.001 mg/L
Selenium, SPLP	<0.0059 mg/L	0.005 mg/L

mg/L = milligrams per Liter.

All non-detect results for these analytes are considered usable with the recognition that the detection limits are higher than the RLs listed in Table B-4 of the WSSOU RI QAPP.

For total metals, the detection limits were the laboratory MDLs, which met the RLs listed in Table B-5 of the WSSOU RI QAPP for non-detect results except for the analytes listed below. The laboratory MDLs for these non-detect results were adjusted for the dilution factor. Pace

qualified these results as "*D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.*"

Laboratory Sample ID	Field Sample ID	Analyte	Result (<adjusted MDL)	Dilution Factor	RL in Table B-5, WSSOU RI QAPP
10581049003	21WS-0010-SO6302-N-092121	Thallium	<7.4 mg/kg	25	2.5 mg/kg
10581049003	21WS-0010-SO6302-N-092121	Selenium	<8.1 mg/kg	25	3.5 mg/kg
10581049016	21WS-0162-SO6404-N-092821	Thallium	<7.3 mg/kg	25	2.5 mg/kg
10581049016	21WS-0162-SO6404-N-092821	Selenium	<8 mg/kg	25	3.5 mg/kg

mg/kg = milligrams per kilogram.

These data points are considered usable with the recognition that the detection limits are higher than the RLs listed in Table B-5 of the WSSOU RI QAPP.

4.7 Overall Data Summary

During the September 2021 sampling event, the 14 natural samples collected by Pioneer and analyzed by Pace generated 426 data points. Of these, 53 data points were qualified as J, J- or UJ. No data points were rejected. Data were also evaluated using the Level A/B Checklist (Attachment B). All samples met both the Level A and Level B criteria defined in the CFRSSI DM/DV Plan (ARCO, 1992a) and addendum (AERL, 2000).

The following list shows an overall summary of the validation performed on the data generated by Pace for the samples collected during the September 2021 sampling event.

Analysis Group	Total Natural		Level A/B	DV Flag J, J+, J-, or UJ	DV Flag R	DV Flag U or A	Enforcement Quality	Screening Quality	Rejected
	Samples	Data Points	A/B	Data Points	Data Points	Data Points	Data Points (% of total)	Data Points (% of Total)	Data Points (% of Total)
ABA	2	28	B	26	0	0	2 (7%)	26 (93%)	0 (0%)
Metals	14	350	B	26	0	1	324 (93%)	26 (7%)	0 (0%)
SPLP	2	48	B	1	0	3	47 (98%)	1 (2%)	0 (0%)
Grand Total	**14**	**426**	**B**	**53**	**0**	**4**	**373 (88%)**	**53 (12%)**	**0 (0%)**

5.0 REFERENCES

AERL, 2000. Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation (DM/DV) Plan Addendum. Prepared for ARCO by Exponent, Lake Oswego, Oregon. June 2000.

ARCO, 1992a. Clark Fork River Superfund Site Investigations Data Management/Data Validation Plan, Atlantic Richfield Company, 1992.

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EPA, 1989. U.S. Environmental Protection Agency Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), EPA/540/1-89/002, December 1989.

EPA, 2009. U.S. Environmental Protection Agency Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, January 2009.

EPA, 2020. U.S. Environmental Protection Agency National Functional Guidelines for Inorganic Superfund Data Review, November 2020.

TABLES

Table 1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Table 1a. Metals in Soil.
Table 1b. SPLP.
Table 1c. ABA.

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

Table 3. Sample Identification.

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10581049					10581049					10581049					10581049					10581049				
		Lab Sample ID	10581049001					10581049002					10581049003					10581049005					10581049007				
		Field Sample ID	21WS-0002-SO6285-N-092021					21WS-0003-SO6294-N-092021					21WS-0010-SO6302-N-092121					21WS-0013-SO6313-N-092121					21WS-0016-SO6325-N-092221				
		Sample Date	9/20/2021					9/20/2021					9/21/2021					9/21/2021					9/22/2021				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Percent Moisture	ASTM D2974	%	2.0	N2		E		1.1	N2		E		2.9	N2		E		1.4	N2		E		0.84	N2		E	
Aluminum	SW-846 6010D	mg/kg	7,720	P6	J	S	SD	8,070			E		3,390	M1	J	S	S%	6,890			E		5,160			E	
Antimony	SW-846 6010D	mg/kg	<0.35	U,M1	UJ	S	S%	4.2			E		<1.8	U,D3,M1	UJ	S	S%	0.37	J		E		11.8			E	
Arsenic	SW-846 6010D	mg/kg	12.8		J	S	SD	71.6			E		215	P6		E		65.2		J	S	FD	259			E	
Barium	SW-846 6010D	mg/kg	421	R1,P6	J	S	SD	215			E		51.4	R1,M1	J	S	S%	101			E		52.0			E	
Beryllium	SW-846 6010D	mg/kg	0.38			E		0.15	J		E		<0.023	U,D3		E		0.25			E		0.022	J		E	
Cadmium	SW-846 6010D	mg/kg	0.32			E		0.89			E		55.1	M1	J	S	S%, SD	9.8			E		2.6			E	
Calcium	SW-846 6010D	mg/kg	7,060		J	S	SD	1,590			E		1,690			E		10,500			E		1,110			E	
Chromium	SW-846 6010D	mg/kg	15.9		J	S	SD	11.3			E		<0.77	U,D3		E		3.7			E		2.5	J,D3		E	
Cobalt	SW-846 6010D	mg/kg	4.9		J	S	SD	3.6			E		5.5			E		7.0			E		3.2			E	
Copper	SW-846 6010D	mg/kg	21.4			E		147			E		128	M1	J	S	S%	75.8			E		75.8			E	
Iron	SW-846 6010D	mg/kg	16,900	P6		E		13,000			E		37,400	P6	J	S	SD	21,600			E		15,600			E	
Lead	SW-846 6010D	mg/kg	27.1		J	S	SD	184			E		8,120	P6	J	S	SD	1,680			E		26,200			E	
Magnesium	SW-846 6010D	mg/kg	4,150	P6	J	S	SD	3,230			E		2,960	M1	J	S	S%	3,900			E		826			E	
Manganese	SW-846 6010D	mg/kg	520	P6	J	S	SD	2,330			E		161,000	R1,P6		E		13,000			E		6,320			E	
Molybdenum	SW-846 6010D	mg/kg	2.2			E		2.2			E		76.1	M1	J	S	S%, SD	2.2			E		3.0			E	
Nickel	SW-846 6010D	mg/kg	10.9		J	S	SD	5.0			E		5.8			E		5.0			E		1.7			E	
Potassium	SW-846 6010D	mg/kg	3,210			E		2,970			E		1,280	M1	J	S	S%	1,910			E		1,570			E	
Selenium	SW-846 6010D	mg/kg	<0.32	U		E		<0.31	U		E		<8.1	U,D3		E		<1.6	U,D3		E		<1.6	U,D3		E	
Silver	SW-846 6010D	mg/kg	0.091	J		E		6.0			E		19.6			E		10			E		38.8			E	
Sodium	SW-846 6010D	mg/kg	120			E		95.2			E		120	J,D3		E		41.8	J		E		36.5	J		E	
Thallium	SW-846 6010D	mg/kg	0.47	J		E		<0.28	U		E		<7.4	U,D3		E		<1.4	U,D3		E		<1.5	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	29.4		J	S	SD	24.2			E		12.1			E		19.5			E		8.2			E	
Zinc	SW-846 6010D	mg/kg	86.2		J	S	SD	123			E		20,100	P6	J	S	SD	5,570			E		1,310			E	
Mercury	SW-846 7471B	mg/kg	0.21			E		0.051			E		0.78	M1	J-	S	S%	0.16			E		0.99			E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

U = Indicates the compound was analyzed for, but not detected.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

R1 = RPD value was outside control limits.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

SD = Qualified due to percent difference of serial dilution outside control limit.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

CCB = Qualified due to detections in the Continuing Calibration Blank.

Abbreviations:

mg/kg - milligram per kilogram

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10581049					10581049					10581049					10581049					10581049				
		Lab Sample ID	10581049008					10581049009					10581049010					10581049011					10581049012				
		Field Sample ID	21WS-0319-SO6332-N-092221					21WS-0296-SO6337-N-092321					21WS-0015-SO6346-N-092321					21WS-0015-SO6347-N-092321					21WS-0285-SO6366-N-092721				
		Sample Date	9/22/2021					9/23/2021					9/23/2021					9/23/2021					9/27/2021				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Percent Moisture	ASTM D2974	%	0.55	N2		E		0.70	N2		E		0.96	N2		E		0.98	N2		E		0.58	N2		E	
Aluminum	SW-846 6010D	mg/kg	3,160			E		2,860			E		3,870			E		5,210			E		4,070			E	
Antimony	SW-846 6010D	mg/kg	2.3	J,D3		E		<1.7	U,D3		E		5.8			E		0.64	J		E		<1.8	U,D3		E	
Arsenic	SW-846 6010D	mg/kg	68.2			E		29.7			E		122			E		28.3			E		66.8			E	
Barium	SW-846 6010D	mg/kg	69.2			E		92.8			E		95.1			E		147			E		56.7			E	
Beryllium	SW-846 6010D	mg/kg	0.39	J,D3		E		0.23	J,D3		E		0.0078	J		E		0.11	J		E		0.096	J,D3		E	
Cadmium	SW-846 6010D	mg/kg	0.37	J,D3		E		6.1			E		63.1			E		3.6			E		0.67	J,D3		E	
Calcium	SW-846 6010D	mg/kg	3,630			E		986			E		3,360			E		1,190			E		517			E	
Chromium	SW-846 6010D	mg/kg	1.2	J,D3		E		2.7			E		4.0			E		9.2			E		2.7			E	
Cobalt	SW-846 6010D	mg/kg	1.3	J,D3		E		1.3	J,D3		E		1.3			E		3.0			E		1.4	J,D3		E	
Copper	SW-846 6010D	mg/kg	14.8			E		46.1			E		276			E		48.6			E		89.0			E	
Iron	SW-846 6010D	mg/kg	7,960			E		5,460			E		19,900			E		6,420			E		4,900			E	
Lead	SW-846 6010D	mg/kg	43.9			E		562			E		13,900			E		922			E		139			E	
Magnesium	SW-846 6010D	mg/kg	547			E		717			E		708			E		1,700			E		486			E	
Manganese	SW-846 6010D	mg/kg	5,920			E		3,290			E		15,100			E		1,920			E		796			E	
Molybdenum	SW-846 6010D	mg/kg	4.4			E		4.0			E		17.4			E		2.0			E		3.6	J,D3		E	
Nickel	SW-846 6010D	mg/kg	1.5	J,D3		E		1.9	J,D3		E		2.7			E		5.1			E		1.5	J,D3		E	
Potassium	SW-846 6010D	mg/kg	1,090			E		769			E		877			E		1,670			E		708			E	
Selenium	SW-846 6010D	mg/kg	<1.5	U,D3		E		<1.6	U,D3		E		<1.6	U,D3		E		<0.32	U		E		<1.6	U,D3		E	
Silver	SW-846 6010D	mg/kg	4.1			E		8.3			E		155	R1		E		9.8			E		1.6	J,D3		E	
Sodium	SW-846 6010D	mg/kg	22.7	J,D3		E		53.6	J,D3		E		74.9			E		75.9			E		15.5	J,D3		E	
Thallium	SW-846 6010D	mg/kg	<1.4	U,D3		E		<1.4	U,D3		E		<1.5	U,D3		E		<0.29	U		E		<1.5	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	16.8			E		7.6			E		7.3			E		12.8			E		7.6			E	
Zinc	SW-846 6010D	mg/kg	149			E		1,690			E		31,700			E		888			E		146			E	
Mercury	SW-846 7471B	mg/kg	0.20			E		0.068			E		0.49			E		0.083			E		0.034			E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

U = Indicates the compound was analyzed for, but not detected.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

R1 = RPD value was outside control limits.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

SD = Qualified due to percent difference of serial dilution outside control limit.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

CCB = Qualified due to detections in the Continuing Calibration Blank.

Abbreviations:

mg/kg - milligram per kilogram

Table 1a. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - Metals in Soil

		Work Order	10581049					10581049					10581049					10581049				
		Lab Sample ID	10581049013					10581049014					10581049015					10581049016				
		Field Sample ID	21WS-1116-SO6378-N-092721					21WS-1072-SO6385-N-092821					21WS-1111-SO6399-N-092821					21WS-0162-SO6404-N-092821				
		Sample Date	9/27/2021					9/28/2021					9/28/2021					9/28/2021				
		Sample Type	Natural Sample					Natural Sample					Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Percent Moisture	ASTM D2974	%	0.26	N2		E		0.97	N2		E		2.7	N2		E		2.1	N2		E	
Aluminum	SW-846 6010D	mg/kg	5,720			E		3,020			E		7,290			E		12,300			E	
Antimony	SW-846 6010D	mg/kg	2.0	J,D3		E		12.5			E		<1.8	U,D3		E		2.8	J,D3		E	
Arsenic	SW-846 6010D	mg/kg	78.6			E		373			E		92.1			E		31.2			E	
Barium	SW-846 6010D	mg/kg	420			E		50.9			E		113			E		57.3			E	
Beryllium	SW-846 6010D	mg/kg	0.036	J,D3	U	E	CCB	<0.023	U,D3		E		<0.024	U,D3		E		0.37	J,D3		E	
Cadmium	SW-846 6010D	mg/kg	5.7			E		86.0			E		<0.17	U,D3		E		2.5			E	
Calcium	SW-846 6010D	mg/kg	2,990			E		1,630			E		2,130			E		14,900			E	
Chromium	SW-846 6010D	mg/kg	16.1			E		2.2	J,D3		E		5.4			E		12.4			E	
Cobalt	SW-846 6010D	mg/kg	7.3			E		3.9			E		6.1			E		6.4			E	
Copper	SW-846 6010D	mg/kg	228			E		331			E		58.7			E		170			E	
Iron	SW-846 6010D	mg/kg	28,700			E		18,500			E		22,800			E		18,900			E	
Lead	SW-846 6010D	mg/kg	312			E		2,090			E		99.8			E		493			E	
Magnesium	SW-846 6010D	mg/kg	2,370			E		849			E		3,610			E		5,820			E	
Manganese	SW-846 6010D	mg/kg	11,000			E		19,100			E		177			E		27,000			E	
Molybdenum	SW-846 6010D	mg/kg	5.3			E		11.8			E		2.9	J,D3		E		2.8	J,D3		E	
Nickel	SW-846 6010D	mg/kg	5.7			E		2.1	J,D3		E		5.7			E		13.5			E	
Potassium	SW-846 6010D	mg/kg	2,050			E		1,640			E		3,390			E		2,820			E	
Selenium	SW-846 6010D	mg/kg	<1.6	U,D3		E		<1.6	U,D3		E		<1.6	U,D3		E		<8	U,D3		E	
Silver	SW-846 6010D	mg/kg	11.4			E		119			E		7.1			E		62.8			E	
Sodium	SW-846 6010D	mg/kg	145	J,D3		E		65.3	J,D3		E		112	J,D3		E		31.2	J,D3		E	
Thallium	SW-846 6010D	mg/kg	<1.4	U,D3		E		<1.4	U,D3		E		<1.5	U,D3		E		<7.3	U,D3		E	
Vanadium	SW-846 6010D	mg/kg	101			E		13.5			E		46.5			E		35.0			E	
Zinc	SW-846 6010D	mg/kg	979			E		22,400			E		119			E		688			E	
Mercury	SW-846 7471B	mg/kg	0.22			E		0.23			E		0.052			E		0.22			E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

U = Indicates the compound was analyzed for, but not detected.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

R1 = RPD value was outside control limits.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

SD = Qualified due to percent difference of serial dilution outside control limit.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

CCB = Qualified due to detections in the Continuing Calibration Blank.

Abbreviations:

mg/kg - milligram per kilogram

Table 1b. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - SPLP

		Work Order	10581049					10581049				
		Lab Sample ID	10581049003					10581049013				
		Field Sample ID	21WS-0010-SO6302-N-092121					21WS-1116-SO6378-N-092721				
		Sample Date	9/21/2021					9/27/2021				
		Sample Type	Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Mercury, SPLP	SW-846 7470A	µg/L	<0.07	U		E		0.48			E	
Aluminum, SPLP	SW-846 6010D	mg/L	<0.015	U		E		15.5			E	
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U		E		<0.007	U		E	
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0035	U		E		0.18			E	
Barium, SPLP	SW-846 6010D	mg/L	0.0053	J,B	U	E	MB	0.17			E	
Beryllium, SPLP	SW-846 6010D	mg/L	<0.000067	U		E		<0.000067	U		E	
Cadmium, SPLP	SW-846 6010D	mg/L	0.0025	J		E		0.0058			E	
Calcium, SPLP	SW-846 6010D	mg/L	8.3			E		7.7			E	
Chromium, SPLP	SW-846 6010D	mg/L	<0.0004	U		E		0.0098	J		E	
Cobalt, SPLP	SW-846 6010D	mg/L	<0.00083	U		E		0.0055	J		E	
Copper, SPLP	SW-846 6010D	mg/L	0.0018	J		E		0.41			E	
Iron, SPLP	SW-846 6010D	mg/L	0.22			E		17.7			E	
Lead, SPLP	SW-846 6010D	mg/L	0.050		J	S	FD	0.47			E	
Magnesium, SPLP	SW-846 6010D	mg/L	4.3			E		4.1			E	
Manganese, SPLP	SW-846 6010D	mg/L	22.9	P6		E		0.72			E	
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0053	J		E		0.0049	J		E	
Nickel, SPLP	SW-846 6010D	mg/L	<0.001	U		E		0.0059	J		E	
Potassium, SPLP	SW-846 6010D	mg/L	0.56	J		E		4.0			E	
Selenium, SPLP	SW-846 6010D	mg/L	<0.0059	U		E		<0.0059	U		E	
Silver, SPLP	SW-846 6010D	mg/L	0.00056	J		E		0.013			E	
Sodium, SPLP	SW-846 6010D	mg/L	5.1	B	U	E	MB	9.9	B	U	E	MB
Thallium, SPLP	SW-846 6010D	mg/L	<0.0043	U		E		<0.0043	U		E	
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00089	U		E		0.035			E	
Zinc, SPLP	SW-846 6010D	mg/L	1.0			E		1.1			E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

U = Indicates the compound was analyzed for, but not detected.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

B = Analyte was detected in the associated method blank.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

MB = Qualified due to preparation blank results.

FD = Qualified due to field duplicate results outside of control limits.

Abbreviations:

mg/l - milligram per liter

ug/L - microgram per liter

Table 1c. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes - ABA

		Work Order	10584587					10584587				
		Lab Sample ID	S2110016-001A					S2110016-003A				
		Field Sample ID	21WS-0010-SO6302-N-092121					21WS-1116-SO6378-N-092721				
		Sample Date	9/21/2021					9/27/2021				
		Sample Type	Natural Sample					Natural Sample				
Analyte	Method	Units	Result	Lab Flag	DV Flag	S/E	Reason Code	Result	Lab Flag	DV Flag	S/E	Reason Code
Acid Base	M600/2-78-054 NV Mod	tons/1000	82.2		J	S	CC, MBX, L%	6.28		J	S	CC, MBX, L%
HCL Extract Sulfur (Sulfate Sulfur)	M600/2-78-054 NV Mod	%	1.45		J	S	CC, FD	<0.01	ND	UJ	S	CC
HCL Sulfur - LECO	M600/2-78-054 NV Mod	%	1.15		J	S	CC, FD	0.15		J	S	CC
HNO3 Extract Sulfur (Pyritic Sulfur)	M600/2-78-054 NV Mod	%	0.79		J	S	CC, L%	0.09		J	S	CC, L%
HNO3 Sulfur - LECO	M600/2-78-054 NV Mod	%	0.36		J	S	CC, L%, FD	0.07		J	S	CC, L%
HNO3 Sulfur (Non-Ext. Sulfur)	M600/2-78-054 NV Mod	%	0.36		J	S	CC, L%, FD	0.07		J	S	CC, L%
Hot Water Extract Sulfur (H2O Sol. SO4)	M600/2-78-054 NV Mod	%	0.04		J	S	CC, L%, FD	0.05		J	S	CC, L%
Hot Water Sulfur - LECO	M600/2-78-054 NV Mod	%	2.59		J	S	CC, L%	0.15		J	S	CC, L%
Pyritic Sulfur Acid Base	M600/2-78-054 NV Mod	tons/1000	24.7		J	S	CC, MBX, L%	2.50		J	S	CC, MBX, L%
Pyritic Sulfur Acid Base Potential	M600/2-78-054 NV Mod	tons/1000	-1.57		J	S	CC, MBX, DX, L%, FD	2.21		J	S	CC, MBX, DX, L%
Acid/Base Potential	M600/2-78-054 NV Mod	tons/1000	-59.1		J	S	CC, MBX, DX, L%	-1.57		J	S	CC, MBX, DX, L%
Neutralization Potential	M600/2-78-054 NV Mod	tons/1000	23.1		J	S	MBX, DX	4.71		J	S	MBX, DX
Total Sulfur	M600/2-78-054 NV Mod	%	2.63		J	S	CC, MBX	0.20		J	S	CC, MBX
pH	USDA 60-21a	SU	5.4			E		6.8			E	

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

Pace Laboratory Flags (Lab Flag)

ND = Not detected at the reporting limit.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Screening/Enforcement Quality (S/E)

E = Enforcement quality.

S = Screening quality.

Data Validation Reason Codes (Reason Code)

MBX = Qualified because preparation blank frequecy not met.

FD = Qualified due to field duplicate results outside of control limits.

CC = Qualified because correlation coefficient of instrument calibration was exceeded.

L% = Qualified due to percent recovery of the Laboratory Control Sample outisde of control limits.

DX = Qualified because lab duplicate frequecy not met.

Abbreviations:

tons/1000 - tons $CaCO_3$/1000 tons

SU - Standard unit

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order[1]	10581049						10581049									
		Lab Sample ID	10581049003						10581049004									
		Field Sample ID	21WS-0010-SO6302-N-092121						21WS-0010-SO6302-D-092121									
		Sample Date	9/21/2021						9/21/2021									
		Sample Type	Natural						Field Duplicate									
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Control Limit[2]	ABS DIF	RPD	Meets Control Limit?
Percent Moisture	ASTM D2974	%	2.9	N2			1	0.1	3.2	N2			1	0.1	RPD≤35%		10%	Yes
Aluminum	SW-846 6010D	mg/kg	3,390	M1	J	S%	25	245	2,970		J	S%	25	251	RPD≤35%		13%	Yes
Antimony	SW-846 6010D	mg/kg	<1.8	U,D3,M1	UJ	S%	5	4.9	2.4	J,D3	J	S%	5	5.0	ABS DIF≤2xRL	0.6		Yes
Arsenic	SW-846 6010D	mg/kg	215	P6			5	4.9	178				5	5.0	RPD≤35%		19%	Yes
Barium	SW-846 6010D	mg/kg	51.4	R1,M1	J	S%	5	2.5	50.4		J	S%	5	2.5	RPD≤35%		2%	Yes
Beryllium	SW-846 6010D	mg/kg	<0.023	U,D3			5	1.2	0.13	J,D3			5	1.3	ABS DIF≤2xRL	0.107		Yes
Cadmium	SW-846 6010D	mg/kg	55.1	M1	J	S%, SD	5	0.74	52.9		J	S%, SD	5	0.75	RPD≤35%		4%	Yes
Calcium	SW-846 6010D	mg/kg	1,690				25	613	1,290				25	627	ABS DIF≤2xRL	400		Yes
Chromium	SW-846 6010D	mg/kg	<0.77	U,D3			25	12.3	<0.78	U,D3			25	12.5	ABS DIF≤2xRL	both U		Yes
Cobalt	SW-846 6010D	mg/kg	5.5				5	2.5	5.0				5	2.5	ABS DIF≤2xRL	0.5		Yes
Copper	SW-846 6010D	mg/kg	128	M1	J	S%	5	2.5	159		J	S%	5	2.5	RPD≤35%		22%	Yes
Iron	SW-846 6010D	mg/kg	37,400	P6	J	SD	5	24.5	34,300		J	SD	5	25.1	RPD≤35%		9%	Yes
Lead	SW-846 6010D	mg/kg	8,120	P6	J	SD	25	12.3	9,250		J	SD	25	12.5	RPD≤35%		13%	Yes
Magnesium	SW-846 6010D	mg/kg	2,960	M1	J	S%	5	123	2,530		J	S%	5	125	RPD≤35%		16%	Yes
Manganese	SW-846 6010D	mg/kg	161,000	R1,P6			250	123	138,000				250	125	RPD≤35%		15%	Yes
Molybdenum	SW-846 6010D	mg/kg	76.1	M1	J	S%, SD	5	3.7	60.7		J	S%, SD	5	3.8	RPD≤35%		23%	Yes
Nickel	SW-846 6010D	mg/kg	5.8				5	4.9	5.2				5	5.0	ABS DIF≤2xRL	0.6		Yes
Potassium	SW-846 6010D	mg/kg	1,280	M1	J	S%	5	613	895		J	S%	5	627	ABS DIF≤2xRL	385		Yes
Selenium	SW-846 6010D	mg/kg	<8.1	U,D3			25	24.5	<8.2	U,D3			25	25.1	ABS DIF<2xRL	both U		Yes
Silver	SW-846 6010D	mg/kg	19.6				25	12.3	20.0				25	12.5	ABS DIF≤2xRL	0.4		Yes
Sodium	SW-846 6010D	mg/kg	120	J,D3			5	245	83.6	J,D3			5	251	ABS DIF≤2xRL	36.4		Yes
Thallium	SW-846 6010D	mg/kg	<7.4	U,D3			25	24.5	<7.5	U,D3			25	25.1	ABS DIF≤2xRL	both U		Yes
Vanadium	SW-846 6010D	mg/kg	12.1				5	3.7	9.5				5	3.8	ABS DIF≤2xRL	2.6		Yes
Zinc	SW-846 6010D	mg/kg	20,100	P6	J	SD	25	49.1	19,500		J	SD	25	50.1	RPD≤35%		3%	Yes
Mercury	SW-846 7471B	mg/kg	0.78	M1	J-	S%	1	0.019	0.87		J-	S%	1	0.019	RPD≤35%		11%	Yes
Mercury, SPLP	SW-846 7470A	µg/L	<0.07	U			1	0.20	<0.07	U			1	0.20	ABS DIF≤2xRL	both U		Yes
Aluminum, SPLP	SW-846 6010D	mg/L	<0.015	U			1	0.20	<0.015	U			1	0.20	ABS DIF≤2xRL	both U		Yes
Antimony, SPLP	SW-846 6010D	mg/L	<0.007	U			1	0.020	<0.007	U			1	0.020	ABS DIF≤2xRL	both U		Yes
Arsenic, SPLP	SW-846 6010D	mg/L	<0.0035	U			1	0.020	<0.0035	U			1	0.020	ABS DIF≤2xRL	both U		Yes
Barium, SPLP	SW-846 6010D	mg/L	0.0053	J,B	U	MB	1	0.10	0.0060	J,B			1	0.10	ABS DIF≤2xRL	0.0007		Yes
Beryllium, SPLP	SW-846 6010D	mg/L	<0.000067	U			1	0.005	<0.000067	U			1	0.005	ABS DIF≤2xRL	both U		Yes
Cadmium, SPLP	SW-846 6010D	mg/L	0.0025	J			1	0.0030	0.0014	J			1	0.0030	ABS DIF≤2xRL	0.0011		Yes
Calcium, SPLP	SW-846 6010D	mg/L	8.3				1	0.50	7.7				1	0.50	RPD≤35%		8%	Yes
Chromium, SPLP	SW-846 6010D	mg/L	<0.0004	U			1	0.010	<0.0004	U			1	0.010	ABS DIF≤2xRL	both U		Yes
Cobalt, SPLP	SW-846 6010D	mg/L	<0.00083	U			1	0.010	<0.00083	U			1	0.010	ABS DIF≤2xRL	both U		Yes
Copper, SPLP	SW-846 6010D	mg/L	0.0018	J			1	0.010	<0.0015	U			1	0.010	ABS DIF≤2xRL	0.0003		Yes
Iron, SPLP	SW-846 6010D	mg/L	0.22				1	0.050	0.13	B			1	0.050	ABS DIF≤2xRL	0.09		Yes
Lead, SPLP	SW-846 6010D	mg/L	0.05		J	FD	1	0.010	0.024		J	FD	1	0.010	ABS DIF≤2xRL	0.026		ABS DIFF>2xRL
Magnesium, SPLP	SW-846 6010D	mg/L	4.3				1	0.50	4.1				1	0.50	RPD≤35%		5%	Yes
Manganese, SPLP	SW-846 6010D	mg/L	22.9	P6			2	0.010	21.5				2	0.010	RPD≤35%		6%	Yes
Molybdenum, SPLP	SW-846 6010D	mg/L	0.0053	J			1	0.015	0.0054	J			1	0.015	ABS DIF≤2xRL	0.0001		Yes
Nickel, SPLP	SW-846 6010D	mg/L	<0.001	U			1	0.020	<0.001	U			1	0.020	ABS DIF≤2xRL	both U		Yes
Potassium, SPLP	SW-846 6010D	mg/L	0.56	J			1	2.5	0.43	J			1	2.5	ABS DIF≤2xRL	0.13		Yes
Selenium, SPLP	SW-846 6010D	mg/L	<0.0059	U			1	0.020	<0.0059	U			1	0.020	ABS DIF≤2xRL	both U		Yes
Silver, SPLP	SW-846 6010D	mg/L	0.00056	J			1	0.010	0.00080	J			1	0.010	ABS DIF≤2xRL	0.00024		Yes
Sodium, SPLP	SW-846 6010D	mg/L	5.1	B	U	MB	1	1.0	5.9	B	U	MB	1	1.0	RPD≤35%		15%	Yes
Thallium, SPLP	SW-846 6010D	mg/L	<0.0043	U			1	0.020	<0.0043	U			1	0.020	ABS DIF≤2xRL	both U		Yes
Vanadium, SPLP	SW-846 6010D	mg/L	<0.00089	U			1	0.015	<0.00089	U			1	0.015	ABS DIF≤2xRL	both U		Yes
Zinc, SPLP	SW-846 6010D	mg/L	1				1	0.020	0.72				1	0.020	RPD≤35%		33%	Yes

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

The Qualifications made to the field duplicate samples (DV Flag/Reason Code) are not included in the summary of Qualifications made to natural samples discussed in the Data Validation Report.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

J- = The result is an estimated quantity, but the result may be biased low.

U = The result is qualified as non-detect due to the detection of the analyte in an associated QC blank.

Data Validation Reason Codes (Reason Code)

SD = Qualified due to percent difference of serial dilution outside control limit.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

FD = Qualified due to field duplicate results outside of control limits.

MB = Qualified due to preparation blank results.

Footnotes:

[1]Work order 10581049 has total and SPLP metals, and work order 10584587 has ABA analyses.

[2] If the control limit is an absolute difference less than the reporting limit, the minimum reporting limit will be used if the samples have varying dilution factors.

Pace Laboratory Flags (Lab Flag)

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

U = Indicates the compound was analyzed for, but not detected.

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

R1 = RPD value was outside control limits.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

B = Analyte was detected in the associated method blank.

Abbreviations:

DF - dilution factor

RL - reporting limit

ABS DIF - absolute difference

RPD - relative percent difference

mg/l - milligram per liter

ug/L - microgram per liter

mg/kg - milligram per kilogram

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order[1]	10581049						10581049									
		Lab Sample ID	10581049005						10581049006									
		Field Sample ID	21WS-0013-SO6313-N-092121						21WS-0013-SO6313-D-092121									
		Sample Date	9/21/2021						9/21/2021									
		Sample Type	Natural						Field Duplicate									
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Control Limit[2]	ABS DIF	RPD	Meets Control Limit?
Percent Moisture	ASTM D2974	%	1.4	N2			1	0.10	1.4	N2			1	0.10	RPD≤35%		0%	Yes
Aluminum	SW-846 6010D	mg/kg	6,890				5	47.8	6,680				5	47.4	RPD≤35%		3%	Yes
Antimony	SW-846 6010D	mg/kg	0.37	J			1	0.96	0.34	J			1	0.95	ABS DIF≤2xRL	0.03		Yes
Arsenic	SW-846 6010D	mg/kg	65.2		J	FD	1	0.96	223		J	FD	1	0.95	RPD≤35%		110%	RPD>35%
Barium	SW-846 6010D	mg/kg	101				1	0.48	102				1	0.47	RPD≤35%		1%	Yes
Beryllium	SW-846 6010D	mg/kg	0.25				1	0.24	0.21	J			1	0.24	ABS DIF≤2xRL	0.04		Yes
Cadmium	SW-846 6010D	mg/kg	9.8				1	0.14	9.2				1	0.14	RPD≤35%		6%	Yes
Calcium	SW-846 6010D	mg/kg	10,500				5	120	10,100				5	119	RPD≤35%		4%	Yes
Chromium	SW-846 6010D	mg/kg	3.7				5	2.4	3.4				5	2.4	ABS DIF≤2xRL	0.3		Yes
Cobalt	SW-846 6010D	mg/kg	7.0				1	0.48	8.2				1	0.47	RPD≤35%		16%	Yes
Copper	SW-846 6010D	mg/kg	75.8				1	0.48	62.0				1	0.47	RPD≤35%		20%	Yes
Iron	SW-846 6010D	mg/kg	21,600				5	23.9	24,100				5	23.7	RPD≤35%		11%	Yes
Lead	SW-846 6010D	mg/kg	1,680				5	2.4	1,960				5	2.4	RPD≤35%		15%	Yes
Magnesium	SW-846 6010D	mg/kg	3,900				1	23.9	4,080				1	23.7	RPD≤35%		5%	Yes
Manganese	SW-846 6010D	mg/kg	13,000				25	12.0	9,960				25	11.9	RPD≤35%		26%	Yes
Mercury	SW-846 7471B	mg/kg	0.16				1	0.018	0.16				1	0.018	RPD≤35%		0%	Yes
Molybdenum	SW-846 6010D	mg/kg	2.2				1	0.72	2.6				1	0.71	ABS DIF≤2xRL	0.4		Yes
Nickel	SW-846 6010D	mg/kg	5.0				1	0.96	5.5				1	0.95	RPD≤35%		10%	Yes
Potassium	SW-846 6010D	mg/kg	1,910				1	120	1,960				1	119	RPD≤35%		3%	Yes
Selenium	SW-846 6010D	mg/kg	<1.6	U,D3			5	4.8	<1.6	U,D3			5	4.7	ABS DIF≤2xRL	both U		Yes
Silver	SW-846 6010D	mg/kg	10				5	2.4	7.7				5	2.4	ABS DIF≤2xRL	2.3		Yes
Sodium	SW-846 6010D	mg/kg	41.8	J			1	47.8	40.2	J			1	47.4	ABS DIF≤2xRL	1.6		Yes
Thallium	SW-846 6010D	mg/kg	<1.4	U,D3			5	4.8	<1.4	U,D3			5	4.7	ABS DIF≤2xRL	both U		Yes
Vanadium	SW-846 6010D	mg/kg	19.5				1	0.72	20.0				1	0.71	RPD≤35%		3%	Yes
Zinc	SW-846 6010D	mg/kg	5,570				5	9.6	4,560				5	9.5	RPD≤35%		20%	Yes

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

The Qualifications made to the field duplicate samples (DV Flag/Reason Code) are not included in the summary of Qualifications made to natural samples discussed in the Data Validation Report.

Footnotes:

[1]Work order 10581049 has total and SPLP metals, and work order 10584587 has ABA analyses.

[2] If the control limit is an absolute difference less than the reporting limit, the minimum reporting limit will be used if the samples have varying dilution factors.

Abbreviations:

DF - dilution factor
ABS DIF - absolute difference
mg/kg - milligram per kilogram
RL - reporting limit
RPD - relative percent difference

Pace Laboratory Flags (Lab Flag)

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

U = Indicates the compound was analyzed for, but not detected.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Data Validation Reason Codes (Reason Code)

FD = Qualified due to field duplicate results outside of control limits.

Table 2. Field Duplicate Pair Samples with Results, Laboratory Flags, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Calculations

		Work Order[1]	10584587						10584587									
		Lab Sample ID	S2110016-001A						S2110016-002A									
		Field Sample ID	21WS-0010-SO6302-N-092121						21WS-0010-SO6302-D-092121									
		Sample Date	9/21/2021						9/21/2021									
		Sample Type	Natural						Field Duplicate									
Analyte	Method	Units	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Result	Lab Flag	DV Flag	Reason Code	DF	RL	Control Limit[2]	ABS DIF	RPD	Meets Control Limit?
Acid Base	M600/2-78-054 NV Mod	tons/1000	82.2		J	CC, MBX, L%	1	0.01	78.5		J	CC, MBX, L%	1	0.01	RPD≤35%		5%	Yes
HCL Extract Sulfur (Sulfate Sulfur)	M600/2-78-054 NV Mod	%	1.45		J	CC, FD	1	0.01	0.64		J	CC, FD	1	0.01	RPD≤35%		78%	RPD>35%
HCL Sulfur - LECO	M600/2-78-054 NV Mod	%	1.15		J	CC, FD	1	0.01	1.78		J	CC, FD	1	0.01	RPD≤35%		43%	RPD>35%
HNO3 Extract Sulfur (Pyritic Sulfur)	M600/2-78-054 NV Mod	%	0.79		J	CC, L%	1	0.01	1.07		J	CC, L%	1	0.01	RPD≤35%		30%	Yes
HNO3 Sulfur - LECO	M600/2-78-054 NV Mod	%	0.36		J	CC, L%, FD	1	0.01	0.71		J	CC, L%, FD	1	0.01	RPD≤35%		65%	RPD>35%
HNO3 Sulfur (Non-Ext. Sulfur)	M600/2-78-054 NV Mod	%	0.36		J	CC, L%, FD	1	0.01	0.71		J	CC, L%, FD	1	0.01	RPD≤35%		65%	RPD>35%
Hot Water Extract Sulfur (H2O Sol. SO4)	M600/2-78-054 NV Mod	%	0.04		J	CC, L%, FD	1	0.01	0.1		J	CC, L%, FD	1	0.01	ABS DIF≤2*RL	0.06		ABS DIFF>2*RL
Hot Water Sulfur - LECO	M600/2-78-054 NV Mod	%	2.59		J	CC, L%	1	0.01	2.41		J	CC, L%	1	0.01	RPD≤35%		7%	Yes
Pyritic Sulfur Acid Base	M600/2-78-054 NV Mod	tons/1000	24.7		J	CC, MBX, L%	1	0.01	33.4		J	CC, MBX, L%	1	0.01	RPD≤35%		30%	Yes
Pyritic Sulfur Acid Base Potential	M600/2-78-054 NV Mod	tons/1000	-1.57		J	CC, MBX, DX, L%, FD	1		-12.9		J	CC, MBX, DX, L%, FD	1		RPD≤35%		157%	RPD>35%
Acid/Base Potential	M600/2-78-054 NV Mod	tons/1000	-59.1		J	CC, MBX, DX, L%	1		-58		J	CC, MBX, DX, L%	1		RPD≤35%		2%	Yes
Neutralization Potential	M600/2-78-054 NV Mod	tons/1000	23.1		J	MBX, DX	1		20.6		J	MBX, DX	1		RPD≤35%		11%	Yes
Total Sulfur	M600/2-78-054 NV Mod	%	2.63		J	CC, MBX	1	0.01	2.51		J	CC, MBX	1	0.01	RPD≤35%		5%	Yes
pH	USDA 60-21a	SU	5.4				1	0.1	5.3				1	0.1	RPD≤35%		2%	Yes

Notes:

< - Not detected at method detection limit (Lab Flag = U) or reporting limit (Lab Flag = ND)

The Qualifications made to the field duplicate samples (DV Flag/Reason Code) are not included in the summary of Qualifications made to natural samples discussed in the Data Validation Report.

Footnotes:

[1]Work order 10581049 has total and SPLP metals, and work order 10584587 has ABA analyses.

[2] If the control limit is an absolute difference less than the reporting limit, the minimum reporting limit will be used if the samples have varying dilution factors.

Abbreviations:

DF - dilution factor	ABS DIF - absolute difference	tons/1000 - tons $CaCO_3$/1000 tons
RL - reporting limit	RPD - relative percent difference	SU - Standard unit

Data Validation Qualifiers (DV Flag)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Data Validation Reason Codes (Reason Code)

MBX = Qualified because preparation blank frequecy not met.

FD = Qualified due to field duplicate results outside of control limits.

CC = Qualified because correlation coefficient of instrument calibration was exceeded.

L% = Qualified due to percent recovery of the Laboratory Control Sample outisde of control limits.

DX = Qualified because lab duplicate frequecy not met.

Table 3. Sample Identification

Field Sample ID	Sample Type	Station	Work Order	Lab ID[1]	Sample Date	Total Metals[2]	SPLP[2]	ABA[2]
21WS-0002-SO6285-N-092021	Natural	SO6285	10581049	10581049001	9/20/2021	X		
21WS-0003-SO6294-N-092021	Natural	SO6294	10581049	10581049002	9/20/2021	X		
21WS-0010-SO6302-N-092121	Natural	SO6302	10581049	10581049003	9/21/2021	X	X	
			10584587	S2110016-001	9/21/2021			X
21WS-0010-SO6302-D-092121	Field Duplicate	SO6302	10581049	10581049004	9/21/2021	X	X	
			10584587	S2110016-002	9/21/2021			X
21WS-0013-SO6313-N-092121	Natural	SO6313	10581049	10581049005	9/21/2021	X		
21WS-0013-SO6313-D-092121	Field Duplicate	SO6313	10581049	10581049006	9/21/2021	X		
21WS-0016-SO6325-N-092221	Natural	SO6325	10581049	10581049007	9/22/2021	X		
21WS-0319-SO6332-N-092221	Natural	SO6332	10581049	10581049008	9/22/2021	X		
21WS-0296-SO6337-N-092321	Natural	SO6337	10581049	10581049009	9/23/2021	X		
21WS-0015-SO6346-N-092321	Natural	SO6346	10581049	10581049010	9/23/2021	X		
21WS-0015-SO6347-N-092321	Natural	SO6347	10581049	10581049011	9/23/2021	X		
21WS-0285-SO6366-N-092721	Natural	SO6366	10581049	10581049012	9/27/2021	X		
21WS-1116-SO6378-N-092721	Natural	SO6378	10581049	10581049013	9/27/2021	X	X	
			10584587	S2110016-003	9/27/2021			X
21WS-1072-SO6385-N-092821	Natural	SO6385	10581049	10581049014	9/28/2021	X		
21WS-1111-SO6399-N-092821	Natural	SO6399	10581049	10581049015	9/28/2021	X		
21WS-0162-SO6404-N-092821	Natural	SO6404	10581049	10581049016	9/28/2021	X		

Footnotes:

[1]Total metals and SPLP were analyzed by Pace in Minneapolis, MN on work order 10581049. Acid Base Accounting (ABA) was analyzed by Pace in Sheridan, WY on work order 10584587, and the Lab IDs begin with S2110016.

[2]Analysis Group:	Method:	Analytes:
Total Metals	ASTM D2974	Percent Moisture
	SW-846 6010D	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
	SW-846 7471B	Mercury
SPLP	SW-846 6010D	Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc
	SW-846 7470A	Mercury
ABA	M600/2-78-054 NV Mod	Acid Base Potential, Neutralization Potential, Total Sulfur, Acid Base, Hot Water Sulfur - LECO, Hot Water Extract Sulfur (H2O Sol. SO4), HCL Sulfur - LECO, HCL Extract Sulfur (Sulfate Sulfur), HNO3 Sulfur - LECO, HNO3 Sulfur (Non-Ext. Sulfur), HNO3 Extract Sulfur (Pyritic Sulfur), Pyritic Sulfur Acid Base, Pyritic Sulfur Acid Base Potential
	USDA 60-21a	pH

Attachment A
Data Validation Checklists

Stage 4 Data Validation Checklist for General Chemistry Sample Analysis

Site: West Side Soils Operable Unit	**Case No:** 10584587 (S2110016)	**Laboratory:** Pace Analytical
Project: WSSOU RI Sampling - 2021	**Sample Matrix:** Soil	**Analyses:** Total Sulfur, Acid Base, Neutralization Potential, Acid Base Potential, Hot Water Sulfur – LECO, Hot Water Extract Sulfur (H2O Sol. SO4), HCL Sulfur – LECO, HCL Extract Sulfur (Sulfate Sulfur), HNO3 Sulfur – LECO, HNO3 Sulfur (Non-Ext. Sulfur), HNO3 Extract Sulfur (Pyritic Sulfur), Pyritic Sulfur Acid Base, and Pyritic Sulfur Acid Base Potential
Sample Date(s): 9/21/2021, 9/27/2021	**Analysis Date(s):** 10/13/2021, 10/14/2021, 10/19/2021, 10/20/2021. 1/24/2022	
Data Validator: Sara Ward	**Validation Date(s):** 1/18/2022, 1/19/2022, 1/27/2022	

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Acid Base; Acid/Base Potential	Pace (Sheridan, WY)	Soil	EPA600/2-78-054	None	9/21/2021, 9/27/2021	1/24/2022	N/A	N/A
Neutralization Potential						10/13/2021		
Total Sulfur; Hot Water Sulfur – LECO; Hot Water Extract Sulfur (H2O Sol. SO4); HCL Sulfur – LECO; HCL Extract Sulfur (Sulfate Sulfur); HNO3 Sulfur – LECO; HNO3 Sulfur (Non-Ext. Sulfur); HNO3 Extract Sulfur (Pyritic Sulfur); Pyritic Sulfur Acid Base; and Pyritic Sulfur Acid Base Potential						10/14/2021, 10/19/2021, 10/20/2021, 1/24/2022		

*Reference for Holding Times –WSSOU RI QAPP (CDM, 2019)

Were any data flagged because of holding time?	Y [ ]	N [X]
Were any data flagged because of preservation problems?	Y [ ]	N [X]

Describe Any Actions Taken: None required

Comments: The receiving temperature was not reported by the laboratory. An email from Pace dated 6/2/2020 stated, "ABA does not have a temperature requirement." Email correspondence was included in 10519814, which was a WSSOU 2020 analytical data package. No qualifications were required.

Samples on this Work Order (WO) were assigned a WO of 10584587, and the Pace Network lab in Pace Sheridan, WY assigned a Lab Order number of S2110016 to this sample delivery group (SDG).

2. Instrument Calibration

Was Instrument successfully calibrated at the correct frequency?	Y	X	N		
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N		
Was Initial Calibration Verification sample analyzed?	Y		N	X	
Was ICV and Continuing Calibration Verifications (ICV) results within the control window?	Y		N		N/A
Were any data flagged because of calibration problems?	Y	X	N		

Describe Any Actions Taken: Three calibration standards are used to calibrate the LECO for analysis of Total and Extractable Sulfur. The results of the readings of the three calibration standards were outside the acceptable range on 10/14/2021 and 10/19/2021. All of the Total and Extractable Sulfur results were qualified "J/UJ" based on the calibration standards failure. The Acid Base, Acid Base Potential, Pyritic Sulfur Acid Base, and Pyritic Sulfur Acid Base Potential are calculated from Total Sulfur, HCL Sulfur, and HNO3 Sulfur; therefore, qualified "J".

Comments: For Method EPA600/2-78-054, an email from Pace dated 6/14/2021 stated that the Pace lab in Sheridan, WY "does not analyze ICV/CCV for this method" and provided "calibration reports for both of their instruments used during analysis." Email correspondence is included in the 10549759 analytical data package. No qualifications were required due to the lack of ICV/CCV.

3. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y		N	X	
Were MBs within the control window?	Y		N		N/A
Were any data flagged because of blank problems?	Y	X	N		

Describe Any Actions Taken: MBs were not reported for any analytes. Past data packages from Pace Sheridan, WY have included MBs for Total Sulfur and Neutralization Potential. Since MBs can be analyzed for these analytes, all samples were qualified "J" for Total Sulfur and Neutralization Potential for failure to meet MB frequency. The Acid Potential, Acid Base Potential, Pyritic Sulfur Acid Base, and Pyritic Sulfur Acid Base Potential are calculated from the Total Sulfur and Neutralization Potential; therefore, qualified "J".

Comments:

4. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N		
What was the source of the LCS?	Unknown				
Were LCS results within the control window?	Y		N	X	
Were any data flagged because of LCS problems?	Y	X	N		

Describe Any Actions Taken: The LCS was outside control limit (80-120%) for Hot Water Sulfur – LECO (77.5%) and HNO3 Sulfur – LECO (134%). All samples were qualified "J-" for Hot Water Sulfur – LECO and "J+" for HNO3 Sulfur – LECO. The Hot Water Extract Sulfur (H2O Sol. SO4) results are calculated using the Hot Water Sulfur – LECO results; therefore, all samples were qualified "J+" for Hot Water Extract Sulfur (H2O Sol. SO4). The HNO3 Sulfur (Non-Ext. Sulfur), HNO3 Extract Sulfur (Pyritic Sulfur), Acid Base, Acid Base Potential, Pyritic Sulfur Acid Base, and Pyritic Sulfur Acid Base Potential results are calculated using the HNO3 Sulfur – LECO results; therefore, all samples were qualified "J-" for HNO3 Sulfur (Non-Ext. Sulfur), HNO3 Extract Sulfur (Pyritic Sulfur), Acid Base, Acid Base Potential, Pyritic Sulfur Acid Base, and Pyritic Sulfur Acid Base Potential. All of the analytes qualified for the LCS failure had a previous qualification of "J"; therefore, the final qualifications were "J".

Comments: The LCS %Rs were within limits for HCL Sulfur – LECO, Neutralization Potential, and Total Sulfur.

5. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y		N	X	
Were LDS results within the control window?	Y		N		N/A
Were any data flagged because of LDS problems?	Y	X	N		

Describe Any Actions Taken: For Neutralization Potential, no LDS was reported. Past data packages from Pace Sheridan, WY have included LDS for Neutralization Potential. Since an LDS can be analyzed for Neutralization Potential, all samples were qualified "J" for Neutralization Potential for failure to meet LDS frequency. Acid Base Potential and Pyritic Sulfur Acid Base Potential are calculated from Neutralization Potential; therefore, also qualified "J". All of the analytes qualified for the LDS frequency not being met had a previous qualification of "J"; therefore, the final qualifications were "J".

Comments: There was no Laboratory Duplicate Samples (LDS) sample for Total Sulfur this work order (WO). However, a Field duplicate sample pair was submitted on this WO and assessed for precision. An email from Pace dated 6/14/2021 stated Pace lab in Sheridan, WY "there is not a duplicate analyzed in the LECO analysis." Email correspondence is included in the 10549759 analytical data package. Applying professional judgement, no qualifications were made for the lack of an LDS sample for Total and Extractable Sulfur.

6. Matrix Spike Sample Results

Were Laboratory Matrix Spike (LMS) samples analyzed at the frequency of 1 per batch?	Y		N		N/A	X	
Were LMS results within the control window?	Y		N		N/A	X	
Were any data flagged because of LMS problems?	Y		N		N/A	X	

Describe Any Actions Taken: None required

Comments: LMS samples are not performed for the EPA600/2-78-054 method.

7. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X	
Were field blanks within the control window?	Y		N		N/A	X	
Were any data qualified because of field blank problems?	Y		N		N/A	X	

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

8. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: The field duplicate and parent sample results for the following analytes were greater than 5 times the Reporting Limit (RL) and had a Relative Percent Difference (RPD) outside the control limits (35%). Therefore, the following table lists analytes that had field duplicate results outside the control limits. The parent sample and field duplicate samples were qualified as indicated:

Analyte	RPD	DV flag	Field duplicate sample	Parent sample
HCL Extract Sulfur (Sulfate Sulfur)	78%	J	21WS-0010-SO6302-D-092121	21WS-0010-SO6302-N-092121
HCL Sulfur – LECO	43%	J		
HNO3 Sulfur – LECO	65%	J		
HNO3 Sulfur (Non-Ext. Sulfur)	65%	J		
Pyritic Sulfur Acid Base Potential	157%	J		

The field duplicate and parent sample results for the following analytes were less than 5 times the RL and the absolute difference between the original and duplicate results were greater than 2 times the RL. Therefore, the following table lists analytes that had field duplicate results outside the control limits. The parent sample and field duplicate samples were qualified as indicated. For results that were reported non-detect, the results were qualified "UJ".

Analyte	RL (mg/kg)	Absolute Difference (mg/kg)	DV flag	Field duplicate sample	Parent sample
Hot Water Extract Sulfur (H2O Sol. SO4)	0.01	0.06	J	21WS-0010-SO6302-D-092121	21WS-0010-SO6302-N-092121

All of the analytes qualified for the field duplicate results outside the control limits had a previous qualification of "J"; therefore, the final qualifications were "J". No other samples on this work order (WO) were considered sufficiently similar enough to require additional qualifications.

Comments:

9. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On WO 10584587(S2110016), the following qualifications were made:

Natural Samples:

Field ID	Analyte	Final Qualification	Reason Code
21WS-0010-SO6302-N-092121	Total Sulfur	J	CC, MBX
21WS-0010-SO6302-N-092121	Acid Base	J	CC, MBX, L%
21WS-0010-SO6302-N-092121	Neutralization Potential	J	MBX, DX
21WS-0010-SO6302-N-092121	Acid Base Potential	J	CC, MBX, DX, L%
21WS-0010-SO6302-N-092121	Hot Water Sulfur - LECO	J	CC, L%
21WS-0010-SO6302-N-092121	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%, FD
21WS-0010-SO6302-N-092121	HCL Sulfur – LECO	J	CC, FD
21WS-0010-SO6302-N-092121	HCL Extract Sulfur (Sulfate Sulfur)	J	CC, FD
21WS-0010-SO6302-N-092121	HNO3 Sulfur - LECO	J	CC, L%, FD
21WS-0010-SO6302-N-092121	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%, FD
21WS-0010-SO6302-N-092121	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC, L%
21WS-0010-SO6302-N-092121	Pyritic Sulfur Acid Base	J	CC, MBX, L%
21WS-0010-SO6302-N-092121	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%, FD
21WS-1116-SO6378-N-092721	Total Sulfur	J	CC, MBX
21WS-1116-SO6378-N-092721	Acid Base	J	CC, MBX, L%
21WS-1116-SO6378-N-092721	Neutralization Potential	J	MBX, DX
21WS-1116-SO6378-N-092721	Acid Base Potential	J	CC, MBX, DX, L%
21WS-1116-SO6378-N-092721	Hot Water Sulfur - LECO	J	CC, L%
21WS-1116-SO6378-N-092721	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%
21WS-1116-SO6378-N-092721	HCL Sulfur – LECO	J	CC
21WS-1116-SO6378-N-092721	HCL Extract Sulfur (Sulfate Sulfur)	UJ	CC
21WS-1116-SO6378-N-092721	HNO3 Sulfur - LECO	J	CC, L%
21WS-1116-SO6378-N-092721	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC, L%
21WS-1116-SO6378-N-092721	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC, L%
21WS-1116-SO6378-N-092721	Pyritic Sulfur Acid Base	J	CC, MBX, L%
21WS-1116-SO6378-N-092721	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%

Field Duplicate Samples:

Field ID	Analyte	Final Qualification	Reason Code
21WS-0010-SO6302-D-092121	Total Sulfur	J	CC, MBX
21WS-0010-SO6302-D-092121	Acid Base	J	CC, MBX, L%
21WS-0010-SO6302-D-092121	Neutralization Potential	J	MBX, DX
21WS-0010-SO6302-D-092121	Acid Base Potential	J	CC, MBX, DX, L%
21WS-0010-SO6302-D-092121	Hot Water Sulfur - LECO	J	CC, L%
21WS-0010-SO6302-D-092121	Hot Water Extract Sulfur (H2O Sol. SO4)	J	CC, L%, FD
21WS-0010-SO6302-D-092121	HCL Sulfur – LECO	J	CC, FD
21WS-0010-SO6302-D-092121	HCL Extract Sulfur (Sulfate Sulfur)	J	CC, FD
21WS-0010-SO6302-D-092121	HNO3 Sulfur - LECO	J	CC, L%, FD
21WS-0010-SO6302-D-092121	HNO3 Sulfur (Non-Ext. Sulfur)	J	CC. L%, FD
21WS-0010-SO6302-D-092121	HNO3 Extract Sulfur (Pyritic Sulfur)	J	CC. L%
21WS-0010-SO6302-D-092121	Pyritic Sulfur Acid Base	J	CC, MBX. L%
21WS-0010-SO6302-D-092121	Pyritic Sulfur Acid Base Potential	J	CC, MBX, DX, L%, FD

Reason for qualification:
CC = Calibration Standard
MBX = Method Blank Frequency
L% = Laboratory Control Samples
DX = Laboratory Duplicate Frequency
FD = Field Duplicate

Comments:

10. Authorization of Data Validation

Data Validator

Name: Sara Ward **Reviewed by:** Josie McElroy

Signature: Sara Ward Josie McElroy

Date: 1/28/2022 2/3/2022

From: Jennifer Anderson
To: Josie M. McElroy
Cc: Laura Moon; Cole Dallaserra
Subject: RE: Missing Level IV Results
Date: Thursday, June 24, 2021 10:16:10 AM
Attachments: image001.png
10549759_frc.pdf

This sender is trusted.

Good Morning Josie,

Attached is the revised report including the additional documents, these are included at the end of the report.

Please let me know if anything else is needed.

Have a great day!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Pace Analytical will be closed on Monday, July 5th in observance of Independence Day. Please work with your project manager to schedule any rush or short hold analyses around this date.

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Jennifer Anderson
Sent: Wednesday, June 23, 2021 4:56 PM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

My apologies for the delay! I've been in meetings this afternoon, but will work on getting the report revised to include the additional documents.

Hope you're having a nice day too!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Pace Analytical will be closed on Monday, July 5th in observance of Independence Day. Please work with your project manager to schedule any rush or short hold analyses around this date.

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Sent: Wednesday, June 23, 2021 12:23 PM
To: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Jennifer,

Sorry for just getting back to you. I was wondering if you could send the original report revised with the attached documents from Sheridan lab?

Hope you are having a nice day!

Thank you,
Josie

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Monday, June 14, 2021 4:04 PM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

I heard back from the Sheridan lab regarding this information. They do not analyze ICV/CCV or ICB/CCB for these methods, there also is not a duplicate analyzed in the Leco analysis. They were able to provide calibration reports for both of their instruments used during analysis and method

blank reports for the neutralization potential. I've attached these documents, please let me know if it would work best to revise the original report sent to include these as attachments or if they are okay as separate documents.

Please let me know if there is any other information needed.

Hope you're having a great day!

Thanks!
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Jennifer Anderson
Sent: Tuesday, June 1, 2021 10:36 AM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

I hope you had a nice weekend too!

I am still waiting on this from the Sheridan lab, I sent them a request earlier this morning for an update and will let you know what I find out.

My apologies for the delay!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Sent: Tuesday, June 1, 2021 10:34 AM
To: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hello Jennifer,

I hope you had a nice three day weekend. I just wanted to follow up with you on the status of the Level IV report for Pace Project Number 10549759, Project: West Side Soils, from Pace Sheridan, WY.

Thank you,
Josie

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Monday, May 17, 2021 3:20 PM
To: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: RE: Missing Level IV Results

Hi Josie,

I will send this to the Sheridan lab for review and let you know what I find out.

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Pace Analytical Minneapolis will be closed on Monday, May 31st in observance of Memorial Day. Please work with your project manager to schedule any rush or short hold analyses around this date.

If you are submitting work under the MPCA Admin contract, please schedule sampling to occur by June 16th to ensure all analyses complete within the fiscal year.

From: Josie M. McElroy <jmmcelroy@pioneer-technical.com>
Sent: Monday, May 17, 2021 1:58 PM
To: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>

Cc: Laura Moon <lmoon@pioneer-technical.com>; Cole Dallaserra <cdallaserra@pioneer-technical.com>
Subject: Missing Level IV Results

Hello Jennifer,

The Level IV report for Pace Project Number 10549759, Project: West Side Soils, from Pace Sheridan, WY is missing some Level IV results for the ABA analysis that was previously provided by Pace Billings lab. Attached is a Pace Billings lab report we received last year that contains samples analyzed for Method Modified Sobek 3.2. The following QC samples/results were missing from the Pace Sheridan, WY lab report that were previously provided by Pace Billings lab:

For Neutralization Potential analyses

- Prep Log Report: For samples and calibration standards
- ICV/CCV- Analyte in Billings Level 4 report was pH at 25 Degrees C
- Method Blank

For Sulfur analyses:

- Low and high Sulfur calibration tables along with the Sulfur Correlation Coefficient Verification Spreadsheet
- ICV/CCV
- ICB/CCB
- Laboratory duplicate Samples

Could you send a revised Level IV report of 10549759, also referred to as S2103084 by Pace Sheridan, WY, to include the missing Level IV results for the ABA analysis?

Thank you,
Josie McElroy

Please consider the environment before printing this email

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Please consider the environment before printing this email

From: Stewart Smith
To: Jennifer Anderson
Cc: Pat Sampson
Subject: RE: Samples Received West Side Soils Pace Project 10519814
Date: Tuesday, June 2, 2020 7:05:23 PM
Attachments: image001.png
image002.png

Jennifer-

Please analyze the samples submitted on Pace Project 10519814 for all of the requested analytes, including total mercury. Thank you.

Stewart Smith

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Tuesday, June 2, 2020 7:06 AM
To: Stewart Smith <ssmith@pioneer-technical.com>; Pat Sampson <psampson@Pioneer-technical.com>
Subject: RE: Samples Received West Side Soils Pace Project 10519814

Good Morning Stewart,

That is correct, Hg is the only analyte requested that is temperature sensitive. I confirmed with the lab that ABA does not have a temperature requirement.

Since Pace covers the shipping, we do reach out to FedEx regarding delays. Unfortunately, delays are typically caused by issues that are beyond their control. We do ship ground within the state due to it typically being faster than express. Express shipping would ship the coolers from Montana to their Memphis hub, then back to Montana. Ground will transport within the state next day. We did have some other coolers that were shipped express by other consultants within Montana to our Minneapolis location that were also delayed so it was an issue with FedEx unfortunately.

Please let me know if you'd prefer to cancel the Hg analysis.

Have a great day!

Thanks,
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

From: Stewart Smith <ssmith@pioneer-technical.com>
Sent: Monday, June 1, 2020 7:26 PM

Site: West Side Soils Operable Unit	**Case No:** 10581049	**Laboratory:** Pace Analytical
Project: WSSOU RI Sampling - 2021	**Sample Matrix:** Soil	**Analyses:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Mercury Percent Moisture
Sample Date(s): 9/20/2021, 9/21/2021, 9/22/2021, 9/23/2021, 9/27/2021, 9/28/2021	**Analysis Date(s):** 10/4/2021, 10/6/2021, 10/12/2021, 10/13/2021, 10/18/2021, 10/19/2021, 10/21/2021	
Data Validator: Sara Ward	**Validation Date(s):** 1/14/2021, 1/17/2021	

1. Holding Times

Analyte(s)	Laboratory	Matrix	Method	Holding Times*	Collection Date(s)	Batch	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	Soil	SW-846 6010D	6 months	9/20/2021, 9/21/2021, 9/22/2021, 9/23/2021, 9/27/2021, 9/28/2021	774139, 776434, 777091, 777806	10/12/2021, 10/13/2021, 10/18/2021, 10/19/2021, 10/21/2021	Y	N/A
Hg			EPA 7471B	28 days		774147, 774825	10/13/2021	Y	N/A
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	Pace	SPLP	SW-846 6010D	6 months		774873	10/12/2021	Y	N/A
Hg			EPA 7470A	28 days		774874	10/12/2021	Y	N/A
Percent Moisture	Pace	Soil	ASTM D2974	None		774193, 774801	10/4/2021, 10/6/2021	Y	N/A

*Reference for Holding Times –WSSOU RI QAPP (CDM,2019)

Were any data flagged because of holding time?	Y		N	X
Were any data flagged because of preservation problems?	Y		N	X

Describe Any Actions Taken: None Required.

Comments: The receiving temperature as reported by the laboratory on 9/30/2021 was 5.0°C. The samples were shipped on ice and analyzed within holding time. On the sample conditional upon receipt exception form, it was noted that samples 21WS-1072-SO6385-N-092821, 21WS-1111-SO6399-N-092821, and 21WS-0162-SO6404-N-092821 were missing. The missing samples were delivered to the laboratory on 10/5/2021 with a receiving temperature reported as 3.5°C. The samples were shipped on ice and analyzed within holding time.

2. Instrument Calibration

Was the Tune analysis performed?	Y		N		N/A	X
Was the peak widths and resolution of the masses within the required control limits?	Y		N		N/A	X
Was the percent relative standard deviation ≤ 5% for all analytes in the Tune solutions?	Y		N		N/A	X
Was Instrument successfully calibrated at the correct frequency?	Y	X	N			
Was Instrument calibrated with appropriate standards and blanks?	Y	X	N			
Was Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) samples analyzed?	Y	X	N			
Were ICV and CCV results within the control window?	Y	X	N			
Were any data flagged because of calibration problems?	Y		N	X		

Describe Any Actions Taken: None Required.

Comments: All %Rs for ICV and CCV are within the control limits.

3. Blanks

Were Initial and Continuing Calibration Blanks (ICB and CCBs) analyzed?	Y	X	N	
Were ICBs and CCBs within the control window?	Y		N	X
Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch?	Y	X	N	
Were MBs within the control window?	Y		N	X
Were any data flagged because of blank problems?	Y	X	N	

Describe Any Actions Taken:

On 10/18/2021, there were detections of beryllium in bracketing CCBs (0.24 ug/L and 0.2 ug/L) greater than 2 times the instrument detection limit (0.192 ug/L). The beryllium result for sample 21WS-1116-SO6378-N-092721 was less than 5 times the detections (1.2 ug/L and 1 ug/L, respectively) of the bracketing CCBs; therefore, was qualified "U" for beryllium.

SPLP batch 774873 had a detection of barium in the MB (0.0011 mg/L) and Leachate Blank (0.0012 mg/L) greater than 2 times the method detection limit (0.00038 mg/L). Sample 21WS-0010-SO6302-N-092121 had a detected results less than 5 times the barium detection in the MB (0.0055 mg/L) and Leachate Blank (0.006 mg/L); therefore, was qualified "U" for barium, SPLP.

SPLP batch 774873 had a detection of sodium in the MB (2.3 mg/L) and Leachate Blank (2.3 mg/L) greater than 2 times the method detection limit (0.132 mg/L). Samples 21WS-0010-SO6302-N-092121, 21WS-0010-SO6302-D-092121, and 21WS-1116-SO6378-N-092721 had detected results less than 5 times the sodium detection in the MB (11.5 mg/L) and Leachate Blank (11.5 mg/L); therefore, were qualified "U" for sodium, SPLP.

Comments:

On 10/12/2021, bracketing CCBs had detections of beryllium (0.14 ug/L, 0.13 ug/L, 0.1 ug/L, 0.18 ug/L, and 0.1 ug/L), lead (2.6 ug/L), and zinc (4.8 ug/L) less than 2 times the instrument detection limits (0.192 ug/L, 4 ug/L, and 8.8 ug/L, respectively). No qualifications were warranted.

On 10/12/2021, bracketing CCBs had detections of manganese (2.1 ug/L and 0.54 ug/L), with one CCB detection greater than 2 times the instrument detection limit (0.92 ug/L). All sample results were greater than 5 times the manganese detection (11 ug/L); therefore, no qualifications were warranted.

SPLP batch 774873 had detections of iron in the MB (0.021 mg/L) less than 2 times the method detection limits (0.022 mg/L); therefore, no qualifications were warranted.

SPLP batch 774873 had detections of zinc in the MB (0.005 mg/L) and Leachate Blank (0.0054 mg/L) less than 2 times the method detection limits (0.0062 mg/L); therefore, no qualifications were warranted.

SPLP batch 774873 had a detection of calcium in the MB (0.27 mg/L) and Leachate Blank (0.28 mg/L) greater than 2 times the method detection limit (0.046 mg/L). All sample results were greater than 5 times the calcium detections (1.4 mg/L); therefore, no qualifications were warranted.

SPLP batch 774873 had a detection of magnesium in the MB (0.038 mg/L) and Leachate Blank (0.04 mg/L) greater than 2 times the method detection limit (0.0156 mg/L). All sample results were greater than 5 times the magnesium detections (0.2 mg/L); therefore, no qualifications were warranted.

SPLP batch 774873 had a detection of manganese in the MB (0.018 mg/L) and Leachate Blank (0.02 mg/L) greater than 2 times the method detection limit (0.00038 mg/L). All sample results were greater than 5 times the manganese detections (0.1 mg/L); therefore, no qualifications were warranted.

Total metals batch 774139 had a detection of copper in the MB (0.096 mg/kg) less than 2 times the method detection limit (0.136 mg/kg); therefore, no qualifications were warranted.

On 10/18/2021, there were detections of beryllium in bracketing CCBs (0.2 ug/L, 0.21 ug/L, and 0.21 ug/L) greater than 2 times the instrument detection limit (0.192 ug/L). Sample results were greater than 5 times the beryllium detections (1 ug/L, 1.05 ug/L, and 1.05 ug/L), unless mentioned above; therefore, no qualifications were warranted.

On 10/18/2021, a bracketing CCB had a detection of barium (1.3 ug/L) greater than 2 times the instrument detection limit (0.6 ug/L). All sample results were greater than 5 times the barium detection (6.5 ug/L); therefore, no qualifications were warranted.

On 10/18/2021, a bracketing CCB had detections of cobalt (0.83 ug/L) and zinc (6.2 ug/L) less than 2 times the instrument detection limits (1.36 ug/L and 8.8 ug/L, respectively). No qualifications were warranted.

On 10/18/2021, bracketing CCBs had detections of manganese (4.1 ug/L, 1.5 ug/L and 0.5 ug/L), with two CCB detections greater than 2 times the instrument detection limit (0.92 ug/L). All sample results were greater than 5 times the manganese detection (21 ug/L); therefore, no qualifications were warranted.

Total metals batch 777091 had a detection of manganese in the MB (0.053 mg/kg) greater than 2 times the method detection limit (0.044 mg/L). All sample results were greater than 5 times the manganese detection (0.265 mg/kg); therefore, no qualifications were warranted.

4. Interference Check Samples

Were ICP Interference Check Samples (ICS) within the control limits?	Y		N	X
Were any data flagged because of ICS problems?	Y		N	X

Describe Any Actions Take: None Required.

Comments: On 10/12/2021, the ICS Solution A at 8:42 had detections of barium, cobalt, manganese, nickel, silver, and vanadium greater than the MDL and negative beryllium, cadmium, and chromium detections with absolute values greater than the MDL. The ICS Solution AB at 8:46 had a detection of molybdenum greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/12/2021, the ICS Solution A at 14:38 had detections of arsenic, barium, beryllium, cobalt, lead, manganese, nickel, silver, and vanadium greater than the MDL and negative cadmium and chromium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/13/2021, the ICS Solution A at 13:34 had detections of barium, cobalt, manganese, nickel, silver, thallium, and vanadium greater than the MDL and negative cadmium and chromium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/13/2021, the ICS Solution A at 16:18 had detections of antimony, arsenic, barium, beryllium, cobalt, copper, manganese, nickel, silver, and vanadium greater than the MDL and a negative cadmium detection with an absolute value greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/18/2021, the ICS Solution A at 9:38 had detections of barium, beryllium, manganese, nickel, silver, thallium, and vanadium greater than the MDL and negative cadmium, chromium, and selenium detections with absolute values greater than the MDL. The ICS Solution AB at 9:42 had a detection of molybdenum greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/18/2021, the ICS Solution A at 14:37 had detections of barium, beryllium, cobalt, manganese, nickel, and silver greater than the MDL. The ICS Solution AB at 14:39 had a detection of molybdenum greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria

On 10/19/2021, the ICS Solution A at 9:01 had detections of barium, cobalt, manganese, nickel, and silver greater than the MDL and negative cadmium and chromium detections with absolute values greater than the MDL. The ICS Solution AB at 9:03 had detections of molybdenum and sodium greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/19/2021, the ICS Solution A at 14:27 had detections of barium, beryllium, cobalt, manganese, nickel, silver, sodium, and vanadium greater than the MDL and a negative cadmium detection with an absolute value greater than the MDL. The ICS Solution AB at 14:29 had a detection of sodium greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/21/2021, the ICS Solution A at 8:49 had detections of barium, beryllium, cobalt, lead, manganese, and silver greater than the MDL and a negative cadmium detection with an absolute value greater than the MDL. The ICS Solution AB at 8:51 had a detection of molybdenum greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

On 10/21/2021, the ICS Solution A at 17:16 had detections of arsenic, barium, beryllium, cobalt, manganese, and silver greater than the MDL and negative cadmium and vanadium detections with absolute values greater than the MDL. The levels of interferents in the sample results were not comparable to the levels in the ICS solutions; therefore, no qualifications are warranted. The percent recoveries for the interference check samples (Solutions A and AB) were within control criteria.

5. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch?	Y	X	N	
What was the source of the LCS?	Unknown			
Were LCS results within the control window?	Y	X	N	
Were any data flagged because of LCS problems?	Y		N	X

Describe Any Actions Taken: None Required.

Comments: All %Rs are within the control limits.

6. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None Required.

Comments: For total metals batch 774139, an LMS/LMSD generated from 21WS-0002-SO6285-N-092021 was used for the LDS calculation. The RPD results were within control limits.

For SPLP metals batch 774873, an LMS/LMSD generated from 21WS-0010-SO6302-N-092121 was used for the LDS calculation. The RPD results were within control limits.

For total metals batch 776434, an LMS/LMSD generated from 21WS-0015-SO6346-N-092321 was used for the LDS calculation. The RPD results were within control limits.

For total metals batch 777091, an LMS/LMSD generated from 21WS-0010-SO6302-N-092121 was used for the LDS calculation. The RPD results were within control limits.

For total metals batch 777806, an LMS/LMSD generated from 21WS-0162-SO6404-N-092821 was used for the LDS calculation. The RPD results were within control limits.

For SPLP mercury batch 774874, an LMS/LMSD generated from 21WS-0010-SO6302-N-092121 was used for the LDS calculation. The RPD result was within control limits.

Fort total mercury batch 774147, an LMS/LMSD generated from 21WS-0002-SO6285-N-092021 was used for the LDS calculation. The RPD result was within control limits.

Fort total mercury batch 774825, an LMS/LMSD generated from 21WS-0010-SO6302-N-092121 was used for the LDS calculation. The RPD result was within control limits.

For percent moisture batch 774193, a duplicate generated from 21WS-0002-SO6285-N-092021 and a duplicate generated from a sample not from this work order were used for the LDS calculations. The RPD results were within control limits.

For percent moisture batch 774801, a duplicate generated from a sample not from this work order were used for the LDS calculation. The RPD result was within control limits.

7. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS percent recovery (%R) results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken:

For total metals batch 774139, the LMS/LMS Duplicate (LMSD) were generated from 21WS-0002-SO6285-N-092021. The %R of the LMS/LMSD for antimony (49%and 46%, respectively) were outside control limits (75-125%). The original sample concentration of antimony was less than 4 times the spike added, and the post digestion spike (PDS) for antimony (77.2%) was within control limits. 21WS-0002-SO6285-N-092021 was qualified "UJ" for antimony. Per the NFG, "*For a spike sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar"* (EPA, 2020). No samples are considered sufficiently similar; therefore, no additional qualifications were warranted.

For total metals batch 777091, the LMS/LMS Duplicate (LMSD) were generated from 21WS-0010-SO6302-N-092121. The %R of the LMS/LMSD aluminum (156% and 193%, respectively), antimony (63% and 64%, respectively), potassium (57% and 62%, respectively), LMS for barium (36%), cadmium (63%), copper (67%), molybdenum (72%), and LMSD for magnesium (62%) were outside control limits (75-125%). The original sample concentration of aluminum, antimony, barium, cadmium, copper, magnesium, molybdenum, and potassium were less than 4 times the spike added. The PDS for aluminum (96.8%), antimony (83.7%), barium (87.9%), cadmium (85.3%), copper (93.2%), magnesium (93.2%), molybdenum (90.8%), and potassium (96.5%) were within control limits. The following table list the qualifications made:

Sample ID	Analyte	Result (mg/kg)	Qualification
21WS-0010-SO6302-N-092121	Aluminum	3390	J
21WS-0010-SO6302-N-092121	Antimony	ND	UJ
21WS-0010-SO6302-N-092121	Barium	51.4	J
21WS-0010-SO6302-N-092121	Cadmium	55.1	J
21WS-0010-SO6302-N-092121	Copper	128	J
21WS-0010-SO6302-N-092121	Magnesium	2960	J
21WS-0010-SO6302-N-092121	Molybdenum	76.1	J
21WS-0010-SO6302-N-092121	Potassium	1280	J

Sample 21WS-0010-SO6302-D-092121 is considered sufficiently similar; therefore, the following qualification were made:

Sample ID	Analyte	Result (mg/kg)	Qualification
21WS-0010-SO6302-D-092121	Aluminum	2970	J
21WS-0010-SO6302-D-092121	Antimony	2.4	J
21WS-0010-SO6302-D-092121	Barium	50.4	J
21WS-0010-SO6302-D-092121	Cadmium	52.9	J
21WS-0010-SO6302-D-092121	Copper	159	J
21WS-0010-SO6302-D-092121	Magnesium	2530	J
21WS-0010-SO6302-D-092121	Molybdenum	60.7	J
21WS-0010-SO6302-D-092121	Potassium	895	J

For total mercury batch 774825, the LMS/LMSD was generated from 21WS-0010-SO6302-N-092121. The %R of the LMSD for mercury (74%) was outside the control limits (75-125%). The total mercury results for 21-WS-0010-SO6302-N-092121 was qualified "J-". 21WS-0010-SO6302-D-092121 is considered sufficiently similar; therefore, qualified "J-" for mercury.

Comments:

For total metals batch 774139, the LMS/LMS Duplicate (LMSD) were generated from 21WS-0002-SO6285-N-092021. The %R of the LMS/LMSD for aluminum (312% and 310%, respectively), iron (159% and 197%, respectively), magnesium (136% and 137%, respectively), and LMS for barium (329%) and manganese (147%) were outside control limits (75-125%). Per the NFG "*spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet the acceptance criteria*." (EPA, 2020). The original sample concentrations of aluminum, barium, iron, magnesium, and manganese were greater than 4 times the spike added; therefore, no qualifications for these analytes were warranted.

For total metals batch 777091, the LMS/LMS Duplicate (LMSD) were generated from 21WS-0010-SO6302-N-092121. The %R of the LMS/LMSD for arsenic (-23% and 2%, respectively), iron (-571% and -291%, respectively), lead (791% and -455%, respectively), manganese (53600% and -42900%, respectively), and zinc (-7130% and -33300%, respectively) were outside control limits (75-125%). The original sample concentrations of arsenic, iron, lead, manganese, and zinc were greater than 4 times the spike added; therefore, no qualifications for these analytes were warranted.

For SPLP metals batch 774873, the LMS/LMSD was generated from 21WS-0010-SO6302-N-092121. The LMSD %R for Manganese (138%) was outside the control limits (75-125%). The original sample concentration of manganese was greater than 4 times the added spike; therefore, no qualifications are warranted. All other %Rs were within control limits.

For total metals batch 776434, the LMS/LMSD was generated from 21WS-0015-SO6346-N-092321. The %Rs of the LMS/LMSD were within the control limits.

For total metals batch 777806, the LMS/LMSD was generated from 21WS-0162-SO6404-N-092821. The %Rs of the LMS/LMSD were within the control limits.

For SPLP mercury batch 774874, the LMS/LMSD was generated from 21WS-0010-SO6302-N-092121. The %Rs of the LMS/LMSD were within the control limits.

For total mercury batch 774147, the LMS/LMSD was generated from 21WS-0002-SO6285-N-092021. The %Rs of the LMS/LMSD were within the control limits.

8. ICP Serial Dilutions

Were ICP Serial Dilutions (SD) analyzed at the frequency of 1 per batch?	Y	X	N	
Were SD percent differences (%D) results within the control window?	Y		N	X
Were any data flagged because of SD problems?	Y	X	N	

Describe Any Actions Taken: For total metals batch 774139, 21WS-0002-SO6285-N-092021 was used to generate the SD. The %D for aluminum (14.2%), arsenic (17.0%), barium (16.8%), calcium (11.6%), chromium (14.2%), cobalt (23.1%), lead (19.0%), magnesium (12.0%), manganese (19.1%), nickel (16.4%), vanadium (11.8%), and zinc (19.8%) were outside the control limits (10%). The sample concentrations were greater than 50 times the MDL and the SD concentration was greater than the reporting limits; therefore, the following table lists the qualifications made:

Sample ID	Analyte	%D	Qualification
21WS-0002-SO6285-N-092021	Aluminum	14.2%	J
21WS-0002-SO6285-N-092021	Arsenic	17.0%	J
21WS-0002-SO6285-N-092021	Barium	16.8%	J
21WS-0002-SO6285-N-092021	Calcium	11.6%	J
21WS-0002-SO6285-N-092021	Chromium	14.2%	J
21WS-0002-SO6285-N-092021	Cobalt	23.1%	J
21WS-0002-SO6285-N-092021	Lead	19.0%	J
21WS-0002-SO6285-N-092021	Magnesium	12.0%	J
21WS-0002-SO6285-N-092021	Manganese	19.1%	J
21WS-0002-SO6285-N-092021	Nickel	16.4%	J
21WS-0002-SO6285-N-092021	Vanadium	11.8%	J
21WS-0002-SO6285-N-092021	Zinc	19.8%	J

Per the NFG, "*For a SD that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar"* (EPA, 2020). No samples are considered sufficiently similar; therefore, no additional qualifications were warranted.

For total metals batch 777091, 21WS-0010-SO6302-N-092121 was used to generate the SD. The %D for cadmium (11.5%), iron (15.2%), lead (11.0%), molybdenum (10.4%), and zinc (13.9%). The sample concentrations were greater than 50 times the MDL and the SD concentrations were less than the reporting limits; therefore, the following table lists the qualifications made:

Sample ID	Analyte	%D	Qualification
21WS-0010-SO6302-N-092121	Cadmium	11.5%	J
21WS-0010-SO6302-N-092121	Iron	15.2%	J
21WS-0010-SO6302-N-092121	Lead	11.0%	J
21WS-0010-SO6302-N-092121	Molybdenum	10.4%	J
21WS-0010-SO6302-N-092121	Zinc	13.9%	J

Sample 21WS-0010-SO6302-D-092121 is considered sufficiently similar; therefore, results for cadmium, iron, lead, molybdenum, and zinc were qualified "J". The cadmium and molybdenum results for 21WS-0010-SO6302-N-092121 and 21WS-0010-SO6302-D-092121 had a previous qualification of "J" due to the LMS/LMSD %R; therefore, the final qualification is "J".

Comments: For total metals batch 774139, 21WS-0002-SO6285-N-092021 was used to generate the SD. The %D for, cadmium (38.4%) was outside the control limits (10%); however, the sample concentration was less than 50 times the MDL and the SD concentration was less than the reporting limit. No qualifications were required.

For total metals batch 777091, 21WS-0010-SO6302-N-092121 was used to generate the SD. The %D for nickel (13.8%) and sodium (10.1%) were outside the control limits (10%); however, the sample concentrations were less than 50 times the MDL and the SD concentration was less than the reporting limit. No qualifications were required.

For SPLP metals batch 774873, 21WS-0010-SO6302-N-092121 was used to generate the SD. The %D for barium (17.7%) outside the control limits (10%); however, the sample concentration was less than 50 times the MDL and the SD concentration was less than the reporting limit. No qualifications were required.

For total metals batch 776434, 21WS-0015-SO6346-N-092321 was used to generate the SD. The %D was within control limits.

For total metals batch 777806, 21WS-0162-SO6404-N-092821 was used to generate the SD. The %D was within control limits.

9. Internal Standards

Were internal standards added to each sample in the analytical batch?	Y	X	N	
Were the percent relative recoveries (%RI) within the control window?	Y	X	N	
Were any data flagged because of internal standard problems?	Y		N	X

Describe Any Actions Taken: None required

Comments: Internal standard used for SW-846 6010D in WO 10580493 was Y. In the analytical runs, the Calibration 0 %RI equaled 100%. The remaining %RI ranged from 86% to 117%, which is within control limits (60-125%).

10. Field Blanks

Were field blanks submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: Single-use disposable sampling equipment was used. The collection of a field blank was not required.

11. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y	X	N		N/A	
Were the field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: Two field duplicate pairs were submitted on this work order. For the first pair, 21WS-0010-SO6302-N-092121 and 21WS-0010-SO6302-D-092121, the lead SPLP results were less than 5 times the reporting limit for the field duplicate, but the absolute difference between the natural sample and field duplicate was greater than 2 times the reporting limit. The lead SPLP results for 21WS-0010-SO6302-N-092121 and 21WS-010-SO6302-D-092121 were qualified "J". Per the NFG, "*For a duplicate sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar"* (EPA, 2020). No samples were considered sufficiently similar; therefore, no additional qualifications were warranted.

For the second pair, 21WS-0013-SO6313-N-092121 and 21WS-0013-SO6313-D-092121, the total arsenic results were greater than 5 times the reporting limit for the natural sample and field duplicate, but the %RPD (109.5%) was outside control limits (35%). The total arsenic results for 21WS-0013-SO6313-N-092121 and 21WS-0013-SO6313-D-092121 were qualified "J". No samples were considered sufficiently similar; therefore, no additional qualifications were made.

Comments: The precision of the remaining field duplicate results was within control limits.

12. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10581049, the following qualifications were made:

Natural Samples:

Field ID	Analyte	Final Qualification	Reason Code
21WS-1116-SO6378-N-092721	Beryllium	U	CCB
21WS-0010-SO6302-N-092121	Barium, SPLP	U	MB
21WS-0010-SO6302-N-092121	Sodium, SPLP	U	MB
21WS-1116-SO6378-N-092721	Sodium, SPLP	U	MB
21WS-0002-SO6285-N-092021	Antimony	UJ	S%
21WS-0010-SO6302-N-092121	Aluminum	J	S%
21WS-0010-SO6302-N-092121	Antimony	UJ	S%
21WS-0010-SO6302-N-092121	Barium	J	S%
21WS-0010-SO6302-N-092121	Cadmium	J	S%, SD
21WS-0010-SO6302-N-092121	Copper	J	S%
21WS-0010-SO6302-N-092121	Magnesium	J	S%
21WS-0010-SO6302-N-092121	Molybdenum	J	S%, SD
21WS-0010-SO6302-N-092121	Potassium	J	S%
21WS-0010-SO6302-N-092121	Mercury	J-	S%
21WS-0002-SO6285-N-092021	Aluminum	J	SD
21WS-0002-SO6285-N-092021	Arsenic	J	SD
21WS-0002-SO6285-N-092021	Barium	J	SD
21WS-0002-SO6285-N-092021	Calcium	J	SD
21WS-0002-SO6285-N-092021	Chromium	J	SD
21WS-0002-SO6285-N-092021	Cobalt	J	SD
21WS-0002-SO6285-N-092021	Lead	J	SD
21WS-0002-SO6285-N-092021	Magnesium	J	SD
21WS-0002-SO6285-N-092021	Manganese	J	SD
21WS-0002-SO6285-N-092021	Nickel	J	SD
21WS-0002-SO6285-N-092021	Vanadium	J	SD
21WS-0002-SO6285-N-092021	Zinc	J	SD
21WS-0010-SO6302-N-092121	Iron	J	SD
21WS-0010-SO6302-N-092121	Lead	J	SD
21WS-0010-SO6302-N-092121	Zinc	J	SD
21WS-0010-SO6302-N-092121	Lead, SPLP	J	FD
21WS-0013-SO6313-N-092121	Arsenic	J	FD

Field Duplicate Samples:

Field ID	Analyte	Final Qualification	Reason Code
21WS-0010-SO6302-D-092121	Sodium, SPLP	U	MB
21WS-0010-SO6302-D-092121	Aluminum	J	S%
21WS-0010-SO6302-D-092121	Antimony	J	S%
21WS-0010-SO6302-D-092121	Barium	J	S%
21WS-0010-SO6302-D-092121	Cadmium	J	S%, SD
21WS-0010-SO6302-D-092121	Copper	J	S%
21WS-0010-SO6302-D-092121	Magnesium	J	S%
21WS-0010-SO6302-D-092121	Molybdenum	J	S%, SD
21WS-0010-SO6302-D-092121	Potassium	J	S%
21WS-0010-SO6302-D-092121	Mercury	J-	S%
21WS-0010-SO6302-D-092121	Iron	J	SD
21WS-0010-SO6302-D-092121	Lead	J	SD
21WS-0010-SO6302-D-092121	Zinc	J	SD
21WS-0010-SO6302-D-092121	Lead, SPLP	J	FD
21WS-0013-SO6313-D-092121	Arsenic	J	FD

Reason codes:

CCB = continuing calibration blank
MB = method blank
FD = field duplicate
S% = matrix spike
SD = serial dilution

Comments:

13. Authorization of Data Validation

Data Validator

Name: Sara Ward **Reviewed by:** Josie McElroy

Signature: Sara Ward Josie McElroy

Date: 1/18/2022 1/20/2022

Attachment B
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: West Side Soils Operable Unit (WSSOU), Multiple Mining Claims
Project: 2021 WSSOU Additional Surface Data Collection
Client: Atlantic Richfield
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable
2. Level A
3. Level B 10581049 and 10584587

I. **Level A**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Sampling date	Yes	Logbook and Field Data Sheets
2. Sampling team or leader	Yes	Logbook
3. Physical description of sampling location	Yes	Logbook, Field Data Sheets, and WSS 2021 Additional Sampling Summaries by Claim
4. Sample depth (soils)	Yes	Logbook
5. Sample collection technique	Yes	Logbook
6. Field preparation technique	Yes	Logbook
7. Sample preservation technique	Yes	Logbook
8. Sample shipping records	Yes	CoC

II**. Level B**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Field instrumentation methods and standardization complete	Yes	Logbook.
2. Sample container preparation	Yes	Logbook
3. Collection of field replicates (1/20 minimum)	Yes	Logbook
4. Proper and decontaminated sampling equipment	Yes	Logbook
6. Field custody documentation	Yes	CoC
7. Shipping custody documentation	Yes	CoC
8. Traceable sample designation number	Yes	Logbook, and CoC
9. Field notebook(s), custody records in secure repository	Yes	
10. Completed field forms	Yes	Field Data Sheets

Attachment C
Data Validation Quality Control Criteria

Data Validation QC Criteria

Field Quality Control Samples							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Field Blank/ Equipment Rinsate Blank	Not required						WSSOU RI QAPP (CDM Smith, 2019)
Field Duplicate	One per 20 samples	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	FD	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2020)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	180 Days	Hold Time > 180 Days	Professional Judgement J-	Professional Judgement UJ or R	H	NFG (EPA, 2020)
Preservation	Every sampling	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ or R	Pres	WSSOU RI QAPP, (CDM Smith, 2019)
			samples received > 6ºC	Professional Judgement J-	Professional Judgement UJ or R		
Calibration	Daily	Mid-level standard and a blank -OR- Three-point curve and a blank with lowest non-zero standard at or below RL with correlation coefficient ≥0.995	Calibration validity tested by ICV and LLICV	See ICV and LLICV	See ICV and LLICV	N/A	BP LaMP, NFG (EPA, 2020)
			If 3-point curve used: correlation coefficient < 0.995	J	UJ	CC	
Linear Range	Linear Range standard(s) analyzed for each calibration run	Linear Range standard %D ± 10%	Linear Range standard %D > 10%	Use highest passing standard as LDR	N/A	CL	Method EPA 6010D, BP LaMP
		Sample raw results ≤ 90% LDR	Sample raw result > 90% LDR	J	N/A		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 90-110%	%R < 75%	Professional Judgement J- or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			%R 75-89%	J-	UJ		
			%R 90-110%	No Qualification	No Qualification		
			%R 111-125%	J+	No Qualification		
			%R > 125%	Professional Judgement J+ or R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	MB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Low Limit Initial Calibration Verification (LLICV)/CRDL Check Sample	After the ICV and ICB	%R 70-130%	%R < 70%	J-	UJ	CS	BP LaMP
			%R 70-130%	No Qualification	No Qualification		
			%R > 130%	J+	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Interference Check Samples (ICS)	At the beginning of each analytical sequence	%R 80-120% -OR- ± 2x the RL (whichever is greater) for analytes and interferents present in ICSA and ICSAB Sample results < MDL for analytes not present in ICSA	ICS not analyzed or not analyzed in proper sequence	Professional Judgement R if not analyzed	Professional Judgement R if not analyzed	ICS	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			ICSAB %R<50%	J-*	R*		
			%R 50-79% -OR- < -2x RL (whichever is greater)	J-*	UJ*		
			%R 80-120% -OR- within ± 2x RL (whichever is greater)	No Qualification	No Qualification		
			%R >120% -OR- > 2x RL (whichever is greater)	J+*	No Qualification		
			%R >150%	Professional Judgement	Professional Judgement		
			Sample results for analytes not present in ICSA ≥ MDL	J+*	No Qualification		
			Negative sample results for analytes not present in the ICS solution A with an absolute value ≥ MDL	J- *	UJ*		
			Note: Associated samples will be qualified if interferents are within 10% or are higher than interferent concentration in the ICS -AND- for detections of analytes not present, if sample results are < 10 times the ICS detection.				
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2020)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 6010D (ICP-AES)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria	Matrix Spike %R < 30% Post-digestion spike %R < 75%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			Matrix Spike %R < 30% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R 30-74% Post-digestion Spike %R < 75%	J-*	UJ*		
			Matrix Spike %R 30-74% Post-digestion spike %R ≥ 75%	J*	UJ*		
			Matrix Spike %R > 125% Post-digestion spike %R > 125%	J+*	No Qualification		
			Matrix Spike %R > 125% Post-digestion spike %R ≤ 125%	J*	No Qualification		
			Matrix Spike %R < 30% No post-digestion spike performed	J-*	R*		
			Matrix Spike %R 30-74% No post-digestion spike performed	J-*	UJ*		
			Matrix Spike %R 75-125% No post-digestion spike is required	No Qualification	No Qualification		
			Matrix Spike %R > 125% No post-digestion spike performed	J+*	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		
Post-digestion Spike (PDS)	When matrix spike %R does not meet acceptance criteria	%R 75-125%	See Matrix Spike	See Matrix Spike	See Matrix Spike	N/A	BP LaMP, NFG (EPA, 2020)
Serial Dilution (SD)	Each analytical batch of samples.	%D ≤ 10% if sample concentration is sufficiently high	Sample >50x MDL and SD ≥ PQL and %D > 10%	J*	No Qualification	SD	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			Sample >50x MDL and SD ≥ PQL and %D ≥ 100%	Professional Judgement	Professional Judgement		
			Sample > 5x PQL and SD < PQL	No Qualification	No Qualification		
			Interferences present	Professional Judgement	Professional Judgement		
Internal Standards	Optional If used, every analysis	%R 60-125%	%R 60-125%	No Qualification	No Qualification	CS	BP LaMP
			%R < 60% or > 125% and original sample reanalyzed at 2-fold dilution	J	UJ		
			%R < 60% or > 125% and original sample not reanalyzed at 2-fold dilution	Professional Judgement J or R	Professional Judgement UJ or R		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 7470A and SW-8466 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time	Every sample	28 Days	Hold Time > 28 Days	Professional Judgement J-	Professional Judgement UJ/R	H	NFG (EPA, 2020)
Preservation	Every sample	4°C ± 2°C/HNO3 to pH < 2 (water) 4°C ± 2°C (soil)	samples received pH > 2 and pH not adjusted (water)	Professional Judgement J-	Professional Judgement UJ/R	Pres	NFG (EPA, 2020)
			samples received > 6ºC but ≤ 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
			samples received > 10ºC	Professional Judgement J-	Professional Judgement UJ/R		
Calibration	Daily	A blank and at least five calibration standards shall be used to establish the calibration curve. At least one of the calibration standards shall be at or below RL but above the MDL. Correlation coefficient ≥0.995	Calibration not performed	R	R	Cal	CFRSSI QAPP (ARCO, 1992)
			Calibration incomplete	Professional Judgement J or R	Professional Judgement UJ or R		
			correlation coefficient < 0.995	J	UJ	CC	
Liner Range	Every sample	The sample instrument level of mercury must be within the calibration range.	Raw result > calibration range	J	N/A	CL	BP LaMP
Low Limit Initial Calibration Verification (LLICV)/CRDL Check Sample	After the ICV and ICB	%R 80-120%	%R < 80%	J-	UJ	CS	BP LaMP
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	ICV - immediately follows calibration Second Source standard CCV - at beginning of run, every 10 samples and at end of run Same source standard	%R 80-120%	%R < 70%	Professional Judgement J or R	Professional Judgement UJ or R	ICV CCV	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			%R 70-79%	J	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R 120-130%	J+	No Qualification		
			%R > 130%	Professional Judgement J+ or R	No Qualification		
			%R > 165%	R	No Qualification		
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

SW-846 7470A and SW-8466 7471B (Mercury)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 80-120%	%R < 40%	J-	R	L%	CFRSSI QAPP (ARCO, 1992)
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019), NFG (EPA, 2020)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		
Matrix Spike (MS)	Each analytical batch of samples for every 20 (or fewer) samples received	%R 75-125% If the original sample result is ≥ 4x the spike amount added, the data shall not be flagged even if the %R exceeds the acceptance criteria	Matrix Spike %R < 30%	J-*	R*	S%	CFRSSI QAPP (ARCO, 1992), NFG (EPA, 2020)
			Matrix Spike %R 30-74%	J-*	UJ*		
			Matrix Spike %R 75-125%	No Qualification	No Qualification		
			Matrix Spike %R > 125%	J+*	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

Data Validation QC Criteria

EPA600/2-78-054 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Holding Time / Preservation	N/A						WSSOU RI QAPP (CDM Smith, 2019)
Neutralization Potential							
Calibration	Prior to sample analysis	pH buffer check ± 0.2 s.u. true pH value	pH > ± 0.2 s.u	J	UJ	CC	ENV-SOP-SHRT-0062 (Pace, 2015)
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	N/A						ENV-SOP-SHRT-0062 (Pace, 2015)
Method Blank (MB)	MB - Each analytical batch of samples for every 20 (or fewer) samples received.	Blank result ≤ 2x MDL	Blank result > 2x MDL.	Results < 5x the blank detection - U	No Qualification	MB	CFRSSI QAPP (ARCO, 1992)
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result is < 5x RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2x RL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is > RL (water) or > 2x RL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x RL and difference between the sample and duplicate results is ≤ RL (water) or ≤ 2x RL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	LCS Result ≤ 20% True Value	LCS Result < 20% True Value	J-	UJ	L%	ENV-SOP-SHRT-0062 (Pace, 2015)
			LCS Result > 20% True Value	J+	N/A		

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

EPA600/2-78-054 (ABA)							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
Total and Extractable Sulfur							
Calibration	Prior to sample analysis	At least three calibration standards shall be used that bracket the expected sample range. Measure values checked against true values.	Calibration not performed	R	R	CC	ENV-SOP-SHRT-0077 (Pace, 2016) LCRM® 502-962 Lot: 1000 LCRM® 502-963 Lot: 1001-2 LCRM® 502-969 Lot: 1001 LCRM® 502-902 Lot: 1001
			Calibration incomplete	Professional Judgement J or R	Professional Judgement UJ or R		
			502-962: Sulfur 0.019 ± 0.004 502-693: Sulfur 2.23 ±0.06 502-699: Sulfur 32.7 ±0.3 502-902: Sulfur 11.99 ± 0.05	J	UJ		
Initial Calibration Verification (ICV)/ Continuing Calibration Verification (CCV)	N/A						ENV-SOP-SHRT-0077 (Pace, 2016)
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	ICB - Following ICV after initial calibration CCB - Following each CCV, every 2 hours and after the last CCV	|blank result| ≤ 2x IDL	Non-detect or ≤ 2x IDL	No Qualification	No Qualification	ICB CCB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x IDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x IDL	Result < 5x |negative blank result| J	UJ		
Method Blank (MB)	Each analytical batch of samples for every 20 (or fewer) samples received	|blank result| ≤ 2x MDL	Non-detect or ≤ 2x the MDL	No Qualification	No Qualification	ICB CCB MB	CFRSSI QAPP (ARCO, 1992)
			Positive blank result > 2x MDL	Results < 5x blank detection U	No Qualification		
			|Negative blank result| > 2x MDL	Result < 5x |negative blank result| J	UJ		
Laboratory Duplicate Samples (LDS)	Each analytical batch of samples for every 20 (or fewer) samples received	1. If both original sample and duplicate sample results are ≥ 5x the RL, then RPD ≤ 20% (water) or RPD ≤ 35% (soil); 2. If original sample or duplicate sample result < 5x the RL (including non-detects), then difference between sample and duplicate ≤ RL (water) or ≤ 2xRL (soil)	Both original and duplicate sample results ≥ 5x RL and RPD > 20% (water) or RPD > 35% (soil)	J*	UJ*	D%	WSSOU RI QAPP (CDM Smith, 2019)
			Both original and duplicate sample results ≥ 5x RL and RPD ≤ 20% (water) or RPD ≤ 35% (soil)	No Qualification	No Qualification		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result is < 5x the RL and difference between the sample and duplicate > RL (water) or > 2xRL (soil)	J*	UJ*		
			Original sample or duplicate sample result is < 5x the RL and difference between the sample and duplicate ≤ RL (water) or ≤ 2xRL (soil)	No Qualification	No Qualification		
Laboratory Control Sample (LCS)	Each analytical batch of samples for every 20 (or fewer) samples received	LCS Result ≤ 20% True Value	LCS Result < 20% True Value	J-	UJ	L%	ENV-SOP-SHRT-0077 (Pace, 2016)
			LCS Result > 20% True Value	J+	N/A		

Notes:
Acid Potential is calculated from Sulfur, HCl Extractable; Sulfur, HNO3; and Sulfur, Residual and will therefore receive the same qualifications as these analytes.
Acid/Base Potential is calculated from Acid Potential and Neutralization Potential and will therefore receive the same qualifications as these analytes.

* Qualifications apply only to the sample used to generate QC sample(s) and samples considered sufficiently similar to the sample used to generate QC sample(s).

Appendix B-6

2021 Remedial Investigation Additional Surface Sampling Field Portable X-Ray Fluorescence Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2021 Additional Surface Sampling Field-Portable X-Ray Fluorescence Data Validation Report

Atlantic Richfield Company

July 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
WEST SIDE SOILS OPERABLE UNIT

Draft Final

2021 Additional Surface Sampling Field-Portable X-Ray Fluorescence Data Validation Report

Prepared for:

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July 2022

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REVISION SUMMARY

Revision No.	Author	Version	Description	Date
Rev 0	Sara Ward	Draft	Issued for Internal Review	5/18/2022
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1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes data validation (DV) conducted on the field-portable X-ray fluorescence (FPXRF) analyses for samples collected as specified in the Final Quality Assurance Project Plan (QAPP) for West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) sampling (CDM Smith, 2019) (referred to as WSSOU RI QAPP) and the WSSOU Final RI Data Collection Work Plan (Atlantic Richfield Company, 2019) (referred to as WSSOU Final RI Work Plan).

All data have undergone Stage 2B data DV and verification as defined in *U.S. Environmental Protection Agency* (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009).

The DV was conducted in accordance with the WSSOU RI QAPP, the *Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation Plan* (DM/DV) (ARCO, 1992a), the CFRSSI DM/DV addendum (AERL, 2000), and the CFRSSI QAPP (ARCO, 1992b). This report details the evaluation of FPXRF data for the purpose of usability.

This document refers to the tables and attachments below.

- Table 1 contains the FPXRF natural sample results with enforcement/screening classifications, DV qualifiers, and DV reason codes.
- Table 2 contains the FPXRF Silicon Dioxide (SiO_2) Standard results.
- Table 3 contains the FPXRF Calibration Check Standard (CCS) results.
- Table 4 contains the FPXRF duplicate and FPXRF replicate sample results.
- Table 5 contains the FPXRF sample identification information including the field sample name, sample date, and analysis date.
- Attachment A contains the DV Checklist.
- Attachment B contains the Qualification Summary Tables.
- Attachment B-1 contains Sio_2 Standard Exceedance Summary Table.
- Attachment B-2 contains CCS Exceedance Summary Table.
- Attachment B-3 contains FPXRF Duplicate and FPXRF Replication Qualifications to Natural Samples.
- Attachment C contains the Level A/B Assessment Checklist.
- Attachment D contains the QC criteria used in the DV process.

The instrument output for FPXRF data, produced by Pioneer Technical Services, Inc. (Pioneer), was used to perform Stage 2B DV and verification.

All samples associated with the FPXRF data produced by Pioneer met Level A and Level B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan (ARCO, 1992a), the quality of the data is ranked as enforcement quality, screening quality, or it is rejected. Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A

and B criteria (Attachment C) and are not qualified as estimated or rejected after the validation process.

Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, remedial investigation/feasibility study, evaluation of alternatives, conformational purposes, risk assessments, and engineering design. All data that met the Level A and B documentation criteria and results that were not qualified as estimated or rejected during the DV process were considered "enforcement" quality data and were assigned an "E" in Table 1.

Screening quality data, as defined in the CFRSSI DM/DV Plan (ARCO, 1992a), are data from those samples that do not meet the Level B criteria and/or were qualified J, J+, J-, or UJ during the DV process. Potential uses of screening quality data, depending on their quality, include site characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. Data that met the Level A criteria, but not Level B criteria, and/or results that were qualified as estimated during the validation process were considered "screening" quality data and were assigned an "S" in Table 1.

Data rejected during DV cannot be used for any Superfund activities. No results were rejected during the DV process.

Investigative soil samples were collected in September 2021 by Pioneer in accordance with the WSSOU RI QAPP. The FPXRF analyses were performed in Butte, Montana, by Pioneer. Table 5 lists the sample identification, sample date, and analysis date for each natural sample.

Field quality control (QC) samples results were used to assess the data quality of natural samples. Please note that the enforcement and screening quality summaries and the precision and accuracy assessment summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summaries.

There were 75 natural surface soil samples analyzed by FPXRF for 19 analytes. In total, 1,425 data points were generated. A summary is shown below:

Summary of Enforcement and Screening Quality Data Points

Analysis Group	Natural Samples	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
FPXRF	75	1,425	810 (57%)	615 (43%)	0 (0%)

Refer to Section 4.7 for details on the major reasons natural data points are considered screening quality.

2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW OF INORGANIC DATA

The QC criteria used during the DV process are discussed in Section 2.3 and are listed in Attachment D. The QC criteria were derived from the WSSOU RI QAPP, the CFRSSI DM/DV Plan (ARCO, 1992a), CFRSSI DM/DV addendum (AERL, 2000), the CFRSSI QAPP (ARCO, 1992b), the Niton XL3 Mining QC Sheet (ThermoFisher Scientific, 2014), and the Pioneer Standard Operating Procedure (SOP) for operating the XL3 FPXRF analyzer (SOP-SFM-02) (refer to Appendix A of the WSSOU Final RI Work Plan).

A DV checklist derived from the CFRSSI DM/DV Plan Addendum (AERL, 2000) was completed (Attachment A) for each day FPXRF was performed. The Laboratory DV Checklist for Metals Analysis by Spectrace FPXRF was modified to more accurately reflect the DV performed.

2.1 Field-Portable X-Ray Fluorescence Analysis Run ID

All samples analyzed by FPXRF including natural and QC samples were assigned an Analysis Run Identification (ID) following the convention of "P_YYYYMMDD_FPXRFID#_Run#" where:

- "P" = Pioneer
- YYYMMDD = date of analysis
- FPXRFID# = ID number of FPXRF unit used
- Run# = Run number generated sequentially by the FPXRF unit

For example, an Analysis Run ID of "P_20191023_92951_140" indicates the sample was analyzed October 23, 2019, with XRF unit #92951 and had a run number of 140.

The Analysis Run IDs and Sample IDs are included in Table 1, Table 2, Table 3, Table 4, and Table 5 to provide the date of analysis and XRF unit ID for each sample.

2.2 Reporting Limits

The reporting limits (RLs) for each analyte were calculated for each FPXRF instrument used. The standard errors output by the FPXRF instruments for site soil samples (natural, FPXRF duplicate, and FPXRF replicate samples) were used in the calculations. For analytes that had non-detect sample results, the RL was calculated as 3 times the average standard errors for the non-detect results. For analytes that did not have any non-detect sample results, the RL was calculated as 3 times the average of the bottom 10% of the standard errors.

The RLs for each analyte for the FPXRF unit used are listed below:

Analyte	Units	Reporting Limits FPXRF Unit: 98052
Antimony	mg/kg	32
Arsenic	mg/kg	87
Barium	mg/kg	62
Cadmium	mg/kg	22
Calcium	mg/kg	497
Chromium	mg/kg	40
Cobalt	mg/kg	345
Copper	mg/kg	34
Iron	mg/kg	385
Lead	mg/kg	16
Manganese	mg/kg	132
Mercury	mg/kg	24
Molybdenum	mg/kg	14
Nickel	mg/kg	100
Potassium	mg/kg	1,122
Selenium	mg/kg	13
Silver	mg/kg	17
Vanadium	mg/kg	146
Zinc	mg/kg	27

mg/kg = milligrams per kilogram.

In Table 1, non-detect results are reported as "<" with the RL and assigned a qualification of "U." Detected results less than the RL were assigned a qualification of "J." Results that were qualified "U" for being a non-detect result (Reason Code = ND) or qualified "J" for being a detected result less than the RL (Reason Code = <RL) are considered enforcement quality data if the Level A/B criteria were met and if no other qualifications were made.

2.3 Quality Control Samples

This section summarizes the QC samples evaluated during the Stage 2B DV of the FPXRF data.

The Pioneer SOP for operating XL3 FPXRF analyzer (SOP-SFM-02) (refer to Appendix A of the WSSOU Final RI Work Plan) was followed for FPXRF data produced by Pioneer. This SOP specifies the requirements for the FPXRF QC samples in the following sections. The QC criteria used during DV to evaluate the QC samples is listed in Attachment D.

2.3.1 Energy Calibration Check

The energy calibration check (system check) determines whether the characteristic X-ray lines are shifting, which would indicate drift within the instrument. The requirements set forth in SOP-SFM-02 are to run a system check each time the instrument is turned on for sample analysis, and the resolution parameter of the system check must be under 195. The system check was performed at the beginning of each working day, and the resolution parameter was under 195 for each system check. The requirements were met.

2.3.2 Silicon Dioxide Standard

The SiO_2 standard, as provided by Niton, is a "clean" quartz or SiO_2 matrix that contains concentrations of selected analytes near or below the machine's lower limit of detection. Analysis results with the FPXRF instrument of the SiO_2 standard are used to monitor for cross contamination.

The frequency requirement for analyzing the SiO_2 standard set forth in SOP-SFM-02 is to analyze the SiO_2 sample at the beginning of each day and once per every 20 samples, and to analyze the SiO_2 standard or a CCS at the end of each day's analysis.

The SiO_2 standard was analyzed at the beginning of each analytical run. There were 7 analyses of the SiO_2 standard for the 75 natural samples (9%). The frequency requirement for the SiO_2 standard was met.

Table 2 lists the results for all SiO_2 standard samples. The control limit was a non-detect result for all SiO_2 standard sample results. If a SiO_2 standard sample had a detected result, the natural sample results analyzed in the same analytical run were qualified "J+" if the natural sample result was a detected result less than 10 times the SiO_2 standard sample result (Reason Code = B).

Qualifications made due to detections in the SiO_2 standard samples are discussed in Section 4.2 and are listed in Table 1 and Attachment B-1.

2.3.3 Calibration Check Standard

The CCS helps check the accuracy of the FPXRF instrument and assess the stability and consistency of the analysis for the analytes of interest. Three Niton-provided Standard Reference Materials were used for the CCS: NIST 2709a- Joaquin Soil (NIST 2709a) sample, a U.S. Geological Survey (USGS) SdAR-M2 sample, and a Resource Conservation and Recovery Act (RCRA) sample.

The frequency requirement to analyze the CCS samples set forth in SOP-SFM-02 is to analyze 1 to 3 of the CCS samples at the start of each day and once per every 20 samples, and to analyze the SiO_2 standard or a CCS at the end of each day's analysis.

A CCS sample was analyzed at the beginning of each run. There were 7 analyses of the CCS samples for the 75 natural samples (9%). The frequency requirements for the CCS samples were met.

The true values for each analyte in each CCS were used to calculate percent recovery (%R). If the true value of the analyte in the CCS was not available or was significantly lower than the

calculated RL, it was not included in the CCS %R assessment. The true values for each analyte in each CCS are listed below:

Analyte	NIST 2709a (mg/kg)	USGS SdAR-M2 (mg/kg)	RCRA (mg/kg)
Antimony	*1.55*	**107**	NA
Arsenic	*10.5*	NA	**500**
Barium	**979**	**990**	NA
Cadmium	*0.371*	*5.1*	**500**
Calcium	**19,100**	NA	NA
Chromium	**130**	**49.6**	**500**
Cobalt	*12.8*	*12.4*	NA
Copper	*33.9*	**236**	NA
Iron	**33,600**	NA	NA
Lead	**17.3**	**808**	**500**
Manganese	**529**	NA	NA
Mercury	*0.9*	*1.44*	NA
Molybdenum	NA	**13.3**	NA
Nickel	**85**	*48.8*	NA
Potassium	**21,100**	NA	NA
Selenium	*1.5*	*2.7*	**500**
Silver	NA	NA	**500**
Vanadium	**110**	*25.2*	NA
Zinc	**103**	**760**	NA

Italics = not used in assessment.
Bold = used in assessment.
NA = not available. USGS = U.S. Geological Survey.

There was no CCS result that had a detectable amount of cobalt or mercury. All non-detect cobalt and mercury results have been qualified "UJ" and detected cobalt and mercury results have been qualified "J" for the lack of an appropriate CCS (Reason Code = CCS).

Table 3 lists the results and the %R for each CCS. The control limit was a %R between 80% and 120%. If the CCS result %R was outside the control limit (80% to 120%), the natural sample results in the same analytical run were qualified as "J" for detected results or "UJ" for non-detect results, except if there was another CCS with results within the control limit in the same analytical run, then, applying professional judgement, only the sample results that were less than 10 times the true value of the failing CCS were qualified as "J" for detected results or "UJ" for non-detect results (Reason Code = C%).

Two CCS (USGS SdAR-M2) results for molybdenum were reported as non-detect. The %R for these CCS results could not be assessed.

Qualifications made due to CCS %R outside the control limit are discussed in Section 4.2 and are listed in Table 1 and Attachment B-2.

2.3.4 FPXRF Duplicate, FPXRF Replicate, and Field Duplicate Samples

The FPXRF duplicate samples are analyzed to assess reproducibility of field procedures and soil heterogeneity. To run a duplicate sample on the Niton XL3, the sample bag is removed from the analytical stand, kneaded once or twice, and replaced in the stand to be analyzed a second time.

The FPXRF replicate samples help assess the stability and consistency of the FPXRF analysis. To run a replicate sample on the Niton XL3, once the primary sample analysis has been completed, the same sample is analyzed a second time with the same soil in the XRF aperture.

The frequency requirement for FPXRF duplicate and FPXRF replicate samples set forth in SOP-SFM-02 is to analyze a FPXRF duplicate sample and a FPXRF replicate sample once per every 20 samples (5%).

For the 75 natural samples, 4 FPXRF duplicate samples (5%) and 4 replicate samples (5%) were analyzed. The frequency requirement for FPXRF duplicate and FPXRF replicate samples was met.

The SOP-SFM-02 does not require field duplicate samples for FPXRF analysis.

Table 4 contains the FPXRF duplicate and FPXRF replicate sample results with the parent sample results and the relative percent difference (RPD). The control limit was an RPD less than or equal to 35% when both sample results were detections. If an RPD was outside the control limit, the parent sample and samples considered sufficiently similar to the parent sample were qualified. No natural samples were considered sufficiently similar enough to each other to require additional qualifications based on the variability of soil matrices. If the parent sample was a duplicate sample, the duplicate sample's parent sample was considered sufficiently similar and was qualified when applicable.

Qualification due to duplicate and replicate sample results outside the control limit are discussed in Section 4.1 and are listed in Table 1, Table 4, and Attachment B-3.

3.0 LEVEL A/B ASSESSMENT

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality data.

Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet Level A or B criteria are designated as unusable.

One Level A/B Assessment Checklist for FPXRF data is included in Attachment C. Sample collection information, including sample collection date, location, and collection method, was recorded in the field logbook. This information was reviewed for Level A/B assessment.

All FPXRF samples met the Level A and B criteria.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, COMPLETENESS, AND SENSITIVITY DATA SUMMARY

This section provides the Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity (PARCCS) assessment for the FPXRF data generated as part of the investigation that underwent Stage 2B DV.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. The precision control limit used for FPXRF soil samples was a RPD less than 35% when both sample results were detections. For FPXRF data, the precision assessment is based on FPXRF duplicate and FPXRF replicate sample pair RPDs. If an RPD was outside the control limit, the parent sample and samples considered sufficiently similar to the parent sample were qualified. No natural samples were considered sufficiently similar enough to each other to require additional qualifications based on the variability of soil matrices. If the parent sample was a duplicate sample, the duplicate sample's parent sample was considered sufficiently similar and was qualified when applicable.

Attachment B-3 lists the FPXRF duplicate and FPXRF replicate samples with an RPD that exceeded the control limit (35%) and the affected natural samples that were qualified. There were 5 instances of an RPD exceedance (3 FPXRF duplicate and 2 FPXRF replicate). This led to the qualification of 4 natural data points because 1 natural data point was qualified for both FPXRF duplicate and FPXRF replicate RPD exceedances.

This resulted in 4 (0.3%) of the 1,425 natural data points that did not meet the precision requirements and 1,421 (99.7%) of the 1,425 natural data points that did meet the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. For the FPXRF data, the SiO_2 standard and CCS samples are used to assess accuracy.

If a SiO_2 standard sample had a detected result, the natural sample results analyzed in the same analytical run were qualified "J+" if the natural sample result was a detected result less than 10 times the SiO_2 standard sample result.

Attachment B-1 lists the detected SiO_2 standard sample results and the affected natural samples that were qualified. There were 41 SiO_2 standard sample results that exceeded the control limit, and 27 of these results led to qualifications of natural samples. The remaining 14 exceedances of the SiO_2 standard samples did not lead to qualifications of natural samples because the affected

natural sample results were either non-detect or were greater than 10 times the SiO_2 standard sample result.

Of the 1,425 natural data points, 236 were qualified because of a SiO_2 standard sample result exceedance. The majority of qualifications were made to antimony, barium, cadmium, chromium, and silver. The total number of natural data points and the number of data points qualified because of a SiO_2 standard sample result exceedance are summarized below:

Analyte	Total Natural Data Points	Natural Data Points Qualified for SiO_2 Standard Exceedance	% of total
Antimony	75	70	93%
Arsenic	75	5	7%
Barium	75	68	91%
Cadmium	75	42	56%
Calcium	75	8	11%
Chromium	75	20	27%
Cobalt	75	0	0%
Copper	75	0	0%
Iron	75	0	0%
Lead	75	0	0%
Manganese	75	0	0%
Mercury	75	0	0%
Molybdenum	75	0	0%
Nickel	75	0	0%
Potassium	75	1	1%
Selenium	75	0	0%
Silver	75	22	29%
Vanadium	75	0	0%
Zinc	75	0	0%
Total	**1,425**	**236**	**17%**

SiO_2 = silicon dioxide.

If the CCS result %R was outside the control limit (80% to 120%), the natural sample results in the same analytical run were qualified as "J" for detected results or "UJ" for non-detect results, except if there was another CCS sample with results within the control limit in the same analytical run, then, applying professional judgement, only the sample results that were less than 10 times the true value of the failing CCS were qualified as "J" for detected results or "UJ" for non-detect results (Reason Code = C%).

Attachment B-2 lists the CCS results that exceeded the control limit and the affected natural samples that were qualified. There were 23 CCS %R results that exceeded the control limit, and all of these results led to qualifications of natural samples.

Of the 1,425 natural data points, 247 were qualified because of a CCS %R exceedance. The qualifications were made to chromium, lead, molybdenum, and vanadium. The total number of

natural data points and the number of data points qualified because of CCS %R exceedance are summarized below:

Analyte	Total Natural Data Points	Natural Data Points Qualified for CCS %R Exceedance	% of total
Antimony	75	0	0%
Arsenic	75	0	0%
Barium	75	0	0%
Cadmium	75	0	0%
Calcium	75	0	0%
Chromium	75	75	100%
Cobalt	75	0	0%
Copper	75	0	0%
Iron	75	0	0%
Lead	75	22	29%
Manganese	75	0	0%
Mercury	75	0	0%
Molybdenum	75	75	100%
Nickel	75	0	0%
Potassium	75	0	0%
Selenium	75	0	0%
Silver	75	0	0%
Vanadium	75	75	100%
Zinc	75	0	0%
Total	**1,425**	**247**	**17%**

CCS = Calibration Check Standard. %R = percent recover.

This resulted in 463 (32%) of the 1,425 natural data points associated with the natural samples collected that did not meet the accuracy requirements, and 962 (68%) of the 1,425 natural data points that did meet the accuracy requirements. There were 20 natural data points for chromium that were qualified for both SiO_2 Standard exceedance and CCS %R exceedance. The majority of natural data points that did not meet accuracy requirements were antimony, barium, cadmium, chromium, lead, molybdenum, silver, and vanadium results as shown below:

Analyte	Total Natural Data Points	Natural Data Points Qualified for Poor Accuracy	% of total
Antimony	75	70	93%
Arsenic	75	5	7%
Barium	75	68	91%
Cadmium	75	42	56%
Calcium	75	8	11%
Chromium	75	75	100%
Cobalt	75	0	0%
Copper	75	0	0%
Iron	75	0	0%
Lead	75	22	29%
Manganese	75	0	0%
Mercury	75	0	0%
Molybdenum	75	75	100%
Nickel	75	0	0%
Potassium	75	1	1%
Selenium	75	0	0%
Silver	75	22	29%
Vanadium	75	75	100%
Zinc	75	0	0%
Total	**1,425**	**463**	**32%**

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper sampling program design. Samples for FPXRF analysis were collected in accordance with the WSSOU RI QAPP. The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report include soil samples collected and analyzed by Pioneer using FPXRF.

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and FPXRF methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in using the SOPs and equipment. Proper sample handling was observed during sample collection and analysis.

All surface samples underwent the “Simple Sieve” preparation method as defined in the WSSOU RI QAPP. Data from future soil sampling events at WSSOU using comparable sampling and FPXRF analysis may be used in concert with the surface sample data.

4.5 Completeness

Completeness is assessed to determine if enough valid data have been collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 90% or greater as designated in the WSSOU RI QAPP.

Sampling for the September 2021 WSSOU sampling event was based on potential data gaps identified during the EPA's spatial review of the data. The appropriate number of samples was determined in the field at the identified locations. The WSSOU RI QAPP lists the planned analytical techniques including FPXRF analysis. Therefore, completeness for FPXRF data based on sample location was 100%, and the completeness goal was met.

A total of 1,425 FPXRF data points were generated by the sampling events. All data points are considered usable because no results were rejected. All 75 FPXRF samples were analyzed by FPXRF for 19 analytes (antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, vanadium, and zinc). Therefore, the completeness for FPXRF data based on sample analysis was 100% and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the detection limits of non-detect results to the project-specific sensitivity requirements. The WSSOU RI QAPP does not specify sensitivity requirements for FPXRF analyses; therefore, the inductively coupled plasma atomic emission spectroscopy (ICP-AES) RLs in Table B-5 of the WSSOU RI QAPP were used to evaluate sensitivity for each analyte.

For FPXRF analyses, the non-detect results were reported to the RL calculated for each FPXRF unit (Section 2.2). All non-detect results for FPXRF analytes were greater than the ICP-AES RL listed in Table B-5 of the WSSOU RI QAPP. The list below shows the results.

FPXRF Analyte	Non-Detect Results (<RL) FPXRF Unit: 98052	ICP-AES RL in Table B-5, WSSOU RI QAPP
Antimony	<32 mg/kg	6 mg/kg
Arsenic	<87 mg/kg	1 mg/kg
Barium	N/A	20 mg/kg
Cadmium	<22 mg/kg	0.5 mg/kg
Calcium	N/A	500 mg/kg
Chromium	N/A	1 mg/kg
Cobalt	<345 mg/kg	5 mg/kg
Copper	N/A	2.5 mg/kg
Iron	N/A	10 mg/kg
Lead	N/A	1 mg/kg
Manganese	N/A	1.5 mg/kg
Mercury	<24 mg/kg	0.1 mg/kg
Molybdenum	<14 mg/kg	5 mg/kg
Nickel	<100 mg/kg	4 mg/kg
Potassium	N/A	500 mg/kg
Selenium	<13 mg/kg	3.5 mg/kg
Silver	<17 mg/kg	1 mg/kg
Vanadium	<146 mg/kg	5 mg/kg
Zinc	N/A	6 mg/kg

mg/kg = milligrams per kilogram. N/A = no non-detect results.

These data points are considered usable with the recognition that the detection limits are higher than the ICP-AES RL listed in Table B-5 of the WSSOU RI QAPP.

4.7 Overall Data Summary

During the September 2021 WSSOU RI sampling events, the 75 natural samples collected and analyzed by Pioneer generated 1,425 FPXRF data points. Data were also evaluated using the Level A/B Checklist (Attachment C). All samples met the Level A and Level B criteria defined in the CFRSSI DM/DV Plan (ARCO, 1992a) and CFRSSI DM/DV addendum (AERL, 2000).

Natural data points that were qualified as estimated (J, J+, or UJ) with the following reason codes are considered screening quality data as defined in the CFRSSI DM/DV Plan (ARCO, 1992a).

- CCS = lack of appropriate CCS.
- C% = %R exceedance in an associated CCS.
- B = detection in associated silicon dioxide standard.
- D% = RPD exceedance in FPXRF duplicate.
- R% = RPD exceedance in FPXRF replicate.

Based on the qualifications assigned during the DV process and the results of the Level A/B assessment, 810 (57%) natural data points were classified as enforcement quality, 615 (43%) natural data points were classified as screening quality, and no natural data points were rejected.

For natural data points derived from surface samples, the number of instances that each analyte was qualified for each reason code, the total natural data points, and the number of natural data points designated as enforcement and screening quality are summarized below:

	Reason Codes							Data Points	Data Quality	
Analyte	**ND**	**<RL**	**CCS**	**D%**	**R%**	**B**	**C%**	**Total**	**Enforcement**	**Screening**
Antimony	5	47	0	0	0	70	0	75	5 (7%)	70 (93%)
Arsenic	1	31	0	1	1	5	0	75	68 (91%)	7 (9%)
Barium	0	0	0	0	0	68	0	75	7 (9%)	68 (91%)
Cadmium	33	39	0	0	0	42	0	75	33 (44%)	42 (56%)
Calcium	0	0	0	0	0	8	0	75	67 (89%)	8 (11%)
Chromium	0	0	0	0	0	20	75	75	0 (0%)	75 (100%)
Cobalt	68	7	75	0	0	0	0	75	0 (0%)	75 (100%)
Copper	0	3	0	0	0	0	0	75	75 (100%)	0 (0%)
Iron	0	0	0	0	0	0	0	75	75 (100%)	0 (0%)
Lead	0	0	0	1	1	0	22	75	53 (71%)	22 (29%)
Manganese	0	0	0	0	0	0	0	75	75 (100%)	0 (0%)
Mercury	73	2	75	0	0	0	0	75	0 (0%)	75 (100%)
Molybdenum	69	2	0	0	0	0	75	75	0 (0%)	75 (100%)
Nickel	39	35	0	0	0	0	0	75	75 (100%)	0 (0%)
Potassium	0	0	0	0	0	1	0	75	74 (99%)	1 (1%)
Selenium	75	0	0	0	0	0	0	75	75 (100%)	0 (0%)
Silver	24	21	0	0	0	22	0	75	53 (71%)	22 (29%)
Vanadium	5	48	0	1	0	0	75	75	0 (0%)	75 (100%)
Zinc	0	0	0	0	0	0	0	75	75 (100%)	0 (0%)
Grand Total	**392**	**235**	**150**	**3**	**2**	**236**	**247**	**1,425**	**810 (57%)**	**615 (43%)**

Note that the total number of screening quality data points is not a sum of the number of instances the analytes were qualified for each reason code because multiple reason codes can be assigned to one data point.

For the 1,425 natural data points derived from the natural surface samples:

- 236 (17%) were qualified due to a detection in an associated SiO_2 standard (Reason Code = B).
    - 70 (30%) of SiO_2 standard qualifications were made to antimony.
    - 68 (29%) of SiO_2 standard qualifications were made to barium.
    - 42 (18%) of SiO_2 standard qualifications were made to cadmium.
    - 20 (8%) of SiO_2 standard qualifications were made to chromium.
    - 22 (9%) of SiO_2 standard qualifications were made to silver.
- 150 (11%) were qualified due to a lack of an appropriate CCS (Reason Code = CCS).
    - all cobalt and mercury data points were qualified for lack of an appropriate CCS.
- 247 (17%) were qualified due to a %R exceedance in an associated CCS (Reason Code = C%).
    - 75 (30%) of CCS %R qualifications were made to chromium.
    - 22 (9%) of CCS %R qualifications were made to lead.

- 75 (30%) of CCS %R qualifications were made to molybdenum.
- 75 (30%) of CCS %R qualifications were made to vanadium.

Qualifications made to antimony, barium, cadmium, cobalt, chromium, lead, mercury, molybdenum, silver, and vanadium accounted for 97% of the screening quality data points for surface samples.

5.0 REFERENCES

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TABLES

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Table 2. FPXRF SiO_2 Standard Results

Table 3. FPXRF Calibration Check Standards Results

Table 4. FPXRF Duplicate and FPXRF Replicate Sample Results

Table 5. FPXRF Natural Sample Identification

Table 1

FPXRF Natural Sample Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Notes:

< - Not detected at reporting limit

Abbreviations:

mg/kg = milligram per kilogram

Enforcement/Screening Quality (E/S)

E = Enforcement quality.

S = Screening quality.

Data Validation Qualifiers (DV Qual)

U = The result is not detected at the reporting limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ = The result is an estimated quantity, but the result may be biased high.

UJ = The result is not detected at the reporting limit. The reporting limit is approximate and may be inaccurate or imprecise.

Data Validation Reason Codes (Reason Code)

ND = not detected result

<RL = detected result less than the reporting limit

B = detection in associated SiO2 standard

C% = Percent recovery exceedance in an associated CCS

CCS = lack of approriate CCS

D% = relative percent difference exceedance in FRXRF duplicate

R% = relative percent difference exceedance in FPXRF replicate

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Calcium				Chromium				Cobalt				Copper			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Field Sample ID	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code
P_20210921_98052_571	21WS-0003-SO6286-N-092021	29.38	S	J+	B, <RL	189.90	E			580.90	S	J+	B	<22	E	U	ND	3,566.89	E			88.36	S	J	C%	<345	S	UJ	CCS, ND	43.24	E		
P_20210921_98052_572	21WS-0003-SO6287-N-092021	21.25	S	J+	B, <RL	77.91	E	J	<RL	714.58	S	J+	B	<22	E	U	ND	18,432.40	E			80.99	S	J	C%	311.11	S	J	CCS, <RL	278.33	E		
P_20210921_98052_573	21WS-0002-SO6290-N-092021	31.24	S	J+	B, <RL	218.81	E			651.87	S	J+	B	8.05	S	J+	B, <RL	10,845.08	E			89.03	S	J	C%	<345	S	UJ	CCS, ND	408.93	E		
P_20210921_98052_574	21WS-0003-SO6291-N-092021	16.70	S	J+	B, <RL	116.11	E			607.17	S	J+	B	<22	E	U	ND	18,063.67	E			103.32	S	J	C%	<345	S	UJ	CCS, ND	307.64	E		
P_20210921_98052_575	21WS-0003-SO6294-N-092021	25.06	S	J+	B, <RL	115.47	E			809.09	E			<22	E	U	ND	9,995.28	E			67.33	S	J	C%	<345	S	UJ	CCS, ND	209.41	E		
P_20210921_98052_576	21WS-0006-SO6295-N-092021	25.85	S	J+	B, <RL	71.68	E	J	<RL	691.48	S	J+	B	<22	E	U	ND	17,009.30	E			90.37	S	J	C%	242.59	S	J	CCS, <RL	285.69	E		
P_20210921_98052_577	21WS-0006-SO6296-N-092021	45.58	S	J+	B	220.44	E			667.64	S	J+	B	11.95	S	J+	B, <RL	11,457.38	E			59.84	S	J	C%	<345	S	UJ	CCS, ND	328.26	E		
P_20210921_98052_578	21WS-0040-SO6298-N-092121	25.88	S	J+	B, <RL	147.35	E			642.97	S	J+	B	<22	E	U	ND	11,668.45	E			98.87	S	J	C%	<345	S	UJ	CCS, ND	435.63	E		
P_20210921_98052_579	21WS-0040-SO6299-N-092121	27.63	S	J+	B, <RL	187.93	E			652.34	S	J+	B	<22	E	U	ND	11,808.00	E			79.28	S	J	C%	250.82	S	J	CCS, <RL	378.33	E		
P_20210921_98052_580	21WS-0010-SO6303-N-092121	32.96	S	J+	B	159.76	E			529.81	S	J+	B	14.15	S	J+	B, <RL	3,471.67	E			59.00	S	J	C%	<345	S	UJ	CCS, ND	29.46	E	J	<RL
P_20210921_98052_581	21WS-0010-SO6306-N-092121	15.32	S	J+	B, <RL	47.53	E	J	<RL	526.64	S	J+	B	<22	E	U	ND	16,485.15	E			91.02	S	J	C%	<345	S	UJ	CCS, ND	84.50	E		
P_20210921_98052_582	21WS-0010-SO6308-N-092121	21.17	S	J+	B, <RL	307.54	E			676.48	S	J+	B	17.00	S	J+	B, <RL	7,349.43	E			80.28	S	J	C%	<345	S	UJ	CCS, ND	198.07	E		
P_20210921_98052_583	21WS-0013-SO6309-N-092121	18.70	S	J+	B, <RL	118.94	E			656.98	S	J+	B	9.88	S	J+	B, <RL	7,516.45	E			65.81	S	J	C%	<345	S	UJ	CCS, ND	76.00	E		
P_20210921_98052_584	21WS-0012-SO6310-N-092121	<32	E	U	ND	55.79	E	J	<RL	621.31	S	J+	B	14.67	S	J+	B, <RL	80,338.10	E			53.12	S	J	C%	<345	S	UJ	CCS, ND	103.45	E		
P_20210921_98052_585	21WS-0010-SO6311-N-092121	19.19	S	J+	B, <RL	61.47	E	J	<RL	752.03	E			<22	E	U	ND	15,077.95	E			125.55	S	J	C%	<345	S	UJ	CCS, ND	68.31	E		
P_20210921_98052_586	21WS-0013-SO6314-N-092121	33.97	S	J+	B	55.61	E	J	<RL	797.57	E			11.11	S	J+	B, <RL	17,921.38	E			78.23	S	J	C%	<345	S	UJ	CCS, ND	116.98	E		
P_20210921_98052_587	21WS-0014-SO6315-N-092121	28.80	S	J+	B, <RL	121.38	E			738.41	E			14.35	S	J+	B, <RL	12,748.74	E			78.41	S	J	C%	<345	S	UJ	CCS, ND	128.70	E		
P_20210921_98052_588	21WS-0016-SO6317-N-092121	32.48	S	J+	B	171.80	E			622.30	S	J+	B	16.25	S	J+	B, <RL	7,525.03	E			66.27	S	J	C%	<345	S	UJ	CCS, ND	99.84	E		
P_20210921_98052_589	21WS-0016-SO6318-N-092121	40.81	S	J+	B	259.17	E			546.92	S	J+	B	26.80	S	J+	B	3,509.39	E			50.60	S	J	C%	<345	S	UJ	CCS, ND	112.45	E		
P_20210921_98052_590	21WS-0016-SO6320-N-092121	21.18	S	J+	B, <RL	74.87	S	J	D%, <RL	718.94	S	J+	B	10.24	S	J+	B, <RL	15,900.83	E			57.51	S	J	C%	<345	S	UJ	CCS, ND	84.25	E		
P_20210927_98052_636	21WS-0016-SO6321-N-092221	24.98	S	J+	B, <RL	179.82	E			796.13	E			20.36	S	J+	B, <RL	4,949.92	E			64.56	S	J	C%	<345	S	UJ	CCS, ND	112.80	E		
P_20210927_98052_637	21WS-0016-SO6323-N-092221	32.54	S	J+	B	41.35	E	J	<RL	845.83	E			11.14	S	J+	B, <RL	13,885.49	E			44.66	S	J	C%	<345	S	UJ	CCS, ND	44.07	E		
P_20210927_98052_638	21WS-0017-SO6326-N-092221	29.54	S	J+	B, <RL	339.46	E			418.32	S	J+	B	10.40	S	J+	B, <RL	1,292.88	E			52.23	S	J	C%	<345	S	UJ	CCS, ND	283.95	E		
P_20210927_98052_639	21WS-0015-SO6327-N-092221	32.20	S	J+	B	38.94	E	J	<RL	705.33	S	J+	B	8.45	S	J+	B, <RL	12,066.97	E			50.09	S	J	C%	<345	S	UJ	CCS, ND	28.24	E	J	<RL
P_20210927_98052_640	21WS-0015-SO6328-N-092221	32.91	S	J+	B	32.64	E	J	<RL	767.47	S	J+	B	10.26	S	J+	B, <RL	13,135.82	E			65.84	S	J	C%	<345	S	UJ	CCS, ND	38.66	E		
P_20210927_98052_641	21WS-0311-SO6330-N-092221	27.14	S	J+	B, <RL	106.63	E			294.36	S	J+	B	8.08	S	J+	B, <RL	1,192.94	E			54.76	S	J	C%	<345	S	UJ	CCS, ND	160.02	E		
P_20210927_98052_642	21WS-0315-SO6333-N-092221	30.23	S	J+	B, <RL	63.51	E	J	<RL	285.78	S	J+	B	<22	E	U	ND	3,762.54	E			67.69	S	J	C%	<345	S	UJ	CCS, ND	34.60	E		
P_20210927_98052_643	21WS-0315-SO6335-N-092221	30.89	S	J+	B, <RL	44.83	E	J	<RL	420.33	S	J+	B	10.86	S	J+	B, <RL	4,424.52	E			56.23	S	J	C%	<345	S	UJ	CCS, ND	44.85	E		
P_20210927_98052_644	21WS-0296-SO6337-N-092321	25.90	S	J+	B, <RL	44.16	E	J	<RL	398.45	S	J+	B	15.72	S	J+	B, <RL	4,550.37	E			45.09	S	J	C%	<345	S	UJ	CCS, ND	60.16	E		
P_20210927_98052_645	21WS-0296-SO6340-N-092321	24.89	S	J+	B, <RL	228.11	E			607.35	S	J+	B	<22	E	U	ND	7,026.60	E			78.86	S	J	C%	<345	S	UJ	CCS, ND	108.98	E		
P_20210927_98052_646	21WS-1150-SO6341-N-092321	30.27	S	J+	B, <RL	95.27	E			615.57	S	J+	B	16.52	S	J+	B, <RL	8,109.04	E			58.14	S	J	C%	<345	S	UJ	CCS, ND	124.75	E		
P_20210927_98052_647	21WS-0015-SO6343-N-092321	32.18	S	J+	B	81.96	E	J	<RL	447.24	S	J+	B	32.59	S	J+	B	6,537.21	E			88.91	S	J	C%	<345	S	UJ	CCS, ND	217.00	E		
P_20210927_98052_648	21WS-0015-SO6344-N-092321	28.95	S	J+	B, <RL	23.62	E	J	<RL	666.61	S	J+	B	<22	E	U	ND	16,470.69	E			61.32	S	J	C%	<345	S	UJ	CCS, ND	30.43	E	J	<RL
P_20210927_98052_649	21WS-0015-SO6347-N-092321	25.47	S	J+	B, <RL	<87	E	U	ND	569.09	S	J+	B	<22	E	U	ND	8,265.77	E			72.12	S	J	C%	<345	S	UJ	CCS, ND	71.30	E		
P_20210927_98052_650	21WS-0301-SO6348-N-092321	30.05	S	J+	B, <RL	22.23	E	J	<RL	316.64	S	J+	B	7.55	S	J+	B, <RL	4,288.60	E			61.00	S	J	C%	<345	S	UJ	CCS, ND	100.43	E		
P_20210927_98052_651	21WS-0015-SO6349-N-092321	35.10	S	J+	B	76.56	E	J	<RL	325.67	S	J+	B	<22	E	U	ND	3,813.31	E			64.82	S	J	C%	<345	S	UJ	CCS, ND	154.30	E		
P_20210927_98052_652	21WS-0301-SO6350-N-092321	18.94	S	J+	B, <RL	23.76	E	J	<RL	283.00	S	J+	B	<22	E	U	ND	5,841.31	E			69.58	S	J	C%	<345	S	UJ	CCS, ND	94.30	E		
P_20210927_98052_653	21WS-0296-SO6351-N-092321	29.36	S	J+	B, <RL	136.79	E			443.37	S	J+	B	11.40	S	J+	B, <RL	3,228.65	E			44.11	S	J	C%	<345	S	UJ	CCS, ND	61.21	E		
P_20210927_98052_654	21WS-0296-SO6352-N-092321	22.67	S	J+	B, <RL	49.46	E	J	<RL	403.05	S	J+	B	12.24	S	J+	B, <RL	1,085.03	E			73.10	S	J	C%	<345	S	UJ	CCS, ND	47.53	E		
P_20210927_98052_655	21WS-0296-SO6353-N-092321	<32	E	U	ND	52.62	S	J	R%, <RL	1,410.12	E			<22	E	U	ND	73,935.36	E			77.54	S	J	C%	<345	S	UJ	CCS, ND	138.05	E		
P_20210927_98052_662	21WS-0289-SO6356-N-092321	42.28	S	J+	B	970.76	E			603.69	S	J+	B	8.20	S	J+	B, <RL	1,782.17	S	J+	B	45.17	S	J	C%	<345	S	UJ	CCS, ND	51.69	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF				XRF				XRF			
Analyte		Iron				Lead				Manganese				Mercury				Molybdenum				Nickel				Potassium			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Field Sample ID	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code
P_20210921_98052_571	21WS-0003-SO6286-N-092021	44,158.02	E			217.98	E			36,311.34	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	46.93	E	J	<RL	22,546.12	E		
P_20210921_98052_572	21WS-0003-SO6287-N-092021	60,414.20	E			75.93	S	J	C%	3,755.87	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	43.81	E	J	<RL	16,337.86	E		
P_20210921_98052_573	21WS-0002-SO6290-N-092021	32,134.09	E			251.78	E			1,036.51	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	15,917.46	E		
P_20210921_98052_574	21WS-0003-SO6291-N-092021	60,134.30	E			112.90	S	J	C%	4,228.72	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	50.58	E	J	<RL	16,383.51	E		
P_20210921_98052_575	21WS-0003-SO6294-N-092021	20,537.21	E			138.20	S	J	C%	1,308.15	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	17,893.19	E		
P_20210921_98052_576	21WS-0006-SO6295-N-092021	59,297.39	E			81.77	S	J	C%	2,332.53	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	52.14	E	J	<RL	10,901.57	E		
P_20210921_98052_577	21WS-0006-SO6296-N-092021	43,145.50	E			508.07	E			27,296.68	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	55.18	E	J	<RL	18,562.54	E		
P_20210921_98052_578	21WS-0040-SO6298-N-092121	31,186.76	E			378.64	E			2,471.23	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	44.14	E	J	<RL	15,417.96	E		
P_20210921_98052_579	21WS-0040-SO6299-N-092121	34,306.46	E			137.84	S	J	C%	1,264.56	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	15,804.39	E		
P_20210921_98052_580	21WS-0010-SO6303-N-092121	21,928.62	E			1,213.33	E			71,102.29	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	59.50	E	J	<RL	28,948.32	E		
P_20210921_98052_581	21WS-0010-SO6306-N-092121	26,666.63	E			893.38	E			6,868.42	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	48.72	E	J	<RL	17,239.76	E		
P_20210921_98052_582	21WS-0010-SO6308-N-092121	54,681.53	E			4,136.32	E			60,374.15	E			<24	S	UJ	CCS, ND	17.92	S	J	C%	142.97	E			14,992.47	E		
P_20210921_98052_583	21WS-0013-SO6309-N-092121	42,253.71	E			1,794.40	E			7,115.77	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	49.34	E	J	<RL	20,961.11	E		
P_20210921_98052_584	21WS-0012-SO6310-N-092121	27,286.37	E			511.87	E			25,957.68	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	78.22	E	J	<RL	13,382.40	E		
P_20210921_98052_585	21WS-0010-SO6311-N-092121	152,414.30	E			418.57	E			7,834.73	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	17,723.15	E		
P_20210921_98052_586	21WS-0013-SO6314-N-092121	51,510.85	E			396.28	E			3,317.31	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	20,018.00	E		
P_20210921_98052_587	21WS-0014-SO6315-N-092121	35,303.66	E			1,318.70	E			7,000.32	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	24,702.54	E		
P_20210921_98052_588	21WS-0016-SO6317-N-092121	35,085.78	E			3,190.71	E			9,956.70	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	21,602.37	E		
P_20210921_98052_589	21WS-0016-SO6318-N-092121	39,327.88	E			3,964.47	E			3,720.24	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	28,536.92	E		
P_20210921_98052_590	21WS-0016-SO6320-N-092121	44,206.50	E			595.42	E			7,005.10	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	40.39	E	J	<RL	18,290.37	E		
P_20210927_98052_636	21WS-0016-SO6321-N-092221	32,038.97	E			1,682.20	E			11,970.20	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	64.38	E	J	<RL	23,618.83	E		
P_20210927_98052_637	21WS-0016-SO6323-N-092221	26,536.96	E			351.68	E			3,160.30	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	23,465.76	E		
P_20210927_98052_638	21WS-0017-SO6326-N-092221	25,485.02	E			6,902.72	E			1,014.00	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	27,292.18	E		
P_20210927_98052_639	21WS-0015-SO6327-N-092221	21,948.32	E			366.34	E			4,106.21	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	35.41	E	J	<RL	19,939.85	E		
P_20210927_98052_640	21WS-0015-SO6328-N-092221	19,629.22	E			212.94	E			1,804.66	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	37.84	E	J	<RL	16,670.69	E		
P_20210927_98052_641	21WS-0311-SO6330-N-092221	15,086.04	E			149.63	S	J	C%	2,523.89	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	44.14	E	J	<RL	30,101.10	E		
P_20210927_98052_642	21WS-0315-SO6333-N-092221	7,986.08	E			21.98	S	J	C%	1,736.22	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	28,897.04	E		
P_20210927_98052_643	21WS-0315-SO6335-N-092221	17,039.53	E			30.62	S	J	C%	2,389.74	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	34.75	E	J	<RL	20,755.87	E		
P_20210927_98052_644	21WS-0296-SO6337-N-092321	11,169.01	E			599.63	E			3,708.60	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	30.37	E	J	<RL	24,844.90	E		
P_20210927_98052_645	21WS-0296-SO6340-N-092321	17,238.22	E			1,533.65	E			5,310.16	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	45.41	E	J	<RL	18,621.18	E		
P_20210927_98052_646	21WS-1150-SO6341-N-092321	12,734.72	E			2,427.73	E			2,686.58	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	45.07	E	J	<RL	14,513.84	E		
P_20210927_98052_647	21WS-0015-SO6343-N-092321	12,772.75	E			6,076.76	E			4,824.89	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	46.46	E	J	<RL	19,370.97	E		
P_20210927_98052_648	21WS-0015-SO6344-N-092321	23,132.92	E			76.43	S	J	C%	3,436.54	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	15,612.75	E		
P_20210927_98052_649	21WS-0015-SO6347-N-092321	11,119.92	E			1,118.46	E			1,762.68	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	14,098.07	E		
P_20210927_98052_650	21WS-0301-SO6348-N-092321	6,600.48	E			70.12	S	J	C%	607.06	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	24,990.43	E		
P_20210927_98052_651	21WS-0015-SO6349-N-092321	6,729.84	E			79.67	S	J	C%	255.28	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	22,185.48	E		
P_20210927_98052_652	21WS-0301-SO6350-N-092321	7,381.21	E			84.75	S	J	C%	425.18	E			6.48	S	J	CCS, <RL	<14	S	UJ	C%, ND	<100	E	U	ND	22,847.60	E		
P_20210927_98052_653	21WS-0296-SO6351-N-092321	10,072.49	E			678.87	E			3,919.59	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	26,408.14	E		
P_20210927_98052_654	21WS-0296-SO6352-N-092321	16,752.07	E			1,373.18	E			615.13	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	39.43	E	J	<RL	20,421.42	E		
P_20210927_98052_655	21WS-0296-SO6353-N-092321	38,069.98	E			447.42	E			2,293.29	E			9.84	S	J	CCS, <RL	22.39	S	J	C%	40.76	E	J	<RL	5,520.04	E		
P_20210927_98052_662	21WS-0289-SO6356-N-092321	18,883.76	E			1,486.41	E			2,241.49	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	36,487.73	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF			
Analyte		Selenium				Silver				Vanadium				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Field Sample ID	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code
P_20210921_98052_571	21WS-0003-SO6286-N-092021	<13	E	U	ND	<17	E	U	ND	162.31	S	J	C%	326.79	E		
P_20210921_98052_572	21WS-0003-SO6287-N-092021	<13	E	U	ND	<17	E	U	ND	209.52	S	J	C%	285.21	E		
P_20210921_98052_573	21WS-0002-SO6290-N-092021	<13	E	U	ND	7.35	E	J	<RL	127.29	S	J	C%, <RL	206.12	E		
P_20210921_98052_574	21WS-0003-SO6291-N-092021	<13	E	U	ND	<17	E	U	ND	191.25	S	J	C%	283.72	E		
P_20210921_98052_575	21WS-0003-SO6294-N-092021	<13	E	U	ND	<17	E	U	ND	83.88	S	J	C%, <RL	172.55	E		
P_20210921_98052_576	21WS-0006-SO6295-N-092021	<13	E	U	ND	<17	E	U	ND	182.40	S	J	C%	266.77	E		
P_20210921_98052_577	21WS-0006-SO6296-N-092021	<13	E	U	ND	55.13	E			224.33	S	J	C%	1,201.55	E		
P_20210921_98052_578	21WS-0040-SO6298-N-092121	<13	E	U	ND	22.08	E			88.49	S	J	C%, <RL	472.80	E		
P_20210921_98052_579	21WS-0040-SO6299-N-092121	<13	E	U	ND	<17	E	U	ND	135.46	S	J	C%, <RL	240.63	E		
P_20210921_98052_580	21WS-0010-SO6303-N-092121	<13	E	U	ND	7.27	E	J	<RL	91.56	S	J	C%, <RL	2,263.40	E		
P_20210921_98052_581	21WS-0010-SO6306-N-092121	<13	E	U	ND	12.68	E	J	<RL	98.79	S	J	C%, <RL	1,061.07	E		
P_20210921_98052_582	21WS-0010-SO6308-N-092121	<13	E	U	ND	27.59	E			186.08	S	J	C%	4,343.39	E		
P_20210921_98052_583	21WS-0013-SO6309-N-092121	<13	E	U	ND	8.49	E	J	<RL	152.40	S	J	C%	3,981.03	E		
P_20210921_98052_584	21WS-0012-SO6310-N-092121	<13	E	U	ND	<17	E	U	ND	117.33	S	J	C%, <RL	2,433.30	E		
P_20210921_98052_585	21WS-0010-SO6311-N-092121	<13	E	U	ND	9.78	E	J	<RL	343.22	S	J	C%	629.65	E		
P_20210921_98052_586	21WS-0013-SO6314-N-092121	<13	E	U	ND	<17	E	U	ND	187.36	S	J	C%	1,372.69	E		
P_20210921_98052_587	21WS-0014-SO6315-N-092121	<13	E	U	ND	10.66	E	J	<RL	157.29	S	J	C%	3,662.41	E		
P_20210921_98052_588	21WS-0016-SO6317-N-092121	<13	E	U	ND	15.36	E	J	<RL	171.65	S	J	C%	6,539.50	E		
P_20210921_98052_589	21WS-0016-SO6318-N-092121	<13	E	U	ND	19.39	E			131.36	S	J	C%, <RL	6,480.61	E		
P_20210921_98052_590	21WS-0016-SO6320-N-092121	<13	E	U	ND	<17	E	U	ND	164.89	S	J	C%	2,092.53	E		
P_20210927_98052_636	21WS-0016-SO6321-N-092221	<13	E	U	ND	20.38	S	J+	B	120.32	S	J	C%, <RL	2,933.25	E		
P_20210927_98052_637	21WS-0016-SO6323-N-092221	<13	E	U	ND	6.38	S	J+	B, <RL	109.54	S	J	C%, <RL	595.29	E		
P_20210927_98052_638	21WS-0017-SO6326-N-092221	<13	E	U	ND	151.11	E			105.44	S	J	C%, <RL	809.85	E		
P_20210927_98052_639	21WS-0015-SO6327-N-092221	<13	E	U	ND	<17	E	U	ND	128.44	S	J	C%, <RL	647.03	E		
P_20210927_98052_640	21WS-0015-SO6328-N-092221	<13	E	U	ND	<17	E	U	ND	83.35	S	J	C%, <RL	444.50	E		
P_20210927_98052_641	21WS-0311-SO6330-N-092221	<13	E	U	ND	5.65	S	J+	B, <RL	135.08	S	J	C%, <RL	105.55	E		
P_20210927_98052_642	21WS-0315-SO6333-N-092221	<13	E	U	ND	5.29	S	J+	B, <RL	35.29	S	J	C%, <RL	107.84	E		
P_20210927_98052_643	21WS-0315-SO6335-N-092221	<13	E	U	ND	8.86	S	J+	B, <RL	69.25	S	J	C%, <RL	122.04	E		
P_20210927_98052_644	21WS-0296-SO6337-N-092321	<13	E	U	ND	11.49	S	J+	B, <RL	44.12	S	J	C%, <RL	1,880.25	E		
P_20210927_98052_645	21WS-0296-SO6340-N-092321	<13	E	U	ND	34.66	S	J+	B	57.10	S	J	C%, <RL	1,972.79	E		
P_20210927_98052_646	21WS-1150-SO6341-N-092321	<13	E	U	ND	37.06	S	J+	B	59.92	S	J	C%, <RL	2,523.59	E		
P_20210927_98052_647	21WS-0015-SO6343-N-092321	<13	E	U	ND	101.00	E			55.62	S	J	C%, <RL	11,897.87	E		
P_20210927_98052_648	21WS-0015-SO6344-N-092321	<13	E	U	ND	<17	E	U	ND	131.02	S	J	C%, <RL	171.83	E		
P_20210927_98052_649	21WS-0015-SO6347-N-092321	<13	E	U	ND	13.75	S	J+	B, <RL	<146	S	UJ	C%, ND	1,113.84	E		
P_20210927_98052_650	21WS-0301-SO6348-N-092321	<13	E	U	ND	<17	E	U	ND	48.66	S	J	C%, <RL	161.70	E		
P_20210927_98052_651	21WS-0015-SO6349-N-092321	<13	E	U	ND	7.25	S	J+	B, <RL	77.69	S	J	C%, <RL	119.15	E		
P_20210927_98052_652	21WS-0301-SO6350-N-092321	<13	E	U	ND	<17	E	U	ND	50.82	S	J	C%, <RL	194.11	E		
P_20210927_98052_653	21WS-0296-SO6351-N-092321	<13	E	U	ND	23.50	S	J+	B	<146	S	UJ	C%, ND	1,827.84	E		
P_20210927_98052_654	21WS-0296-SO6352-N-092321	<13	E	U	ND	13.27	S	J+	B, <RL	<146	S	UJ	C%, ND	2,664.27	E		
P_20210927_98052_655	21WS-0296-SO6353-N-092321	<13	E	U	ND	<17	E	U	ND	142.54	S	J	C%, D%, <RL	1,448.00	E		
P_20210927_98052_662	21WS-0289-SO6356-N-092321	<13	E	U	ND	74.33	E			107.89	S	J	C%, <RL	390.12	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF				XRF				XRF				XRF			
Analyte		Antimony				Arsenic				Barium				Cadmium				Calcium				Chromium				Cobalt				Copper			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Field Sample ID	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code
P_20210927_98052_663	21WS-0296-SO6354-N-092321	22.76	S	J+	B, <RL	180.39	E			417.07	S	J+	B	19.64	S	J+	B, <RL	4,449.66	E			62.51	S	J	C%	<345	S	UJ	CCS, ND	119.26	E		
P_20210927_98052_664	21WS-0288-SO6357-N-092321	27.27	S	J+	B, <RL	140.17	E			349.14	S	J+	B	9.39	S	J+	B, <RL	2,515.19	E			59.49	S	J	C%	<345	S	UJ	CCS, ND	89.16	E		
P_20210927_98052_665	21WS-0288-SO6358-N-092321	31.75	S	J+	B, <RL	141.76	E			378.67	S	J+	B	<22	E	U	ND	4,301.96	E			83.54	S	J	C%	<345	S	UJ	CCS, ND	126.32	E		
P_20210927_98052_666	21WS-0297-SO6359-N-092321	32.77	S	J+	B	119.64	E			397.88	S	J+	B	13.36	S	J+	B, <RL	2,132.00	S	J+	B	61.09	S	J	C%	<345	S	UJ	CCS, ND	99.65	E		
P_20210927_98052_667	21WS-0290-SO6361-N-092321	<32	E	U	ND	69.14	E	J	<RL	693.50	S	J+	B	<22	E	U	ND	22,787.22	E			64.29	S	J	C%	<345	S	UJ	CCS, ND	93.98	E		
P_20210927_98052_668	21WS-0291-SO6362-N-092321	29.87	S	J+	B, <RL	120.17	E			683.13	S	J+	B	11.83	S	J+	B, <RL	8,329.32	E			77.14	S	J	C%	<345	S	UJ	CCS, ND	83.31	E		
P_20210927_98052_669	21WS-0296-SO6363-N-092321	34.12	S	J+	B	77.81	E	J	<RL	460.52	S	J+	B	18.45	S	J+	B, <RL	5,984.22	E			53.76	S	J	C%	<345	S	UJ	CCS, ND	92.57	E		
P_20210927_98052_670	21WS-0285-SO6364-N-092721	24.22	S	J+	B, <RL	141.34	E			357.61	S	J+	B	<22	E	U	ND	4,114.85	E			73.60	S	J	C%	<345	S	UJ	CCS, ND	206.14	E		
P_20210927_98052_671	21WS-0285-SO6365-N-092721	31.13	S	J+	B, <RL	106.37	E			415.24	S	J+	B	<22	E	U	ND	3,762.87	E			76.71	S	J	C%	<345	S	UJ	CCS, ND	151.20	E		
P_20210927_98052_672	21WS-0285-SO6368-N-092721	29.89	S	J+	B, <RL	111.80	E			312.12	S	J+	B	<22	E	U	ND	4,131.92	E			69.28	S	J	C%	<345	S	UJ	CCS, ND	192.59	E		
P_20210927_98052_673	21WS-0299-SO6370-N-092721	26.02	S	J+	B, <RL	38.78	E	J	<RL	266.61	S	J+	B	<22	E	U	ND	4,796.92	E			56.37	S	J	C%	<345	S	UJ	CCS, ND	144.07	E		
P_20210927_98052_674	21WS-0298-SO6371-N-092721	53.55	S	J+	B	250.18	E			262.54	S	J+	B	<22	E	U	ND	2,977.83	E			70.68	S	J	C%	<345	S	UJ	CCS, ND	159.11	E		
P_20210927_98052_675	21WS-0298-SO6372-N-092721	25.43	S	J+	B, <RL	124.83	E			350.58	S	J+	B	7.48	S	J+	B, <RL	3,554.85	E			71.62	S	J	C%	<345	S	UJ	CCS, ND	163.11	E		
P_20210927_98052_676	21WS-0246-SO6377-N-092721	20.54	S	J+	B, <RL	44.50	E	J	<RL	422.55	S	J+	B	<22	E	U	ND	8,775.61	E			82.53	S	J	C%	<345	S	UJ	CCS, ND	43.41	E		
P_20210929_98052_688	21WS-1116-SO6379-N-092721	22.03	S	J+	B, <RL	186.16	E			601.81	S	J+	B	14.90	S	J+	B, <RL	19,907.99	E			84.98	S	J	B, C%	188.68	S	J	CCS, <RL	2,066.82	E		
P_20210929_98052_689	21WS-1116-SO6380-N-092721	37.92	S	J+	B	270.25	E			697.71	S	J+	B	10.87	S	J+	B, <RL	16,487.76	E			66.93	S	J	B, C%	<345	S	UJ	CCS, ND	1,153.43	E		
P_20210929_98052_690	21WS-1072-SO6381-N-092821	49.56	S	J+	B	463.26	E			431.37	S	J+	B	27.04	S	J+	B	6,729.78	E			72.90	S	J	B, C%	<345	S	UJ	CCS, ND	754.12	E		
P_20210929_98052_691	21WS-1072-SO6382-N-092821	50.26	S	J+	B	285.99	E			661.85	S	J+	B	14.71	S	J+	B, <RL	10,691.06	E			72.01	S	J	B, C%	<345	S	UJ	CCS, ND	515.70	E		
P_20210929_98052_692	21WS-1072-SO6383-N-092821	33.10	S	J+	B	399.95	E			436.58	S	J+	B	9.68	S	J+	B, <RL	3,421.23	S	J+	B	56.39	S	J	B, C%	<345	S	UJ	CCS, ND	101.65	E		
P_20210929_98052_693	21WS-1072-SO6385-N-092821	39.03	S	J+	B	482.03	E			423.17	S	J+	B	18.47	S	J+	B, <RL	3,619.52	S	J+	B	82.07	S	J	B, C%	<345	S	UJ	CCS, ND	391.92	E		
P_20210929_98052_694	21WS-1072-SO6387-N-092821	<32	E	U	ND	53.18	S	J+	B, <RL	243.24	S	J+	B	<22	E	U	ND	16,641.77	E			84.39	S	J	B, C%	<345	S	UJ	CCS, ND	339.39	E		
P_20210929_98052_695	21WS-1072-SO6389-N-092821	37.30	S	J+	B	172.62	E			518.75	S	J+	B	<22	E	U	ND	3,965.37	S	J+	B	54.35	S	J	B, C%	<345	S	UJ	CCS, ND	176.09	E		
P_20210929_98052_696	21WS-1072-SO6390-N-092821	41.31	S	J+	B	240.06	E			680.68	S	J+	B	18.83	S	J+	B, <RL	8,700.88	E			81.98	S	J	B, C%	<345	S	UJ	CCS, ND	464.81	E		
P_20210929_98052_697	21WS-1072-SO6392-N-092821	37.05	S	J+	B	178.19	E			609.66	S	J+	B	14.95	S	J+	B, <RL	3,872.13	S	J+	B	77.27	S	J	B, C%	<345	S	UJ	CCS, ND	139.66	E		
P_20210929_98052_698	21WS-1016-SO6394-N-092821	28.97	S	J+	B, <RL	52.96	S	J+	B, <RL	716.46	S	J+	B	10.33	S	J+	B, <RL	18,107.57	E			76.89	S	J	B, C%	186.38	S	J	CCS, <RL	155.56	E		
P_20210929_98052_699	21WS-1016-SO6396-N-092821	20.60	S	J+	B, <RL	125.25	E			545.86	S	J+	B	12.62	S	J+	B, <RL	4,777.43	S	J+	B	53.65	S	J	B, C%	<345	S	UJ	CCS, ND	165.78	E		
P_20210929_98052_700	21WS-1111-SO6397-N-092821	23.71	S	J+	B, <RL	106.07	E			609.12	S	J+	B	<22	E	U	ND	12,842.12	E			97.84	S	J	B, C%	308.68	S	J	CCS, <RL	166.62	E		
P_20210929_98052_701	21WS-1111-SO6398-N-092821	34.19	S	J+	B	200.73	E			565.64	S	J+	B	<22	E	U	ND	8,279.45	E			83.48	S	J	B, C%	<345	S	UJ	CCS, ND	127.24	E		
P_20210929_98052_702	21WS-1111-SO6402-N-092821	15.80	S	J+	B, <RL	94.36	E			571.86	S	J+	B	<22	E	U	ND	14,511.40	E			75.29	S	J	B, C%	<345	S	UJ	CCS, ND	121.30	E		
P_20210929_98052_703	21WS-1111-SO6403-N-092821	21.73	S	J+	B, <RL	70.81	E	J	<RL	580.24	S	J+	B	<22	E	U	ND	30,248.65	E			77.31	S	J	B, C%	267.36	S	J	CCS, <RL	248.71	E		
P_20210929_98052_704	21WS-0162-SO6405-N-092821	26.63	S	J+	B, <RL	39.13	S	J+	B, <RL	461.23	S	J+	B	<22	E	U	ND	25,538.71	E			63.02	S	J	B, C%	<345	S	UJ	CCS, ND	146.24	E		
P_20210929_98052_705	21WS-0162-SO6406-N-092821	26.39	S	J+	B, <RL	80.98	E	J	<RL	500.82	S	J+	B	11.85	S	J+	B, <RL	18,004.18	E			45.72	S	J	B, C%	<345	S	UJ	CCS, ND	249.35	E		
P_20210929_98052_706	21WS-0162-SO6407-N-092821	<32	E	U	ND	31.51	S	J+	B, <RL	398.39	S	J+	B	<22	E	U	ND	12,993.58	E			55.33	S	J	B, C%	<345	S	UJ	CCS, ND	128.39	E		
P_20210929_98052_707	21WS-0102-SO6409-N-092821	26.00	S	J+	B, <RL	40.00	S	J+	B, <RL	346.28	S	J+	B	<22	E	U	ND	3,949.30	S	J+	B	63.03	S	J	B, C%	<345	S	UJ	CCS, ND	73.79	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF				XRF				XRF				XRF				XRF			
Analyte		Iron				Lead				Manganese				Mercury				Molybdenum				Nickel				Potassium			
Units		mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Field Sample ID	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code
P_20210927_98052_663	21WS-0296-SO6354-N-092321	11,782.98	E			2,722.70	E			5,407.30	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	21,078.26	E		
P_20210927_98052_664	21WS-0288-SO6357-N-092321	11,235.29	E			440.99	E			3,886.63	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	28,229.88	E		
P_20210927_98052_665	21WS-0288-SO6358-N-092321	11,102.16	E			492.20	E			2,514.91	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	34.21	E	J	<RL	24,527.10	E		
P_20210927_98052_666	21WS-0297-SO6359-N-092321	10,546.23	E			893.01	E			1,810.10	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	21,837.00	E		
P_20210927_98052_667	21WS-0290-SO6361-N-092321	15,230.69	E			930.60	E			1,034.84	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	8,425.47	E		
P_20210927_98052_668	21WS-0291-SO6362-N-092321	13,931.98	E			1,583.05	E			3,193.84	E			<24	S	UJ	CCS, ND	7.83	S	J	C%, <RL	<100	E	U	ND	17,074.90	E		
P_20210927_98052_669	21WS-0296-SO6363-N-092321	9,415.37	E			2,989.26	E			4,194.20	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	57.46	E	J	<RL	23,187.16	E		
P_20210927_98052_670	21WS-0285-SO6364-N-092721	10,957.20	E			174.86	E			1,354.79	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	22,829.61	E		
P_20210927_98052_671	21WS-0285-SO6365-N-092721	11,255.34	E			312.92	E			2,154.17	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	28,513.20	E		
P_20210927_98052_672	21WS-0285-SO6368-N-092721	10,918.11	E			412.95	E			1,141.55	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	22,920.86	E		
P_20210927_98052_673	21WS-0299-SO6370-N-092721	7,002.55	E			81.46	S	J	C%	1,854.34	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	32,060.06	E		
P_20210927_98052_674	21WS-0298-SO6371-N-092721	17,270.24	E			257.63	E			9,606.36	E			<24	S	UJ	CCS, ND	19.11	S	J	C%	<100	E	U	ND	22,684.55	E		
P_20210927_98052_675	21WS-0298-SO6372-N-092721	10,346.72	E			86.77	S	J	C%	1,631.45	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	26,299.87	E		
P_20210927_98052_676	21WS-0246-SO6377-N-092721	23,454.50	E			60.32	S	J	C%	2,678.33	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	21,271.34	E		
P_20210929_98052_688	21WS-1116-SO6379-N-092721	35,950.52	E			757.47	E			1,342.81	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	13,893.30	E		
P_20210929_98052_689	21WS-1116-SO6380-N-092721	43,836.86	E			512.38	E			1,814.14	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	44.02	E	J	<RL	16,640.01	E		
P_20210929_98052_690	21WS-1072-SO6381-N-092821	30,988.29	E			3,179.07	E			48,614.02	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	50.44	E	J	<RL	22,056.57	E		
P_20210929_98052_691	21WS-1072-SO6382-N-092821	34,839.90	E			1,690.54	E			5,061.58	E			<24	S	UJ	CCS, ND	25.27	S	J	C%	<100	E	U	ND	19,530.74	E		
P_20210929_98052_692	21WS-1072-SO6383-N-092821	36,875.36	E			924.33	E			2,808.14	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	31,432.88	E		
P_20210929_98052_693	21WS-1072-SO6385-N-092821	33,824.11	E			1,782.69	E			13,735.92	E			<24	S	UJ	CCS, ND	6.29	S	J	C%, <RL	<100	E	U	ND	25,136.61	E		
P_20210929_98052_694	21WS-1072-SO6387-N-092821	17,618.34	E			63.34	S	J	C%	576.86	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	6,503.62	S	J+	B
P_20210929_98052_695	21WS-1072-SO6389-N-092821	31,962.04	E			934.70	E			6,272.33	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	24,076.44	E		
P_20210929_98052_696	21WS-1072-SO6390-N-092821	29,807.58	E			1,079.51	E			4,586.39	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	49.59	E	J	<RL	14,413.47	E		
P_20210929_98052_697	21WS-1072-SO6392-N-092821	37,084.86	E			457.39	E			18,400.03	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	57.03	E	J	<RL	30,470.21	E		
P_20210929_98052_698	21WS-1016-SO6394-N-092821	50,950.80	E			74.09	S	J	C%	2,386.56	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	58.49	E	J	<RL	18,815.07	E		
P_20210929_98052_699	21WS-1016-SO6396-N-092821	38,718.45	E			763.00	E			30,636.38	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	71.08	E	J	<RL	30,591.35	E		
P_20210929_98052_700	21WS-1111-SO6397-N-092821	47,579.24	E			42.08	S	J	C%	647.84	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	18,731.94	E		
P_20210929_98052_701	21WS-1111-SO6398-N-092821	33,748.41	E			123.51	S	J	C%	479.03	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	42.43	E	J	<RL	23,356.20	E		
P_20210929_98052_702	21WS-1111-SO6402-N-092821	51,173.52	E			32.58	S	J	C%	1,441.24	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	14,419.06	E		
P_20210929_98052_703	21WS-1111-SO6403-N-092821	81,276.69	E			56.81	S	J	C%	2,137.91	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	48.63	E	J	<RL	10,531.31	E		
P_20210929_98052_704	21WS-0162-SO6405-N-092821	14,156.91	E			487.21	E			64,852.25	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	52.71	E	J	<RL	13,057.35	E		
P_20210929_98052_705	21WS-0162-SO6406-N-092821	27,044.99	E			477.95	E			34,455.30	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	47.63	E	J	<RL	14,069.28	E		
P_20210929_98052_706	21WS-0162-SO6407-N-092821	32,354.37	E			272.10	E			22,781.78	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	47.70	E	J	<RL	14,633.49	E		
P_20210929_98052_707	21WS-0102-SO6409-N-092821	16,519.91	E			33.45	S	J	C%, D%, R%	418.84	E			<24	S	UJ	CCS, ND	<14	S	UJ	C%, ND	<100	E	U	ND	23,089.20	E		

Table 1. FPXRF Natural Results with Enforcement/Screening Classifications, Data Validation Qualifiers, and Data Validation Reason Codes

Method		XRF				XRF				XRF				XRF			
Analyte		Selenium				Silver				Vanadium				Zinc			
Units		mg/kg				mg/kg				mg/kg				mg/kg			
Analysis Run ID	Field Sample ID	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code	Result	S/E	DV Qual	Reason Code
P_20210927_98052_663	21WS-0296-SO6354-N-092321	<13	E	U	ND	35.55	S	J+	B	72.09	S	J	C%, <RL	5,038.13	E		
P_20210927_98052_664	21WS-0288-SO6357-N-092321	<13	E	U	ND	19.61	S	J+	B	48.09	S	J	C%, <RL	631.03	E		
P_20210927_98052_665	21WS-0288-SO6358-N-092321	<13	E	U	ND	16.33	S	J+	B, <RL	57.00	S	J	C%, <RL	402.36	E		
P_20210927_98052_666	21WS-0297-SO6359-N-092321	<13	E	U	ND	44.27	S	J+	B	43.99	S	J	C%, <RL	712.38	E		
P_20210927_98052_667	21WS-0290-SO6361-N-092321	<13	E	U	ND	8.24	S	J+	B, <RL	57.33	S	J	C%, <RL	2,355.08	E		
P_20210927_98052_668	21WS-0291-SO6362-N-092321	<13	E	U	ND	49.43	S	J+	B	62.04	S	J	C%, <RL	2,217.19	E		
P_20210927_98052_669	21WS-0296-SO6363-N-092321	<13	E	U	ND	44.35	S	J+	B	<146	S	UJ	C%, ND	3,338.59	E		
P_20210927_98052_670	21WS-0285-SO6364-N-092721	<13	E	U	ND	<17	E	U	ND	61.55	S	J	C%, <RL	273.92	E		
P_20210927_98052_671	21WS-0285-SO6365-N-092721	<13	E	U	ND	13.11	S	J+	B, <RL	60.22	S	J	C%, <RL	244.85	E		
P_20210927_98052_672	21WS-0285-SO6368-N-092721	<13	E	U	ND	11.66	S	J+	B, <RL	63.79	S	J	C%, <RL	557.93	E		
P_20210927_98052_673	21WS-0299-SO6370-N-092721	<13	E	U	ND	<17	E	U	ND	35.98	S	J	C%, <RL	275.05	E		
P_20210927_98052_674	21WS-0298-SO6371-N-092721	<13	E	U	ND	18.57	S	J+	B	71.59	S	J	C%, <RL	283.27	E		
P_20210927_98052_675	21WS-0298-SO6372-N-092721	<13	E	U	ND	<17	E	U	ND	54.01	S	J	C%, <RL	190.67	E		
P_20210927_98052_676	21WS-0246-SO6377-N-092721	<13	E	U	ND	<17	E	U	ND	92.28	S	J	C%, <RL	237.66	E		
P_20210929_98052_688	21WS-1116-SO6379-N-092721	<13	E	U	ND	18.08	E			117.24	S	J	C%, <RL	3,007.86	E		
P_20210929_98052_689	21WS-1116-SO6380-N-092721	<13	E	U	ND	25.47	E			161.32	S	J	C%	2,049.81	E		
P_20210929_98052_690	21WS-1072-SO6381-N-092821	<13	E	U	ND	149.69	E			75.07	S	J	C%, <RL	4,906.00	E		
P_20210929_98052_691	21WS-1072-SO6382-N-092821	<13	E	U	ND	136.41	E			134.66	S	J	C%, <RL	2,276.34	E		
P_20210929_98052_692	21WS-1072-SO6383-N-092821	<13	E	U	ND	68.31	E			136.70	S	J	C%, <RL	526.82	E		
P_20210929_98052_693	21WS-1072-SO6385-N-092821	<13	E	U	ND	67.04	E			110.11	S	J	C%, <RL	1,498.22	E		
P_20210929_98052_694	21WS-1072-SO6387-N-092821	<13	E	U	ND	<17	E	U	ND	234.01	S	J	C%	162.16	E		
P_20210929_98052_695	21WS-1072-SO6389-N-092821	<13	E	U	ND	65.04	E			179.09	S	J	C%	2,720.88	E		
P_20210929_98052_696	21WS-1072-SO6390-N-092821	<13	E	U	ND	42.66	E			120.48	S	J	C%, <RL	1,646.68	E		
P_20210929_98052_697	21WS-1072-SO6392-N-092821	<13	E	U	ND	33.81	E			179.59	S	J	C%	1,646.94	E		
P_20210929_98052_698	21WS-1016-SO6394-N-092821	<13	E	U	ND	<17	E	U	ND	173.87	S	J	C%	360.40	E		
P_20210929_98052_699	21WS-1016-SO6396-N-092821	<13	E	U	ND	17.12	E			170.62	S	J	C%	1,455.31	E		
P_20210929_98052_700	21WS-1111-SO6397-N-092821	<13	E	U	ND	8.47	E	J	<RL	196.39	S	J	C%	128.17	E		
P_20210929_98052_701	21WS-1111-SO6398-N-092821	<13	E	U	ND	9.96	E	J	<RL	169.91	S	J	C%	158.99	E		
P_20210929_98052_702	21WS-1111-SO6402-N-092821	<13	E	U	ND	<17	E	U	ND	209.85	S	J	C%	139.28	E		
P_20210929_98052_703	21WS-1111-SO6403-N-092821	<13	E	U	ND	<17	E	U	ND	254.83	S	J	C%	198.15	E		
P_20210929_98052_704	21WS-0162-SO6405-N-092821	<13	E	U	ND	135.25	E			<146	S	UJ	C%, ND	672.73	E		
P_20210929_98052_705	21WS-0162-SO6406-N-092821	<13	E	U	ND	61.33	E			102.33	S	J	C%, <RL	778.78	E		
P_20210929_98052_706	21WS-0162-SO6407-N-092821	<13	E	U	ND	21.89	E			143.98	S	J	C%, <RL	834.40	E		
P_20210929_98052_707	21WS-0102-SO6409-N-092821	<13	E	U	ND	<17	E	U	ND	69.65	S	J	C%, <RL	48.87	E		

Table 2
FPXRF SiO2 Standard Results

Abbreviations:
mg/kg = milligram per kilogram
ND = not detected

Table 2. FPXRF SiO2 Standard Results

Analysis Run ID	Sample Type	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Potassium (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
P_20210921_98052_567	SiO2	14.41	ND	51.75	6.98	84.74	ND	ND	ND	39.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P_20210921_98052_593	SiO2	16.14	ND	72.41	6.82	ND	ND	ND	ND	46.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P_20210927_98052_632	SiO2	19.63	ND	78.96	7.02	82.61	ND	ND	ND	57.09	ND	ND	ND	ND	ND	144.48	ND	6.39	ND	ND
P_20210927_98052_658	SiO2	14.37	ND	77.81	ND	ND	ND	ND	ND	43.94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P_20210927_98052_679	SiO2	21.64	ND	87.31	7.20	224.54	ND	ND	ND	137.15	ND	ND	ND	ND	ND	359.96	ND	5.24	ND	ND
P_20210929_98052_684	SiO2	27.32	3.23	79.20	11.7	327.25	ND	ND	ND	191.82	ND	ND	ND	ND	ND	337.76	ND	ND	ND	ND
P_20210929_98052_710	SiO2	30.91	5.77	111.24	10.9	486.48	23.46	ND	ND	224.46	ND	ND	ND	ND	ND	776.21	ND	ND	ND	ND

Table 3
FPXRF Calibration Check Standards Results

Abbreviations:
mg/kg = milligram per kilogram
%R = percent recovery
ND = not detected

Table 3. FPXRF Calibration Check Standards Results

Analysis Run ID	Sample Type	Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron		Lead		Manganese		Mercury		Molybdenum		Nickel		Potassium		Selenium	
		Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R
P_20210921_98052_568	NIST 2709a	44.55	N/A	14.52	N/A	897.47	92	11.34	N/A	21,395.70	112	127.78	98	163.94	N/A	28.59	N/A	28,344.57	84	12.18	70	511.81	97	ND	N/A	ND	N/A	91.91	108	19,964.93	95	ND	N/A
P_20210921_98052_569	USGS SdAR-M2	113.58	106	86.47	N/A	876.76	89	19.31	N/A	5,171.60	N/A	92.74	187	ND	N/A	212.89	90	13,384.33	N/A	804.27	100	843.21	N/A	ND	N/A	9.68	73	68.81	N/A	41,745.58	N/A	ND	N/A
P_20210921_98052_570	RCRA	26.09	N/A	484.91	97	776.77	N/A	517.35	103	6,243.08	N/A	523.05	105	ND	N/A	23.91	N/A	14,586.16	N/A	510.13	102	117.95	N/A	ND	N/A	ND	N/A	ND	N/A	11,873.00	N/A	503.94	101
P_20210921_98052_594	NIST 2709a	34.50	N/A	12.03	N/A	861.98	88	7.99	N/A	21,310.59	112	120.84	93	ND	N/A	32.72	N/A	28,184.05	84	11.91	69	491.92	93	ND	N/A	ND	N/A	81.64	96	20,888.49	99	ND	N/A
P_20210921_98052_595	USGS SdAR-M2	116.14	109	76.05	N/A	943.82	95	13.50	N/A	5,244.12	N/A	71.65	144	ND	N/A	196.08	83	13,323.81	N/A	791.46	98	783.91	N/A	ND	N/A	5.65	42	53.89	N/A	41,853.05	N/A	ND	N/A
P_20210921_98052_596	RCRA	37.62	N/A	496.91	99	822.56	N/A	549.19	110	6,537.19	N/A	538.27	108	ND	N/A	21.63	N/A	14,755.53	N/A	478.86	96	179.41	N/A	ND	N/A	ND	N/A	ND	N/A	11,918.68	N/A	513.86	103
P_20210927_98052_633	NIST 2709a	41.18	N/A	12.38	N/A	901.84	92	11.20	N/A	21,025.90	110	117.05	90	ND	N/A	36.97	N/A	28,454.14	85	10.25	59	486.54	92	ND	N/A	ND	N/A	91.69	108	20,363.34	97	ND	N/A
P_20210927_98052_634	USGS SdAR-M2	121.60	114	72.64	N/A	927.44	94	17.24	N/A	5,326.57	N/A	89.23	180	91.07	N/A	209.22	89	13,365.90	N/A	791.67	98	836.19	N/A	ND	N/A	10.48	79	86.59	N/A	41,308.47	N/A	ND	N/A
P_20210927_98052_635	RCRA	31.65	N/A	497.14	99	786.47	N/A	515.55	103	6,552.61	N/A	525.45	105	ND	N/A	29.55	N/A	14,576.40	N/A	479.40	96	146.90	N/A	ND	N/A	ND	N/A	ND	N/A	12,315.92	N/A	507.27	101
P_20210927_98052_659	NIST 2709a	29.67	N/A	10.58	N/A	881.73	90	8.70	N/A	21,666.30	113	120.85	93	ND	N/A	30.39	N/A	28,437.43	85	16.71	97	511.96	97	ND	N/A	ND	N/A	81.43	96	20,190.26	96	4.28	N/A
P_20210927_98052_660	USGS SdAR-M2	111.71	104	88.48	N/A	912.63	92	18.42	N/A	5,355.96	N/A	92.57	187	ND	N/A	214.27	91	13,409.24	N/A	789.78	98	835.20	N/A	ND	N/A	ND	N/A	63.96	N/A	42,195.44	N/A	4.88	N/A
P_20210927_98052_661	RCRA	24.07	N/A	503.06	101	772.85	N/A	508.78	102	6,391.64	N/A	530.90	106	ND	N/A	21.80	N/A	14,831.90	N/A	485.81	97	156.01	N/A	ND	N/A	ND	N/A	ND	N/A	12,401.91	N/A	509.50	102
P_20210927_98052_680	NIST 2709a	38.59	N/A	14.75	N/A	855.07	87	ND	N/A	21,259.45	111	143.78	111	ND	N/A	29.97	N/A	28,254.68	84	12.13	70	487.10	92	ND	N/A	ND	N/A	73.80	87	20,451.89	97	ND	N/A
P_20210927_98052_681	USGS SdAR-M2	118.92	111	90.74	N/A	917.17	93	17.11	N/A	5,464.11	N/A	96.14	194	ND	N/A	226.79	96	13,651.43	N/A	777.16	96	867.89	N/A	ND	N/A	7.71	58	69.88	N/A	42,033.65	N/A	ND	N/A
P_20210927_98052_682	RCRA	30.44	N/A	487.50	98	777.51	N/A	502.23	100	6,388.05	N/A	539.77	108	ND	N/A	ND	N/A	14,571.45	N/A	493.88	99	168.04	N/A	ND	N/A	ND	N/A	ND	N/A	12,273.26	N/A	507.38	101
P_20210929_98052_685	NIST 2709a	32.32	N/A	11.45	N/A	855.57	87	10.07	N/A	21,205.33	111	137.71	106	167.52	N/A	30.31	N/A	27,884.21	83	14.81	86	535.30	101	ND	N/A	ND	N/A	85.94	101	20,638.77	98	ND	N/A
P_20210929_98052_686	USGS SdAR-M2	118.96	111	84.82	N/A	906.23	92	17.96	N/A	5,112.11	N/A	87.36	176	95.00	N/A	220.46	93	13,351.93	N/A	795.23	98	819.76	N/A	ND	N/A	5.41	41	59.56	N/A	41,550.70	N/A	ND	N/A
P_20210929_98052_687	RCRA	32.19	N/A	484.06	97	792.10	N/A	526.02	105	6,515.57	N/A	517.60	104	ND	N/A	21.11	N/A	14,437.17	N/A	485.30	97	144.78	N/A	ND	N/A	ND	N/A	ND	N/A	12,186.86	N/A	508.33	102
P_20210929_98052_711	NIST 2709a	40.50	N/A	12.95	N/A	881.19	90	11.31	N/A	19,506.39	102	162.64	125	ND	N/A	31.98	N/A	27,002.10	80	11.34	66	504.68	95	ND	N/A	ND	N/A	92.86	109	19,335.59	92	ND	N/A
P_20210929_98052_712	USGS SdAR-M2	118.38	111	86.82	N/A	903.91	91	19.69	N/A	4,781.56	N/A	67.40	136	ND	N/A	218.73	93	12,986.80	N/A	775.07	96	804.35	N/A	ND	N/A	ND	N/A	52.81	N/A	38,622.73	N/A	ND	N/A
P_20210929_98052_713	RCRA	31.75	N/A	498.36	100	809.04	N/A	527.47	105	6,216.14	N/A	486.56	97	ND	N/A	21.19	N/A	14,455.02	N/A	473.01	95	110.75	N/A	ND	N/A	ND	N/A	42.15	N/A	11,024.55	N/A	494.80	99

Table 3. FPXRF Calibration Check Standards Results

Analysis Run ID	Sample Type	Silver		Vanadium		Zinc	
		Result (mg/kg)	%R	Result (mg/kg)	%R	Result (mg/kg)	%R
P_20210921_98052_568	NIST 2709a	ND	N/A	139.35	127	98.56	96
P_20210921_98052_569	USGS SdAR-M2	22.53	N/A	ND	N/A	725.20	95
P_20210921_98052_570	RCRA	508.76	102	108.39	N/A	52.30	N/A
P_20210921_98052_594	NIST 2709a	ND	N/A	130.82	119	83.76	81
P_20210921_98052_595	USGS SdAR-M2	22.79	N/A	73.02	N/A	706.51	93
P_20210921_98052_596	RCRA	526.91	105	94.01	N/A	43.39	N/A
P_20210927_98052_633	NIST 2709a	ND	N/A	153.95	140	86.26	84
P_20210927_98052_634	USGS SdAR-M2	22.08	N/A	ND	N/A	718.92	95
P_20210927_98052_635	RCRA	517.35	103	141.16	N/A	46.43	N/A
P_20210927_98052_659	NIST 2709a	ND	N/A	144.19	131	98.28	95
P_20210927_98052_660	USGS SdAR-M2	24.74	N/A	66.86	N/A	731.58	96
P_20210927_98052_661	RCRA	503.48	101	145.94	N/A	44.85	N/A
P_20210927_98052_680	NIST 2709a	ND	N/A	145.58	132	97.50	95
P_20210927_98052_681	USGS SdAR-M2	25.06	N/A	75.77	N/A	720.63	95
P_20210927_98052_682	RCRA	508.29	102	133.13	N/A	50.63	N/A
P_20210929_98052_685	NIST 2709a	ND	N/A	110.38	100	87.61	85
P_20210929_98052_686	USGS SdAR-M2	23.72	N/A	53.59	N/A	725.91	96
P_20210929_98052_687	RCRA	512.32	102	106.35	N/A	39.19	N/A
P_20210929_98052_711	NIST 2709a	ND	N/A	139.59	127	83.03	81
P_20210929_98052_712	USGS SdAR-M2	20.34	N/A	ND	N/A	697.91	92
P_20210929_98052_713	RCRA	510.57	102	101.58	N/A	46.18	N/A

Table 4
FPXRF Duplicate and FPXRF Replicate Sample Results

Abbreviations:
mg/kg = milligram per kilogram
RPD = relative percent differnce
ND = not detected

Table 4. FPXRF Duplicate and FPXRF Replicate Sample Results

Sample Type	Analysis Run ID	Sample Name	Parent Sample	Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron		Lead		Manganese	
				Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20210921_98052_590	21WS-0016-SO6320-N-092121		21.18		74.87		718.94		10.24		15,900.83		57.51		ND		84.25		44,206.50		595.42		7,005.10	
XRF Replicate	P_20210921_98052_591	21WS-0016-SO6320-N-092121-R	21WS-0016-SO6320-N-092121	23.67	11%	70.25	6%	709.14	1%	ND	N/A	15,265.03	4%	75.68	27%	ND	N/A	79.29	6%	44,191.86	0%	578.45	3%	6,841.60	2%
XRF Duplicate	P_20210921_98052_592	21WS-0016-SO6320-N-092121-D	21WS-0016-SO6320-N-092121	26.39	22%	51.26	37%	743.44	3%	ND	N/A	14,560.19	9%	71.27	21%	ND	N/A	90.97	8%	42,846.09	3%	512.66	15%	6,603.47	6%
Natural	P_20210927_98052_655	21WS-0296-SO6353-N-092321		ND		52.62		1,410.12		ND		73,935.36		77.54		ND		138.05		38,069.98		447.42		2,293.29	
XRF Replicate	P_20210927_98052_656	21WS-0296-SO6353-N-092321-R	21WS-0296-SO6353-N-092321	ND	N/A	34.81	41%	1,404.68	0%	ND	N/A	73,798.18	0%	80.93	4%	ND	N/A	135.05	2%	37,907.28	0%	479.57	7%	2,208.81	4%
XRF Duplicate	P_20210927_98052_657	21WS-0296-SO6353-N-092321-D	21WS-0296-SO6353-N-092321	ND	N/A	65.49	22%	1,233.59	13%	ND	N/A	66,064.28	11%	89.29	14%	ND	N/A	167.46	19%	36,848.49	3%	513.78	14%	2,309.45	1%
Natural	P_20210927_98052_676	21WS-0246-SO6377-N-092721		20.54		44.50		422.55		ND		8,775.61		82.53		ND		43.41		23,454.50		60.32		2,678.33	
XRF Replicate	P_20210927_98052_677	21WS-0246-SO6377-N-092721-R	21WS-0246-SO6377-N-092721	28.52	33%	46.31	4%	456.38	8%	8.76	N/A	8,531.84	3%	75.48	9%	ND	N/A	45.67	5%	24,111.36	3%	56.97	6%	2,626.19	2%
XRF Duplicate	P_20210927_98052_678	21WS-0246-SO6377-N-092721-D	21WS-0246-SO6377-N-092721	17.92	14%	60.70	31%	381.38	10%	8.53	N/A	7,712.27	13%	69.56	17%	ND	N/A	47.51	9%	25,751.48	9%	66.43	10%	3,239.92	19%
Natural	P_20210929_98052_707	21WS-0102-SO6409-N-092821		26.00		40.00		346.28		ND		3,949.30		63.03		ND		73.79		16,519.91		33.45		418.84	
XRF Replicate	P_20210929_98052_708	21WS-0102-SO6409-N-092821-R	21WS-0102-SO6409-N-092821	22.57	14%	56.06	33%	382.28	10%	ND	N/A	4,068.67	3%	71.72	13%	ND	N/A	64.88	13%	17,929.43	8%	12.37	92%	320.13	27%
XRF Duplicate	P_20210929_98052_709	21WS-0102-SO6409-N-092821-D	21WS-0102-SO6409-N-092821	28.70	10%	47.84	18%	364.96	5%	ND	N/A	3,636.92	8%	68.09	8%	ND	N/A	70.34	5%	17,851.11	8%	10.78	103%	309.76	30%

Table 4. FPXRF Duplicate and FPXRF Replicate Sample Results

Sample Type	Analysis Run ID	Sample Name	Parent Sample	Mercury		Molybdenum		Nickel		Potassium		Selenium		Silver		Vanadium		Zinc	
				Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20210921_98052_590	21WS-0016-SO6320-N-092121		ND		ND		40.39		18,290.37		ND		ND		164.89		2,092.53	
XRF Replicate	P_20210921_98052_591	21WS-0016-SO6320-N-092121-R	21WS-0016-SO6320-N-092121	ND	N/A	ND	N/A	48.32	18%	18,493.57	1%	ND	N/A	ND	N/A	144.94	13%	2,042.38	2%
XRF Duplicate	P_20210921_98052_592	21WS-0016-SO6320-N-092121-D	21WS-0016-SO6320-N-092121	ND	N/A	ND	N/A	47.54	16%	17,252.65	6%	ND	N/A	ND	N/A	183.47	11%	2,541.45	19%
Natural	P_20210927_98052_655	21WS-0296-SO6353-N-092321		9.84		22.39		40.76		5,520.04		ND		ND		142.54		1,448.00	
XRF Replicate	P_20210927_98052_656	21WS-0296-SO6353-N-092321-R	21WS-0296-SO6353-N-092321	ND	N/A	21.01	6%	51.44	23%	5,723.43	4%	ND	N/A	ND	N/A	128.09	11%	1,417.42	2%
XRF Duplicate	P_20210927_98052_657	21WS-0296-SO6353-N-092321-D	21WS-0296-SO6353-N-092321	ND	N/A	ND	N/A	47.28	15%	5,760.62	4%	ND	N/A	ND	N/A	95.13	40%	1,707.56	16%
Natural	P_20210927_98052_676	21WS-0246-SO6377-N-092721		ND		ND		ND		21,271.34		ND		ND		92.28		237.66	
XRF Replicate	P_20210927_98052_677	21WS-0246-SO6377-N-092721-R	21WS-0246-SO6377-N-092721	ND	N/A	ND	N/A	42.39	N/A	21,900.50	3%	ND	N/A	7.10	N/A	115.61	22%	230.52	3%
XRF Duplicate	P_20210927_98052_678	21WS-0246-SO6377-N-092721-D	21WS-0246-SO6377-N-092721	ND	N/A	ND	N/A	43.45	N/A	22,551.54	6%	ND	N/A	ND	N/A	123.21	29%	289.93	20%
Natural	P_20210929_98052_707	21WS-0102-SO6409-N-092821		ND		ND		ND		23,089.20		ND		ND		69.65		48.87	
XRF Replicate	P_20210929_98052_708	21WS-0102-SO6409-N-092821-R	21WS-0102-SO6409-N-092821	ND	N/A	ND	N/A	ND	N/A	23,230.20	1%	ND	N/A	ND	N/A	93.31	29%	47.99	2%
XRF Duplicate	P_20210929_98052_709	21WS-0102-SO6409-N-092821-D	21WS-0102-SO6409-N-092821	ND	N/A	ND	N/A	ND	N/A	24,934.11	8%	ND	N/A	ND	N/A	98.58	34%	46.94	4%

Table 5
FPXRF Natural Sample Identification

Abbreviations:
ft = feet

Table 5. FPXRF Natural Sample Identification

Analysis Run ID	Sample Name	Site	Sample ID	Type	Matrix	Sample Date	Borehole	Depth Interval (ft)	Prep Method	Analysis Date
P_20210921_98052_571	21WS-0003-SO6286-N-092021	3	SO6286	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_572	21WS-0003-SO6287-N-092021	3	SO6287	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_573	21WS-0002-SO6290-N-092021	2	SO6290	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_574	21WS-0003-SO6291-N-092021	3	SO6291	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_575	21WS-0003-SO6294-N-092021	3	SO6294	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_576	21WS-0006-SO6295-N-092021	6	SO6295	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_577	21WS-0006-SO6296-N-092021	6	SO6296	Surface	Soil	9/20/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_578	21WS-0040-SO6298-N-092121	40	SO6298	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_579	21WS-0040-SO6299-N-092121	40	SO6299	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_580	21WS-0010-SO6303-N-092121	10	SO6303	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_581	21WS-0010-SO6306-N-092121	10	SO6306	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_582	21WS-0010-SO6308-N-092121	10	SO6308	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_583	21WS-0013-SO6309-N-092121	13	SO6309	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_584	21WS-0012-SO6310-N-092121	13	SO6310	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_585	21WS-0010-SO6311-N-092121	13	SO6311	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_586	21WS-0013-SO6314-N-092121	13	SO6314	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_587	21WS-0014-SO6315-N-092121	14	SO6315	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_588	21WS-0016-SO6317-N-092121	16	SO6317	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_589	21WS-0016-SO6318-N-092121	16	SO6318	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210921_98052_590	21WS-0016-SO6320-N-092121	16	SO6320	Surface	Soil	9/21/2021	N/A	N/A	Simple Sieve	9/21/2021
P_20210927_98052_636	21WS-0016-SO6321-N-092221	16	SO6321	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_637	21WS-0016-SO6323-N-092221	16	SO6323	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_638	21WS-0017-SO6326-N-092221	17	SO6326	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_639	21WS-0015-SO6327-N-092221	15	SO6327	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_640	21WS-0015-SO6328-N-092221	15	SO6328	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_641	21WS-0311-SO6330-N-092221	311	SO6330	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_642	21WS-0315-SO6333-N-092221	315	SO6333	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_643	21WS-0315-SO6335-N-092221	315	SO6335	Surface	Soil	9/22/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_644	21WS-0296-SO6337-N-092321	296	SO6337	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_645	21WS-0296-SO6340-N-092321	296	SO6340	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_646	21WS-1150-SO6341-N-092321	1150	SO6341	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_647	21WS-0015-SO6343-N-092321	15	SO6343	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_648	21WS-0015-SO6344-N-092321	15	SO6344	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_649	21WS-0015-SO6347-N-092321	15	SO6347	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_650	21WS-0301-SO6348-N-092321	301	SO6348	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_651	21WS-0015-SO6349-N-092321	15	SO6349	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_652	21WS-0301-SO6350-N-092321	301	SO6350	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_653	21WS-0296-SO6351-N-092321	296	SO6351	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_654	21WS-0296-SO6352-N-092321	296	SO6352	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_655	21WS-0296-SO6353-N-092321	296	SO6353	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_662	21WS-0289-SO6356-N-092321	289	SO6356	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_663	21WS-0296-SO6354-N-092321	296	SO6354	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_664	21WS-0288-SO6357-N-092321	288	SO6357	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_665	21WS-0288-SO6358-N-092321	288	SO6358	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_666	21WS-0297-SO6359-N-092321	297	SO6359	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_667	21WS-0290-SO6361-N-092321	290	SO6361	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_668	21WS-0291-SO6362-N-092321	296	SO6362	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_669	21WS-0296-SO6363-N-092321	296	SO6363	Surface	Soil	9/23/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_670	21WS-0285-SO6364-N-092721	285	SO6364	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_671	21WS-0285-SO6365-N-092721	285	SO6365	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_672	21WS-0285-SO6368-N-092721	285	SO6368	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_673	21WS-0299-SO6370-N-092721	299	SO6370	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_674	21WS-0298-SO6371-N-092721	299	SO6371	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_675	21WS-0298-SO6372-N-092721	299	SO6372	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210927_98052_676	21WS-0246-SO6377-N-092721	246	SO6377	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/27/2021
P_20210929_98052_688	21WS-1116-SO6379-N-092721	1116	SO6379	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_689	21WS-1116-SO6380-N-092721	1116	SO6380	Surface	Soil	9/27/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_690	21WS-1072-SO6381-N-092821	1072	SO6381	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_691	21WS-1072-SO6382-N-092821	1072	SO6382	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_692	21WS-1072-SO6383-N-092821	1072	SO6383	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_693	21WS-1072-SO6385-N-092821	1072	SO6385	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_694	21WS-1072-SO6387-N-092821	1072	SO6387	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_695	21WS-1072-SO6389-N-092821	1072	SO6389	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_696	21WS-1072-SO6390-N-092821	1072	SO6390	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_697	21WS-1072-SO6392-N-092821	1072	SO6392	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_698	21WS-1016-SO6394-N-092821	1016	SO6394	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_699	21WS-1016-SO6396-N-092821	1016	SO6396	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_700	21WS-1111-SO6397-N-092821	1111	SO6397	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_701	21WS-1111-SO6398-N-092821	1111	SO6398	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_702	21WS-1111-SO6402-N-092821	1111	SO6402	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_703	21WS-1111-SO6403-N-092821	1111	SO6403	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_704	21WS-0162-SO6405-N-092821	162	SO6405	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_705	21WS-0162-SO6406-N-092821	162	SO6406	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_706	21WS-0162-SO6407-N-092821	162	SO6407	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021
P_20210929_98052_707	21WS-0102-SO6409-N-092821	102	SO6409	Surface	Soil	9/28/2021	N/A	N/A	Simple Sieve	9/29/2021

Attachment A
Data Validation Checklists

FPXRF Data Validation Checklist

Site:	West Side Soils Operable Unit	**Case No:**	P_20210921	**Laboratory:**	Field
Project:	WSSOU RI Sampling	**Sample Matrix:**	Soil	**Analyses:** antimony, arsenic, barium, calcium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, vanadium, zinc	
Sample Date(s): 09/20/2021, 09/21/2021		**Analysis Date(s):** 09/21/2021			
Data Validator:	S. Ward	**Validation Date(s):**	01/25/2021, 01/26/2021, 01/27/2021		

1. Holding Times

Analytes	Laboratory	Matrix	Method	Holding Times	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Sb, As, Ba, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, K, Se, Ag, V, Zn	Field	Soil	FPXRF	N/A	09/20/2021, 09/21/2021	09/21/2021	N/A	N/A

Were any data flagged because of holding time? Y [ ] N [X]
What sample preparation steps were performed (i.e. drying, sieving etc.)? Simple Sieve
Were the samples prepped according to the SAP/QAPP? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments: All samples underwent the "Simple Sieve" prep method as defined in the WSSOU RI QAPP.

2. Energy Calibration (System Check)

Was the energy calibration performed at the frequency of once per day? Y [X] N [ ]
Was the energy calibration Resolution below 195? Y [X] N [ ]
Did the energy calibration run for at least 50 seconds? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments:

3. SiO_2 Standard

Was the SiO_2 Standard analyzed at the beginning of analysis? Y [X] N [ ]
Was the SiO_2 Standard analyzed at the frequency of 1 per 20 natural samples? Y [X] N [ ]
Were the SiO_2 Standard results within the control limits? Y [ ] N [X]
Were any data flagged because of the SiO_2 Standard results? Y [X] N [ ]

Describe Any Actions Taken: SiO_2 Standard results that were outside the control limits are listed in Attachment 1 - SiO2 Standard Exceedance Summary Table. Sample results in the same analytical run as these SiO_2 Standards were qualified as "J+" for the analytes with the SiO_2 Standard results outside the control limit, if the sample had a detected result less than 10 times the SiO_2 Standard result.

Comments:

4. Calibration Check Standard

Was the appropriate Calibration Check Standard (CCS) analyzed at the beginning of analysis? Y [X] N [ ]
Was the appropriate CCS analyzed at the frequency of 1 per 20 natural samples? Y [X] N [ ]
Were CCS results within the control limits? Y [ ] N [X]
Were any data flagged because of CCS problems? Y [X] N [ ]

Describe Any Actions Taken: There were no calibration check standards that had a known amount (true value) of mercury and cobalt greater than the limit of detection (LOD). Therefore, all cobalt and mercury results were qualified "UJ" for non-detect results and "J" for the detected results.

CCS results that were outside the control limits (%R 80-120%) are listed in Attachment 2 - CCS Exceedance Summary Table. Sample results in the same analytical run as these CCS were qualified as "J" for detected results or "UJ" for non-detected results, except if there was another CCS with results within the control limit in the same analytical run, then applying professional judgement, only the sample results that were less than 10 times the true value of the failing CCS were qualified as "J" for detected results or "UJ" for non-detected results.

Comments:

5. Duplicate Sample Results

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were Duplicate Sample results within the control window?	Y		N	X
Were any data flagged because of duplicate sample results?	Y	X	N	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate and FPXRF Replicate Sample Results) lists all FPXRF duplicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF duplicate was a field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples.

Comments:

6. Replicate Sample Results

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were replicate sample results within the control window?	Y	X	N	
Were any data flagged because of replicate sample results?	Y		N	X

Describe Any Actions Taken: None required

Comments:

7. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: There was not a field duplicate pair analyzed on 9/21/2021. Field duplicate samples are not required for FPXRF analysis by SOP-SFM-02.

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: All cobalt and mercury results have been qualified "UJ" or "J" due to a lack of an appropriate CCS.

Refer to the following tables for a summary of qualifications made:

- Attachment 1 - SiO2 Standard Exceedance Summary Table
- Attachment 2 - CCS Exceedance Summary Table
- Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples

Comments:

9. Authorization of Data Validation

Data Validator

Name: S. Ward

Reviewed by: Josie McElroy

Signature: 

Date: 1/27/2022

2/1/2022

FPXRF Data Validation Checklist

Site:	West Side Soils Operable Unit	**Case No:**	P_20210927	**Laboratory:**	Field
Project:	WSSOU RI Sampling	**Sample Matrix:**	Soil	**Analyses:** antimony, arsenic, barium, calcium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, vanadium, zinc	
Sample Date(s): 09/22/2021, 09/23/2021, 09/27/2021		**Analysis Date(s):** 09/27/2021			
Data Validator:	S. Ward	**Validation Date(s):**	01/26/2021, 01/27/2021		

1. Holding Times

Analytes	Laboratory	Matrix	Method	Holding Times	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Sb, As, Ba, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, K, Se, Ag, V, Zn	Field	Soil	FPXRF	N/A	09/22/2021, 09/23/2021, 09/27/2021	09/27/2021	N/A	N/A

Were any data flagged because of holding time? Y [ ] N [X]

What sample preparation steps were performed (i.e. drying, sieving etc.)? Simple Sieve

Were the samples prepped according to the SAP/QAPP? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments: All samples underwent the "Simple Sieve" prep method as defined in the WSSOU RI QAPP.

2. Energy Calibration (System Check)

Was the energy calibration performed at the frequency of once per day?	Y [X]	N [ ]
Was the energy calibration Resolution below 195?	Y [X]	N [ ]
Did the energy calibration run for at least 50 seconds?	Y [X]	N [ ]

Describe Any Actions Taken: None required

Comments:

3. SiO_2 Standard

Was the SiO_2 Standard analyzed at the beginning of analysis?	Y [X]	N [ ]
Was the SiO_2 Standard analyzed at the frequency of 1 per 20 natural samples?	Y [X]	N [ ]
Were the SiO_2 Standard results within the control limits?	Y [ ]	N [X]
Were any data flagged because of the SiO_2 Standard results?	Y [X]	N [ ]

Describe Any Actions Taken: SiO_2 Standard results that were outside the control limits are listed in Attachment 1 - SiO2 Standard Exceedance Summary Table. Sample results in the same analytical run as these SiO_2 Standards were qualified as "J+" for the analytes with the SiO_2 Standard results outside the control limit, if the sample had a detected result less than 10 times the SiO_2 Standard result.

Comments:

4. Calibration Check Standard

Was the appropriate Calibration Check Standard (CCS) analyzed at the beginning of analysis?	Y [X]	N [ ]
Was the appropriate CCS analyzed at the frequency of 1 per 20 natural samples?	Y [X]	N [ ]
Were CCS results within the control limits?	Y [ ]	N [X]
Were any data flagged because of CCS problems?	Y [X]	N [ ]

Describe Any Actions Taken: There were no calibration check standards that had a known amount (true value) of mercury and cobalt greater than the limit of detection (LOD). Therefore, all cobalt and mercury results were qualified "UJ" for non-detect results and "J" for the detected results.

CCS results that were outside the control limits (%R 80-120%) are listed in Attachment 2 - CCS Exceedance Summary Table. Sample results in the same analytical run as these CCS were qualified as "J" for detected results or "UJ" for non-detected results, except if there was another CCS with results within the control limit in the same analytical run, then applying professional judgement, only the sample results that were less than 10 times the true value of the failing CCS were qualified as "J" for detected results or "UJ" for non-detected results.

Comments:

5. Duplicate Sample Results

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were Duplicate Sample results within the control window?	Y		N	X
Were any data flagged because of duplicate sample results?	Y	X	N	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate and FPXRF Replicate Sample Results) lists all FPXRF duplicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF duplicate was an FPXRF Duplicate or field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples. The vanadium results qualified due to the FPXRF duplicate being outside the control limits were previously qualified "J" due to CCS results being outside the control limits; therefore, the final qualification was "J".

Comments:

6. Replicate Sample Results

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were replicate sample results within the control window?	Y	X	N	
Were any data flagged because of replicate sample results?	Y		N	X

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate and FPXRF Replicate Sample Results) lists all FPXRF replicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF replicate was a field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples.

Comments:

7. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None required

Comments: There was not a field duplicate pair analyzed on 9/27/2021. Field duplicate samples are not required for FPXRF analysis by SOP-SFM-02.

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: All cobalt and mercury results have been qualified "UJ" or "J" due to a lack of an appropriate CCS.

Refer to the following tables for a summary of qualifications made:

- Attachment 1 - SiO2 Standard Exceedance Summary Table
- Attachment 2 - CCS Exceedance Summary Table
- Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples

Comments:

9. Authorization of Data Validation

Data Validator

Name: S. Ward

Reviewed by: Josie McElroy

Signature:  

Date: 1/27/2022 2/1/2022

FPXRF Data Validation Checklist

Site:	West Side Soils Operable Unit	**Case No:**	P_20210929	**Laboratory:**	Field
Project:	WSSOU RI Sampling	**Sample Matrix:**	Soil	**Analyses:** antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, vanadium, zinc	
Sample Date(s): 9/27/2021, 9/28/2021		**Analysis Date(s):** 9/29/2021			
Data Validator:	Josie M.	**Validation Date(s):**	1/25/2022		

1. Holding Times

Analytes	Laboratory	Matrix	Method	Holding Times	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Sb, As, Ba, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, K, Se, Ag, V, Zn	Field	Soil	FPXRF	N/A	9/27/2021, 9/28/2021	9/29/2021	N/A	N/A

Were any data flagged because of holding time? Y [ ] N [X]

What sample preparation steps were performed (i.e. drying, sieving etc.)? Simple Sieve

Were the samples prepped according to the SAP/QAPP? Y [X] N [ ]

Describe Any Actions Taken:

Comments: All XRF samples underwent the "Simple Sieve" prep method as defined in the WSSOU RI QAPP.

2. Energy Calibration (System Check)

Was the energy calibration performed at the frequency of once per day? Y [X] N [ ]

Was the energy calibration Resolution below 195? Y [X] N [ ]

Did the energy calibration run for at least 50 seconds? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments:

3. SiO_2 Standard

Was the SiO_2 Standard analyzed at the beginning of analysis? Y [X] N [ ]

Was the SiO_2 Standard analyzed at the frequency of 1 per 20 natural samples? Y [X] N [ ]

Were the SiO_2 Standard results within the control limits? Y [ ] N [X]

Were any data flagged because of the SiO_2 Standard results? Y [X] N [ ]

Describe Any Actions Taken: SiO_2 Standard results that were outside the control limits are listed in Attachment 1 - SiO2 Standard Exceedance Summary Table. Sample results in the same analytical run as these SiO_2 Standards were qualified as "J+" for the analytes with the SiO_2 Standard results outside the control limit, if the sample had a detected result less than 10 times the SiO_2 Standard result.

Comments:

4. Calibration Check Standard

Was the appropriate Calibration Check Standard (CCS) analyzed at the beginning of analysis?	Y	X	N	
Was the appropriate CCS analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were CCS results within the control limits?	Y		N	X
Were any data flagged because of CCS problems?	Y	X	N	

Describe Any Actions Taken: There were no calibration check standards that had a known amount (true value) of mercury and cobalt greater than the limit of detection (LOD). Therefore, all mercury and cobalt results have been qualified "J" for detected results and "UJ" for non-detected results.

CCS results that were outside the control limits (%R 80-120%) are listed in Attachment 2 - CCS Exceedance Summary Table. Sample results in the same analytical run as these CCS were qualified as "J" for detected results or "UJ" for non-detected results, except if there was another CCS with results within the control limit in the same analytical run, then applying professional judgement, only the sample results that were less than 10 times the true value of the failing CCS were qualified as "J" for detected results or "UJ" for non-detected results.

The chromium results qualified due to calibration check standards being outside the control limits were previously qualified "J+" due to SiO2 Standard results being outside the control limits; therefore, the final qualifications are "J".

Comments:

5. Duplicate Sample Results

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were Duplicate Sample results within the control window?	Y		N	X
Were any data flagged because of duplicate sample results?	Y	X	N	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate and FPXRF Replicate Sample Results) lists all FPXRF duplicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF duplicate was a field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples. The lead results qualified due to the FPXRF Duplicate being outside the control limits were previously qualified "J" due to CCS results being outside the control limits; therefore, the final qualification was "J".

Comments:

6. Replicate Sample Results

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	X	N	
Were replicate sample results within the control window?	Y		N	X
Were any data flagged because of replicate sample results?	Y	X	N	

Describe Any Actions Taken: Table 4 of the Data Validation Report (FPXRF Duplicate and FPXRF Replicate Sample Results) lists all FPXRF replicate sample results and the RPD. The parent sample was qualified "J" for results which did not meet the control limit. If the parent sample for the FPXRF replicate was an FPXRF Duplicate or field duplicate, that sample's parent sample was also qualified "J". No additional samples were considered sufficiently similar to warrant further qualification.

Qualifications made to the natural samples are summarized on Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples. The lead results qualified due to the FPXRF Replicate being outside the control limits were previously qualified "J" due to CCS and FPXRF Duplicate results being outside the control limits; therefore, the final qualification was "J".

Comments:

7. Field Duplicates

Were field duplicates submitted as specified in the Sampling Analysis Plan (SAP)?	Y		N		N/A	X
Were the field duplicates within the control window?	Y		N		N/A	X
Were any data qualified because of field duplicate problems?	Y		N		N/A	X

Describe Any Actions Taken: None Required

Comments: There was not a field duplicate pair analyzed on 9/29/2021. Field duplicate samples are not required for FPXRF analysis by SOP-SFM-02.

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: All cobalt and mercury results have been qualified "UJ" or "J" due to a lack of an appropriate CCS.

Refer to the following tables for a summary of qualifications made:
Attachment 1 - SiO2 Standard Exceedance Summary Table
Attachment 2 - CCS Exceedance Summary Table
Attachment 3 - FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples

Comments:

9. Authorization of Data Validation

Data Validator
Name: Josie McElroy **Reviewed by:** Sara Ward

Signature: Josie McElroy Sara Ward

Date: 1/25/2022 1/28/2022

Attachment B
Qualification Summary Tables

Attachment B-1. Sio_2 Standard Exceedance Summary Table
Attachment B-2. CCS Exceedance Summary Table
Attachment B-3. FPXRF Duplicate and FPXRF Replication Qualifications to Natural Samples

Attachment B-1.
SiO_2 Standard Exceedance Summary Table

Abbreviations:
mg/kg = milligram per kilogram

Attachment 1. SiO_2 Standard Exceedance Summary Table

Analysis Run ID	QC Sample	Analysis Date	Analyte	Result (mg/kg)	DV Qual	Affected Samples
SIO2_20210921_98052_567	SiO2	9/21/2021	Barium	51.75	J+	None Affected
SIO2_20210921_98052_567	SiO2	9/21/2021	Calcium	84.74	J+	None Affected
SIO2_20210921_98052_567	SiO2	9/21/2021	Cadmium	6.98	J+	21WS-0002-SO6290-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
SIO2_20210921_98052_567	SiO2	9/21/2021	Iron	39	J+	None Affected
SIO2_20210921_98052_567	SiO2	9/21/2021	Antimony	14.41	J+	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
SIO2_20210921_98052_593	SiO2	9/21/2021	Barium	72.41	J+	21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
SIO2_20210921_98052_593	SiO2	9/21/2021	Cadmium	6.82	J+	21WS-0002-SO6290-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
SIO2_20210921_98052_593	SiO2	9/21/2021	Iron	46.17	J+	None Affected
SIO2_20210921_98052_593	SiO2	9/21/2021	Antimony	16.14	J+	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
SIO2_20210927_98052_632	SiO2	9/27/2021	Silver	6.39	J+	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321
SIO2_20210927_98052_632	SiO2	9/27/2021	Barium	78.96	J+	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321
SIO2_20210927_98052_632	SiO2	9/27/2021	Calcium	82.61	J+	None Affected
SIO2_20210927_98052_632	SiO2	9/27/2021	Cadmium	7.02	J+	21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6335-N-092221; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321
SIO2_20210927_98052_632	SiO2	9/27/2021	Iron	57.09	J+	None Affected
SIO2_20210927_98052_632	SiO2	9/27/2021	Potassium	144.48	J+	None Affected
SIO2_20210927_98052_632	SiO2	9/27/2021	Antimony	19.63	J+	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321

SIO2_20210927_98052_658	SiO2	9/27/2021	Barium	77.81	J+	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321; 21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
SIO2_20210927_98052_658	SiO2	9/27/2021	Iron	43.94	J+	None Affected
SIO2_20210927_98052_658	SiO2	9/27/2021	Antimony	14.37	J+	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321; 21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
SIO2_20210927_98052_679	SiO2	9/27/2021	Silver	5.24	J+	21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0298-SO6371-N-092721
SIO2_20210927_98052_679	SiO2	9/27/2021	Barium	87.31	J+	21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
SIO2_20210927_98052_679	SiO2	9/27/2021	Calcium	224.54	J+	21WS-0289-SO6356-N-092321; 21WS-0297-SO6359-N-092321
SIO2_20210927_98052_679	SiO2	9/27/2021	Cadmium	7.2	J+	21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0298-SO6372-N-092721
SIO2_20210927_98052_679	SiO2	9/27/2021	Iron	137.15	J+	None Affected
SIO2_20210927_98052_679	SiO2	9/27/2021	Potassium	359.96	J+	None Affected
SIO2_20210927_98052_679	SiO2	9/27/2021	Antimony	21.64	J+	21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
P_20210929_98052_684	SiO2	9/29/2021	Arsenic	3.23	J+	21WS-0162-SO6407-N-092821
P_20210929_98052_684	SiO2	9/29/2021	Barium	79.2	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_684	SiO2	9/29/2021	Calcium	327.25	J+	None Affected
P_20210929_98052_684	SiO2	9/29/2021	Cadmium	11.7	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-0162-SO6406-N-092821
P_20210929_98052_684	SiO2	9/29/2021	Iron	191.82	J+	None Affected
P_20210929_98052_684	SiO2	9/29/2021	Potassium	337.76	J+	None Affected

Attachment 1. SiO_2 Standard Exceedance Summary Table

P_20210929_98052_684	SiO2	9/29/2021	Antimony	27.32	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Arsenic	5.77	J+	21WS-1072-SO6387-N-092821; 21WS-1016-SO6394-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Barium	111.24	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Calcium	486.48	J+	21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6396-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Cadmium	10.9	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-0162-SO6406-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Chromium	23.46	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Iron	224.46	J+	None Affected
P_20210929_98052_710	SiO2	9/29/2021	Potassium	776.21	J+	21WS-1072-SO6387-N-092821
P_20210929_98052_710	SiO2	9/29/2021	Antimony	30.91	J+	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0102-SO6409-N-092821

Attachment B-2.
CCS Exceedance Summary Table

Abbreviations:
mg/kg = milligram per kilogram
%R = percent recovery

Footnotes:
[1]The CCS Molybdenum result for Sample run IDs P_20210927_98052_660 and P_20210929_98052_712 were reported as non-detect (<14 mg/kg). The %R for these CCS results could not be assessed.

Attachment 2. CCS Exceedance Summary Table

Sample Run ID	QC Sample	Analysis Date	Analyte[1]	Result (mg/kg)	True Value (mg/kg)	%R	DV Qual	Affected Samples
P_20210921_98052_568	NIST 2709a	9/21/2021	Lead	12.18	17.3	70%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0040-SO6299-N-092121
P_20210921_98052_594	NIST 2709a	9/21/2021	Lead	11.91	17.3	69%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0040-SO6299-N-092121
P_20210921_98052_568	NIST 2709a	9/21/2021	Vanadium	139.35	110	127%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
P_20210921_98052_569	USGS SdAR-M2	9/21/2021	Chromium	92.74	49.6	187%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
P_20210921_98052_595	USGS SdAR-M2	9/21/2021	Chromium	71.65	49.6	144%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
P_20210921_98052_569	USGS SdAR-M2	9/21/2021	Molybdenum	9.68	13.3	73%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
P_20210921_98052_595	USGS SdAR-M2	9/21/2021	Molybdenum	5.65	13.3	42%	J/UJ	21WS-0003-SO6294-N-092021; 21WS-0003-SO6286-N-092021; 21WS-0003-SO6287-N-092021; 21WS-0002-SO6290-N-092021; 21WS-0003-SO6291-N-092021; 21WS-0006-SO6295-N-092021; 21WS-0006-SO6296-N-092021; 21WS-0040-SO6298-N-092121; 21WS-0040-SO6299-N-092121; 21WS-0010-SO6303-N-092121; 21WS-0010-SO6306-N-092121; 21WS-0010-SO6308-N-092121; 21WS-0013-SO6309-N-092121; 21WS-0012-SO6310-N-092121; 21WS-0010-SO6311-N-092121; 21WS-0013-SO6314-N-092121; 21WS-0014-SO6315-N-092121; 21WS-0016-SO6317-N-092121; 21WS-0016-SO6318-N-092121; 21WS-0016-SO6320-N-092121
P_20210927_98052_633	NIST 2709a	9/27/2021	Lead	10.25	17.3	59%	J/UJ	21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321
P_20210927_98052_680	NIST 2709a	9/27/2021	Lead	12.13	17.3	70%	J/UJ	21WS-0299-SO6370-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
P_20210927_98052_633	NIST 2709a	9/27/2021	Vanadium	153.95	110	140%	J/UJ	21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6353-N-092321; 21WS-0015-SO6347-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321
P_20210927_98052_659	NIST 2709a	9/27/2021	Vanadium	144.19	110	131%	J/UJ	21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6353-N-092321; 21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721; 21WS-0015-SO6347-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321; 21WS-0296-SO6363-N-092321
P_20210927_98052_680	NIST 2709a	9/27/2021	Vanadium	145.58	110	132%	J/UJ	21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721; 21WS-0296-SO6363-N-092321
P_20210927_98052_634	USGS SdAR-M2	9/27/2021	Chromium	89.23	49.6	180%	J/UJ	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321; 21WS-0296-SO6353-N-092321

Attachment 2. CCS Exceedance Summary Table

Sample Run ID	QC Sample	Analysis Date	Analyte[1]	Result (mg/kg)	True Value (mg/kg)	%R	DV Qual	Affected Samples
P_20210927_98052_660	USGS SdAR-M2	9/27/2021	Chromium	92.57	49.6	187%	J/UJ	21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321; 21WS-0296-SO6353-N-092321; 21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
P_20210927_98052_681	USGS SdAR-M2	9/27/2021	Chromium	96.14	49.6	194%	J/UJ	21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0291-SO6362-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6371-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
P_20210927_98052_634	USGS SdAR-M2	9/27/2021	Molybdenum	10.48	13.3	79%	J/UJ	21WS-0296-SO6353-N-092321; 21WS-0015-SO6347-N-092321; 21WS-0296-SO6337-N-092321; 21WS-0016-SO6321-N-092221; 21WS-0016-SO6323-N-092221; 21WS-0017-SO6326-N-092221; 21WS-0015-SO6327-N-092221; 21WS-0015-SO6328-N-092221; 21WS-0311-SO6330-N-092221; 21WS-0315-SO6333-N-092221; 21WS-0315-SO6335-N-092221; 21WS-0296-SO6340-N-092321; 21WS-1150-SO6341-N-092321; 21WS-0015-SO6343-N-092321; 21WS-0015-SO6344-N-092321; 21WS-0301-SO6348-N-092321; 21WS-0015-SO6349-N-092321; 21WS-0301-SO6350-N-092321; 21WS-0296-SO6351-N-092321; 21WS-0296-SO6352-N-092321
P_20210927_98052_660	USGS SdAR-M2	9/27/2021	Molybdenum	ND	13.3	N/A	J/UJ	None Affected
P_20210927_98052_681	USGS SdAR-M2	9/27/2021	Molybdenum	7.71	13.3	58%	J/UJ	21WS-0291-SO6362-N-092321; 21WS-0298-SO6371-N-092721; 21WS-0289-SO6356-N-092321; 21WS-0296-SO6354-N-092321; 21WS-0288-SO6357-N-092321; 21WS-0288-SO6358-N-092321; 21WS-0297-SO6359-N-092321; 21WS-0290-SO6361-N-092321; 21WS-0296-SO6363-N-092321; 21WS-0285-SO6364-N-092721; 21WS-0285-SO6365-N-092721; 21WS-0285-SO6368-N-092721; 21WS-0299-SO6370-N-092721; 21WS-0298-SO6372-N-092721; 21WS-0246-SO6377-N-092721
P_20210929_98052_711	NIST 2709a	9/29/2021	Chromium	162.64	130	125%	J/UJ	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_711	NIST 2709a	9/29/2021	Lead	11.34	17.3	66%	J/UJ	21WS-1072-SO6387-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0102-SO6409-N-092821; 21WS-1116-SO6379-N-092721
P_20210929_98052_711	NIST 2709a	9/29/2021	Vanadium	139.59	110	127%	J/UJ	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_712	USGS SdAR-M2	9/29/2021	Molybdenum	ND	13.3	N/A	J/UJ	None Affected
P_20210929_98052_686	USGS SdAR-M2	9/29/2021	Chromium	87.36	49.6	176%	J/UJ	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092821
P_20210929_98052_686	USGS SdAR-M2	9/29/2021	Molybdenum	5.41	13.3	41%	J/UJ	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092822
P_20210929_98052_712	USGS SdAR-M2	9/29/2021	Chromium	67.4	49.6	136%	J/UJ	21WS-1116-SO6379-N-092721; 21WS-1116-SO6380-N-092721; 21WS-1072-SO6381-N-092821; 21WS-1072-SO6382-N-092821; 21WS-1072-SO6383-N-092821; 21WS-1072-SO6385-N-092821; 21WS-1072-SO6387-N-092821; 21WS-1072-SO6389-N-092821; 21WS-1072-SO6390-N-092821; 21WS-1072-SO6392-N-092821; 21WS-1016-SO6394-N-092821; 21WS-1016-SO6396-N-092821; 21WS-1111-SO6397-N-092821; 21WS-1111-SO6398-N-092821; 21WS-1111-SO6402-N-092821; 21WS-1111-SO6403-N-092821; 21WS-0162-SO6405-N-092821; 21WS-0162-SO6406-N-092821; 21WS-0162-SO6407-N-092821; 21WS-0102-SO6409-N-092822

Attachment B-3.
FPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples

Abbreviations:
RPD = relative percent difference
mg/kg = milligram per kilogram

Attachment 3. XPXRF Duplicate and FPXRF Replicate Qualifications to Natural Samples

Sample Run ID	QC Sample	Analysis Date	Analyte	Field Sample ID	Parent Sample	QC Result (mg/kg)	Parent Result (mg/kg)	RPD	DV Qual	Affected Samples
P_20210921_98052_592	XRF Duplicate	9/21/2021	Arsenic	21WS-0016-SO6320-N-092121-D	21WS-0016-SO6320-N-092121	51.26	74.87	37.44%	J	21WS-0016-SO6320-N-092121
P_20210927_98052_657	XRF Duplicate	9/27/2021	Vanadium	21WS-0296-SO6353-N-092321-D	21WS-0296-SO6353-N-092321	95.13	142.54	39.90%	J	21WS-0296-SO6353-N-092321
P_20210927_98052_656	XRF Replicate	9/27/2021	Arsenic	21WS-0296-SO6353-N-092321-R	21WS-0296-SO6353-N-092321	34.81	52.62	40.74%	J	21WS-0296-SO6353-N-092321
P_20210929_98052_709	XRF Duplicate	9/29/2021	Lead	21WS-0102-SO6409-N-092821-D	21WS-0102-SO6409-N-092821	10.78	33.45	102.51%	J	21WS-0102-SO6409-N-092821
P_20210929_98052_708	XRF Replicate	9/29/2021	Lead	21WS-0102-SO6409-N-092821-R	21WS-0102-SO6409-N-092821	12.37	33.45	92.01%	J	21WS-0102-SO6409-N-092821

Attachment C
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: West Side Soils Operable Unit (WSSOU), Multiple Mining Claims
Project: 2021 WSSOU Additional Surface Data Collection
Client: Atlantic Richfield
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable
2. Level A
3. Level B P_20210921, P_20210927, and P_20210929

I. **Level A**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Sampling date	Yes	Logbook and Field Data Sheets
2. Sampling team or leader	Yes	Logbook and Field Data Sheets
3. Physical description of sampling location	Yes	Logbook and WSS 2021 Additional Sampling Summaries by Claim
4. Sample depth (soils)	Yes	Logbook
5. Sample collection technique	Yes	Logbook and WSS 2021 Additional Sampling Summaries by Claim
6. Field preparation technique	Yes	Logbook
7. Sample preservation technique	Yes	Logbook
8. Sample shipping records	Yes	Shipping N/A; analysis – XRF Data Sheets

II**. Level B**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Field instrumentation methods and standardization complete	Yes	Logbook.
2. Sample container preparation	Yes	Logbook
3. Collection of field replicates (1/20 minimum)	Yes	Logbook
4. Proper and decontaminated sampling equipment	Yes	Logbook
6. Field custody documentation	Yes	Logbook
7. Shipping custody documentation	N/A	
8. Traceable sample designation number	Yes	Logbook and Field Data Sheets
9. Field notebook(s), custody records in secure repository	Yes	
10. Completed field forms	Yes	Field Data Sheets

Attachment D
Data Validation QC Criteria

XRF						
Quality Control	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
			Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
System Check	Performed daily, prior to sample analysis	System Check not performed	R	R	CX	SOP-SFM-02 (Pioneer, 2015)
	Resolution < 195	Resolution ≥ 195	R	R	SC	
SiO_2 Standard	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Frequency criteria not met	J	UJ	CX	SOP-SFM-02 (Pioneer, 2015) Niton XL3 Mining QC Sheet (ThermoFisher Scientific, 2014)
	Non-detected result	Detected result	Sample Results < 10x detected SiO2 result- J+	No Qualification	B	
Calibration Check Samples	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Frequency criteria not met	J	UJ	CX	SOP-SFM-02 (Pioneer, 2015) Niton XL3 Mining QC Sheet (ThermoFisher Scientific, 2016)
	%R 80-120%	%R < 80%	J	UJ	C%	
		%R >120%	J	No Qualification		
FPXRF Replicate	At least 1 for every 20 samples	Frequency criteria not met	J	UJ	RX	SOP-SFM-02 (Pioneer, 2015)
	RPD ≤ 35%*	RPD > 35%	J	UJ	R%	
		RPD ≤ 35%	No Qualification	No Qualification		
FPXRF Duplicate	At least 1 for every 20 samples	Frequency criteria not met	J	UJ	DX	SOP-SFM-02 (Pioneer, 2015)
	RPD ≤ 35%*	RPD > 35%	J	UJ	D%	
		RPD ≤ 35%	No Qualification	No Qualification		
Field Duplicate	At least 1 for every 20 samples	Frequency criteria not met	J	UJ	FDX	SOP-SFM-02 (Pioneer, 2015) WSSOU RI QAPP (CDM Smith, 2019)
	RPD ≤ 35%*	RPD > 35%	J	UJ	FD	
		RPD ≤ 35%	No Qualification	No Qualification		

*The RPD must be less than 35% when both sample results are detections.