

Chemical Analysis Report

TLH-ROC-2022-08-17-02

Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Run1 Wekiva Spring, Waccasassa, Metals Blank**
Request ID: **RQ-2022-07-04-60**
Customer: **TLH-ROC**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
2600 Blair Stone Rd
Tallahassee, FL 32399
Attn: Chris Green

For additional information please contact
Colin Wright, Ph.D.
Liang-Tsair Lin, Ph.D.
Kerry Tate, Ph.D.
Dr. rer. nat. Bettina Steinbock
Thekkekalathil Chandrasekhar, Ph.D, QA Officer
Phone (850) 245-8085

Certified by: Dr. rer. nat. Bettina Steinbock, Environmental Administrator

Date Certified: 07-SEP-2022 12:40



Case Narrative

Unless otherwise noted, all samples included in this report were received in accordance with protocols referenced in Chapter 62-160, Florida Administrative Code (F.A.C.). Results published in this report pertain only to the samples as submitted to, and received by the laboratory. All times in this report are adjusted to the applicable Eastern Time Zone (EST or EDT).

Results for the following analytical group are included in this report: Metals.

Scientific notation may be used in reporting very large or small values. Values reported using scientific notation will take the form of the following example: 1.3E+03, which is equivalent to 1.3×10^3 or 1300.

Unless otherwise noted, analytical values for soil and sediment samples are reported on a dry weight basis, and analytical values for waste and tissue samples are reported on a wet weight basis.

Results for TNI accredited tests met requirements established by The NELAC Institute. A double asterisk (**) is used to indicate an analyte/matrix/method for which the laboratory is not TNI accredited by the Florida Department of Health Environmental Laboratory Certification Program or where accreditation for that field of testing is not applicable.

Any significant anomalies or deviations from established protocols are documented in Non-Conformance Reports, which, where appropriate, are included within this analytical report. Additional comments related to specific analytical tests may be included as remarks following the analytical results for each sample. Such comments and remarks are for informational purposes only and are not intended to convey judgement about the usability of the reported data.

A quality control report on the performance of the test method for the submitted samples is included. Uncertainty associated with the analytical results contained in this report can be estimated from the reported quality assurance results and from published quality control acceptance limits for each analytical test. Matrix quality control results (matrix spike recoveries and matrix sample precision) pertain only to the matrix sample tested and do not necessarily reflect test method performance for other samples.

Typical matrix quality control (QC) measurements may include matrix spike recovery, matrix spike duplicate recovery, matrix spike precision and matrix sample precision. Not all matrix QC results may be available or reportable; where they are not an explanation is provided. Typical reasons for unavailable QC results include, but are not limited to, a) insufficient matrix sample to perform some or all QC measurements; b) analyte concentration in the sample replicated was too low for a meaningful measurement of precision and c) analyte concentration in the matrix sample spiked was too high (relative to the amount of analyte spiked) for a meaningful measurement of recovery. Where matrix QC results are unavailable, other method performance metrics (e.g., LCS recovery, LCS precision, surrogate recovery) may be used to assess performance of the method. Comments explaining any missing QC measurements are not intended to convey any adverse conclusions about the quality of the reported data.

Precision is reported as relative percent difference unless otherwise noted.

Quality Control codes as defined below may be used in this report to indicate results that are associated with one or more quality control elements which did not fall within established test method criteria. Such results may be qualified as estimates using a J qualifier as required by 62-160 F.A.C. Explanations are included in the report for any results that were reported as estimates for other reasons.

QC Codes used in this report may include:

- LCS – Recovery for the batch Laboratory Control Sample (LCS) was outside existing control limits;
- MS – Recovery for the batch matrix spike (MS) was outside existing control limits;
- CCV – Recovery for a continuing calibration verification (CCV) standard was outside existing control limits;
- SUR – Recovery of a surrogate (SUR) for associated analytes was outside existing control limits;
- RPD – The precision, measured as relative percent difference (RPD), of batch replicate measurements was outside existing control limits;
- RSD – The precision, measured as relative standard deviation (RSD), of batch replicate measurements was outside existing control limits;
- SMP – Sample - used precision derived from replicate analyses of a sample;

The following data qualifiers are used, where applicable, in this report as specified in 62-160 F.A.C.

- A - Value reported is the mean of two or more determinations.
- B - Results based on colony counts outside the acceptable range.
- I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J - Estimated value and/or the analysis did not meet established quality control criteria.
- K - Actual value is known to be less than value given.
- L - Actual value is known to be greater than value given.
- N - Presumptive evidence of presence of material.
- O - Sampled, but analysis lost or not performed.
- Q - Sample held beyond normal holding time.
- T - Value reported is less than the criterion of detection.
- U - Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.
- V - Analyte was detected in both sample and method blank.
- X - Too few individuals to calculate SCI value.
- Y - The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.
- Z - Colonies were too numerous to count (TNTC).

Quality control information from overflow laboratories may not be included in this report. Please refer to the associated report from the overflow laboratory for additional information.

Sample Location: G1TLHR0101

Collection Date/Time: 08/17/2022 12:15

Field ID: G1TLHR0101

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2350410	EPA 200.7 Rev. 4.4	Calcium	49.7		mg/L	P418293	
		Iron	540		ug/L	P418293	
		Magnesium	30.8		mg/L	P418293	
		Strontium	297		ug/L	P418293	
		Tin	6.2	I	ug/L	P418293	
		Titanium	1.3	I	ug/L	P418293	
		Vanadium	2.0	U	ug/L	P418293	
	EPA 200.8 Rev. 5.4	Zinc	5.0	U	ug/L	P418293	
		Aluminum	60		ug/L	P418293	
		Antimony	0.050	U	ug/L	P418293	
		Arsenic	0.84		ug/L	P418293	
		Beryllium	0.015	I	ug/L	P418293	
		Cadmium	0.020	U	ug/L	P418293	
		Chromium	0.54	I	ug/L	P418293	
		Cobalt	0.056	I	ug/L	P418293	
		Copper	0.40	U	ug/L	P418293	
		Lead	0.20	U	ug/L	P418293	
		Manganese	25.0		ug/L	P418293	
		Molybdenum	1.18		ug/L	P418293	
		Nickel	0.50	U	ug/L	P418293	
		Selenium	0.20	U	ug/L	P418293	
		Silver	0.010	U	ug/L	P418293	
		Thallium	0.10	U	ug/L	P418293	

Sample Location: Waccasassa River @ Boat Ramp

Collection Date/Time: 08/17/2022 12:30

Field ID: G1TLHR0032

Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2350411	EPA 200.7 Rev. 4.4	Calcium	39.3		mg/L	P418293	
		Iron	600		ug/L	P418293	
		Magnesium	6.70		mg/L	P418293	
		Strontium	120		ug/L	P418293	
		Tin	5.8	I	ug/L	P418293	
		Titanium	1.1	I	ug/L	P418293	
		Vanadium	2.0	U	ug/L	P418293	
	EPA 200.8 Rev. 5.4	Zinc	5.0	U	ug/L	P418293	
		Aluminum	54		ug/L	P418293	
		Antimony	0.050	U	ug/L	P418293	
		Arsenic	0.40		ug/L	P418293	
		Beryllium	0.012	I	ug/L	P418293	
		Cadmium	0.020	U	ug/L	P418293	
		Chromium	0.52	I	ug/L	P418293	
		Cobalt	0.050	I	ug/L	P418293	
		Copper	0.40	U	ug/L	P418293	
		Lead	0.20	U	ug/L	P418293	
		Manganese	19.5		ug/L	P418293	
		Molybdenum	0.92		ug/L	P418293	
		Nickel	0.50	U	ug/L	P418293	
		Selenium	0.20	U	ug/L	P418293	
		Silver	0.010	U	ug/L	P418293	
		Thallium	0.10	U	ug/L	P418293	

Sample Location: FB

Collection Date/Time: 08/17/2022 12:40

Field ID: FB_08172022

Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2350412	EPA 200.7 Rev. 4.4	Calcium	0.075	U	mg/L	P418358	
		Iron	30	U	ug/L	P418358	
		Magnesium	0.040	U	mg/L	P418358	
		Strontium	2.0	U	ug/L	P418358	
		Tin	3.0	U	ug/L	P418358	
		Titanium	0.75	U	ug/L	P418358	
		Vanadium	2.0	U	ug/L	P418358	
	EPA 200.8 Rev. 5.4	Zinc	5.0	U	ug/L	P418358	
		Aluminum	5.0	U	ug/L	P418358	
		Antimony	0.050	U	ug/L	P418358	
		Arsenic	0.050	U	ug/L	P418358	
		Beryllium	0.010	U	ug/L	P418358	
		Cadmium	0.020	U	ug/L	P418358	
		Chromium	0.40	U	ug/L	P418358	
		Cobalt	0.020	U	ug/L	P418358	
		Copper	0.40	U	ug/L	P418358	
		Lead	0.20	U	ug/L	P418358	
		Manganese	0.10	U	ug/L	P418358	
		Molybdenum	0.15	U	ug/L	P418358	
		Nickel	0.50	U	ug/L	P418358	
		Selenium	0.20	U	ug/L	P418358	
		Silver	0.010	U	ug/L	P418358	
		Thallium	0.10	U	ug/L	P418358	

Quality Assurance Report Method Blank Results

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P418293

Component	Result	Code	Units
Calcium	0.075	U	mg/L
Iron	30	U	ug/L
Magnesium	0.040	U	mg/L
Strontium	2.0	U	ug/L
Tin	3.0	U	ug/L
Titanium	0.75	U	ug/L
Vanadium	2.0	U	ug/L
Zinc	5.0	U	ug/L

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P418358

Component	Result	Code	Units
Calcium	0.075	U	mg/L
Iron	30	U	ug/L
Magnesium	0.040	U	mg/L
Strontium	2.0	U	ug/L
Tin	3.0	U	ug/L
Titanium	0.75	U	ug/L
Vanadium	2.0	U	ug/L
Zinc	5.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P418293

Component	Result	Code	Units
Aluminum	5.0	U	ug/L
Antimony	0.050	U	ug/L
Arsenic	0.050	U	ug/L
Beryllium	0.010	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.40	U	ug/L
Cobalt	0.020	U	ug/L
Copper	0.40	U	ug/L
Lead	0.20	U	ug/L
Manganese	0.10	U	ug/L
Molybdenum	0.15	U	ug/L
Nickel	0.50	U	ug/L
Selenium	0.20	U	ug/L
Silver	0.010	U	ug/L
Thallium	0.10	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P418358

Component	Result	Code	Units
Aluminum	5.0	U	ug/L
Antimony	0.050	U	ug/L
Arsenic	0.050	U	ug/L
Beryllium	0.010	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.40	U	ug/L

Quality Assurance Report

Method Blank Results

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418358

Component	Result	Code	Units
Cobalt	0.020	U	ug/L
Copper	0.40	U	ug/L
Lead	0.20	U	ug/L
Manganese	0.10	U	ug/L
Molybdenum	0.15	U	ug/L
Nickel	0.50	U	ug/L
Selenium	0.20	U	ug/L
Silver	0.010	U	ug/L
Thallium	0.10	U	ug/L

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P418293

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	99.2		P	80 - 120
Iron	98.7		P	80 - 120
Magnesium	99.2		P	80 - 120
Strontium	101		P	80 - 120
Tin	97.2		P	80 - 120
Titanium	98.4		P	80 - 120
Vanadium	98.4		P	80 - 120
Zinc	97.7		P	80 - 120

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P418358

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	103		P	85 - 115
Iron	105		P	85 - 115
Magnesium	106		P	85 - 115
Strontium	105		P	85 - 115
Tin	108		P	85 - 115
Titanium	105		P	85 - 115
Vanadium	99.9		P	85 - 115
Zinc	100		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P418293

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	103		P	85 - 115
Antimony	99.2		P	85 - 115
Arsenic	101		P	85 - 115
Beryllium	94.9		P	85 - 115
Cadmium	103		P	85 - 115
Chromium	102		P	85 - 115
Cobalt	96.9		P	85 - 115
Copper	98.3		P	85 - 115
Lead	96.5		P	85 - 115
Manganese	101		P	85 - 115
Molybdenum	99.4		P	85 - 115
Nickel	99.4		P	85 - 115
Selenium	101		P	85 - 115
Silver	102		P	85 - 115
Thallium	97.0		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P418358

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	100		P	85 - 115
Antimony	103		P	85 - 115
Arsenic	98.1		P	85 - 115
Beryllium	95.4		P	85 - 115
Cadmium	103		P	85 - 115
Chromium	105		P	85 - 115

Quality Assurance Report

Laboratory Control Sample Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P418358

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Cobalt	92.0		P	85 - 115
Copper	91.0		P	85 - 115
Lead	96.1		P	85 - 115
Manganese	101		P	85 - 115
Molybdenum	98.2		P	85 - 115
Nickel	92.9		P	85 - 115
Selenium	98.5		P	85 - 115
Silver	99.4		P	85 - 115
Thallium	94.9		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4

Batch ID: P418293

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2350007	Iron	96.8		P	80 - 120
2350007	Magnesium	99.9		P	80 - 120
2350007	Strontium	99.3		P	80 - 120
2350007	Tin	93.7		P	80 - 120
2350007	Titanium	96.3		P	80 - 120
2350007	Vanadium	97.5		P	80 - 120
2350007	Zinc	94.9		P	80 - 120
2350044	Calcium	101	96.2	P/P	80 - 120
2350044	Iron	99.1	97.1	P/P	80 - 120
2350044	Magnesium	99.6	97.2	P/P	80 - 120
2350044	Strontium	100	96.7	P/P	80 - 120
2350044	Tin	97.6	94.9	P/P	80 - 120
2350044	Titanium	98.0	94.4	P/P	80 - 120
2350044	Vanadium	96.7	93.5	P/P	80 - 120
2350044	Zinc	97.2	94.2	P/P	80 - 120

Reference Method: EPA 200.7 Rev. 4.4

Batch ID: P418358

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2349421	Calcium	105		P	80 - 120
2349421	Iron	101	109	P/P	80 - 120
2349421	Magnesium	102	108	P/P	80 - 120
2349421	Strontium	105	108	P/P	80 - 120
2349421	Tin	109	111	P/P	80 - 120
2349421	Titanium	104	106	P/P	80 - 120
2349421	Vanadium	99.9	102	P/P	80 - 120
2349421	Zinc	99.4	102	P/P	80 - 120
2349423	Calcium	102		P	80 - 120
2349423	Iron	105		P	80 - 120
2349423	Magnesium	105		P	80 - 120
2349423	Strontium	106		P	80 - 120
2349423	Tin	104		P	80 - 120
2349423	Titanium	103		P	80 - 120
2349423	Vanadium	100		P	80 - 120
2349423	Zinc	97.9		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418293

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2350007	Aluminum	97.4		P	75 - 125
2350007	Antimony	102		P	75 - 125
2350007	Arsenic	98.4		P	75 - 125
2350007	Beryllium	91.9		P	75 - 125
2350007	Cadmium	104		P	75 - 125
2350007	Chromium	105		P	75 - 125
2350007	Cobalt	92.0		P	75 - 125
2350007	Copper	90.6		P	75 - 125
2350007	Lead	95.7		P	75 - 125
2350007	Manganese	101		P	75 - 125
2350007	Molybdenum	101		P	75 - 125

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418293

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2350007	Nickel	94.1		P	75 - 125
2350007	Selenium	98.7		P	75 - 125
2350007	Silver	98.9		P	75 - 125
2350007	Thallium	98.3		P	75 - 125
2350044	Aluminum	104	103	P/P	80 - 120
2350044	Antimony	99.4	101	P/P	80 - 120
2350044	Arsenic	100	102	P/P	80 - 120
2350044	Beryllium	95.5	94.8	P/P	80 - 120
2350044	Cadmium	100	102	P/P	80 - 120
2350044	Chromium	103	102	P/P	80 - 120
2350044	Cobalt	97.5	96.3	P/P	80 - 120
2350044	Copper	101	101	P/P	80 - 120
2350044	Lead	98.7	97.9	P/P	80 - 120
2350044	Manganese	104	103	P/P	80 - 120
2350044	Molybdenum	99.4	101	P/P	80 - 120
2350044	Nickel	101	99.7	P/P	80 - 120
2350044	Selenium	101	102	P/P	80 - 120
2350044	Silver	101	99.8	P/P	80 - 120
2350044	Thallium	98.7	98.6	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418358

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2349421	Aluminum	98.6	96.5	P/P	80 - 120
2349421	Antimony	101	99.8	P/P	80 - 120
2349421	Arsenic	97.1	95.5	P/P	80 - 120
2349421	Beryllium	94.8		P	80 - 120
2349421	Cadmium	102	102	P/P	80 - 120
2349421	Chromium	105	103	P/P	80 - 120
2349421	Cobalt	90.8	89.4	P/P	80 - 120
2349421	Copper	92.3	91.0	P/P	80 - 120
2349421	Lead	95.6	94.8	P/P	80 - 120
2349421	Manganese	99.4	98.0	P/P	80 - 120
2349421	Molybdenum	98.3	97.3	P/P	80 - 120
2349421	Nickel	92.0	90.4	P/P	80 - 120
2349421	Selenium	96.8	94.5	P/P	80 - 120
2349421	Silver	98.9	97.1	P/P	80 - 120
2349421	Thallium	95.2	96.1	P/P	80 - 120
2349423	Aluminum	97.1		P	80 - 120
2349423	Antimony	101		P	80 - 120
2349423	Arsenic	95.6		P	80 - 120
2349423	Beryllium	94.3	99.6	P/P	80 - 120
2349423	Cadmium	102		P	80 - 120
2349423	Chromium	105		P	80 - 120
2349423	Cobalt	90.3		P	80 - 120
2349423	Copper	87.3		P	80 - 120
2349423	Lead	95.1		P	80 - 120
2349423	Manganese	100		P	80 - 120
2349423	Molybdenum	97.2		P	80 - 120
2349423	Nickel	90.4		P	80 - 120
2349423	Selenium	96.6		P	80 - 120

Quality Assurance Report

Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P418358

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2349423	Silver	98.3		P	80 - 120
2349423	Thallium	94.1		P	80 - 120

Quality Assurance Report Precision

Reference Method: EPA 200.7 Rev. 4.4

Batch ID: P418293

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2350044	Calcium	3.24	Spike	P	0 - 20
2350044	Iron	1.71	Spike	P	0 - 20
2350044	Magnesium	1.92	Spike	P	0 - 20
2350044	Strontium	3.67	Spike	P	0 - 20
2350044	Tin	2.80	Spike	P	0 - 20
2350044	Titanium	3.72	Spike	P	0 - 20
2350044	Vanadium	3.45	Spike	P	0 - 20
2350044	Zinc	3.17	Spike	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4

Batch ID: P418358

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2349421	Calcium	0.379	Spike	P	0 - 20
2349421	Iron	6.70	Spike	P	0 - 20
2349421	Magnesium	3.87	Spike	P	0 - 20
2349421	Strontium	2.23	Spike	P	0 - 20
2349421	Tin	1.83	Spike	P	0 - 20
2349421	Titanium	2.16	Spike	P	0 - 20
2349421	Vanadium	2.13	Spike	P	0 - 20
2349421	Zinc	2.52	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418293

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2350044	Aluminum	1.03	Spike	P	0 - 20
2350044	Antimony	1.09	Spike	P	0 - 20
2350044	Arsenic	1.83	Spike	P	0 - 20
2350044	Beryllium	0.704	Spike	P	0 - 20
2350044	Cadmium	1.22	Spike	P	0 - 20
2350044	Chromium	0.615	Spike	P	0 - 20
2350044	Cobalt	1.24	Spike	P	0 - 20
2350044	Copper	0.177	Spike	P	0 - 20
2350044	Lead	0.873	Spike	P	0 - 20
2350044	Manganese	0.230	Spike	P	0 - 20
2350044	Molybdenum	1.68	Spike	P	0 - 20
2350044	Nickel	0.824	Spike	P	0 - 20
2350044	Selenium	1.11	Spike	P	0 - 20
2350044	Silver	1.12	Spike	P	0 - 20
2350044	Thallium	0.183	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418358

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2349421	Aluminum	2.02	Spike	P	0 - 20
2349421	Antimony	1.52	Spike	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P418358

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2349421	Arsenic	1.55	Spike	P	0 - 20
2349421	Beryllium	3.14	Spike	P	0 - 20
2349421	Cadmium	0.118	Spike	P	0 - 20
2349421	Chromium	2.03	Spike	P	0 - 20
2349421	Cobalt	1.55	Spike	P	0 - 20
2349421	Copper	1.44	Spike	P	0 - 20
2349421	Lead	0.862	Spike	P	0 - 20
2349421	Manganese	0.857	Spike	P	0 - 20
2349421	Molybdenum	1.00	Spike	P	0 - 20
2349421	Nickel	1.86	Spike	P	0 - 20
2349421	Selenium	2.41	Spike	P	0 - 20
2349421	Silver	1.85	Spike	P	0 - 20
2349421	Thallium	0.876	Spike	P	0 - 20

* Sample, spike and/or laboratory control sample precision (LCS) is reported.

Quality Assurance Report Calibration Verification

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A114225

Included Lab Sample IDs: 2350412

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	102	101	P/P	90 - 110
Iron	102	101	P/P	90 - 110
Magnesium	103	101	P/P	90 - 110
Strontium	101	101	P/P	90 - 110
Tin	99.7	101	P/P	90 - 110
Titanium	101	101	P/P	90 - 110
Vanadium	101	101	P/P	90 - 110
Zinc	100	100	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A114256

Included Lab Sample IDs: 2350410, 2350411, 2350412

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	96.1	97.1	P/P	90 - 110
Aluminum	97.3	96.1	P/P	90 - 110
Antimony	96.9	97.6	P/P	90 - 110
Antimony	98.6	96.9	P/P	90 - 110
Arsenic	96.4	97.0	P/P	90 - 110
Arsenic	98.0	96.4	P/P	90 - 110
Beryllium	93.9	95.5	P/P	90 - 110
Beryllium	95.5	93.6	P/P	90 - 110
Cadmium	105	105	P/P	90 - 110
Cadmium	106	105	P/P	90 - 110
Chromium	104	105	P/P	90 - 110
Chromium	105	104	P/P	90 - 110
Cobalt	91.7	91.7	P/P	90 - 110
Cobalt	92.3	91.7	P/P	90 - 110
Copper	92.6	92.6	P/P	90 - 110
Copper	93.7	92.6	P/P	90 - 110
Lead	92.0	92.6	P/P	90 - 110
Lead	92.6	92.0	P/P	90 - 110
Manganese	100	101	P/P	90 - 110
Manganese	101	100	P/P	90 - 110
Molybdenum	96.3	96.7	P/P	90 - 110
Molybdenum	96.7	96.3	P/P	90 - 110
Nickel	91.9	92.1	P/P	90 - 110
Nickel	92.5	91.9	P/P	90 - 110
Selenium	100	101	P/P	90 - 110
Selenium	103	100	P/P	90 - 110
Silver	97.4	97.6	P/P	90 - 110
Silver	97.8	97.4	P/P	90 - 110
Thallium	97.1	98.6	P/P	90 - 110
Thallium	98.2	97.1	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A114332

Included Lab Sample IDs: 2350410, 2350411

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Strontium	96.6	95.5	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A114332

Included Lab Sample IDs: 2350410, 2350411

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Tin	93.2	90.7	P/P	90 - 110
Titanium	97.0	94.7	P/P	90 - 110
Vanadium	99.9	97.6	P/P	90 - 110
Zinc	99.8	98.4	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A114528

Included Lab Sample IDs: 2350410, 2350411

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	101	97.8	P/P	90 - 110
Iron	101	97.5	P/P	90 - 110
Magnesium	101	97.8	P/P	90 - 110

* Pass/Fail determinations are made for each bracketing calibration verification check.

Control limits for initial calibration checks may be different from those for continuing checks, depending on method requirements.
Where they are different, both control limits are provided.

Quality Assurance Report Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery			Precision SMP	MS
			LCS				
EPA 200.7 Rev. 4.4	Calcium	99.2	101	96.2			3.24
	Calcium	103	105	102			0.379
	Iron	98.7	96.8	99.1	97.1		1.71
	Iron	105	101	109	105		6.70
	Magnesium	99.2	99.9	99.6	97.2		1.92
	Magnesium	106	102	108	105		3.87
	Strontium	101	99.3	100	96.7		3.67
	Strontium	105	105	108	106		2.23
	Tin	97.2	93.7	97.6	94.9		2.80
	Tin	108	109	111	104		1.83
	Titanium	98.4	96.3	98.0	94.4		3.72
	Titanium	105	104	106	103		2.16
	Vanadium	98.4	97.5	96.7	93.5		3.45
	Vanadium	99.9	99.9	102	100		2.13
	Zinc	97.7	94.9	97.2	94.2		3.17
	Zinc	100	99.4	102	97.9		2.52
EPA 200.8 Rev. 5.4	Aluminum	103	104	103	97.4		1.03
	Aluminum	100	98.6	96.5	97.1		2.02
	Antimony	99.2	99.4	101	102		1.09
	Antimony	103	101	99.8	101		1.52
	Arsenic	101	100	102	98.4		1.83
	Arsenic	98.1	97.1	95.5	95.6		1.55
	Beryllium	94.9	95.5	94.8	91.9		0.704
	Beryllium	95.4	99.6	94.8	94.3		3.14
	Cadmium	103	100	102	104		1.22
	Cadmium	103	102	102	102		0.118
	Chromium	102	103	102	105		0.615
	Chromium	105	105	103	105		2.03
	Cobalt	96.9	97.5	96.3	92.0		1.24
	Cobalt	92.0	90.8	89.4	90.3		1.55
	Copper	98.3	101	101	90.6		0.177
	Copper	91.0	92.3	91.0	87.3		1.44
	Lead	96.5	98.7	97.9	95.7		0.873
	Lead	96.1	95.6	94.8	95.1		0.862
	Manganese	101	104	103	101		0.230
	Manganese	101	99.4	98.0	100		0.857
	Molybdenum	99.4	99.4	101	101		1.68
	Molybdenum	98.2	98.3	97.3	97.2		1.00
	Nickel	99.4	101	99.7	94.1		0.824
	Nickel	92.9	92.0	90.4	90.4		1.86
	Selenium	101	101	102	98.7		1.11
	Selenium	98.5	96.8	94.5	96.6		2.41
	Silver	102	101	99.8	98.9		1.12
	Silver	99.4	98.9	97.1	98.3		1.85
	Thallium	97.0	98.7	98.6	98.3		0.183
	Thallium	94.9	95.2	96.1	94.1		0.876

Reference Method Descriptions

Method	Description	Associated Samples
EPA 200.7 Rev. 4.4	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2350410, 2350411, 2350412

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2350410, 2350411, 2350412

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 200.7 Rev. 4.4	08/17/2022	08/18/2022 10:30	Megan Whitefoot	08/25/2022 06:00	McKinley C Carter	2350410
	08/17/2022	08/18/2022 10:30	Megan Whitefoot	08/25/2022 06:07	McKinley C Carter	2350411
	08/17/2022	08/18/2022 10:30	Megan Whitefoot	09/03/2022 02:39	McKinley C Carter	2350410
	08/17/2022	08/18/2022 10:30	Megan Whitefoot	09/03/2022 02:47	McKinley C Carter	2350411
	08/17/2022	08/19/2022 10:10	Megan Whitefoot	08/20/2022 07:55	McKinley C Carter	2350412
EPA 200.8 Rev. 5.4	08/17/2022	08/18/2022 10:30	Megan Whitefoot	08/22/2022 19:54	Emily M Philpot	2350410
	08/17/2022	08/18/2022 10:30	Megan Whitefoot	08/22/2022 20:03	Emily M Philpot	2350411
	08/17/2022	08/19/2022 10:10	Megan Whitefoot	08/22/2022 20:51	Emily M Philpot	2350412