Chemical Analysis Report

NW-DIST-2023-10-19-01

Florida DEP Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Lake Powell Deployment Run**
Request ID: **RQ-2023-10-16-23**
Customer: **NW-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
160 W Government Street
Suite 208
Pensacola, FL 32502-5794
Attn: Myranda Butler

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

Certified by: Thekkekalathil Chandrasekhar, Environmental Consultant Date Certified: 30-OCT-2023 11:42

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: SISTER RIVER MOUTH **Collection Date/Time: 10/18/2023 11:00**

Field ID: G3NW0154 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2446184	EPA 200.7 Rev. 4.4	Calcium	27.3		mg/L	P436818	
		Iron	480		ug/L	P436818	
		Magnesium	22.7		mg/L	P436818	
		Potassium	7.0		mg/L	P436818	
		Sodium	161		mg/L	P436818	
		Strontium	148		ug/L	P436818	
		Tin	3.0	U	ug/L	P436818	
		Titanium	4.8		ug/L	P436818	
		Vanadium	2.0	U	ug/L	P436818	
		Zinc	7.3	I	ug/L	P436818	
	EPA 200.8 Rev. 5.4	Aluminum	114		ug/L	P436818	
		Antimony	0.050	U	ug/L	P436818	
		Arsenic	0.46		ug/L	P436818	
		Barium	22.2		ug/L	P436818	
		Beryllium	0.010	U	ug/L	P436818	
		Boron	81.1		ug/L	P436818	
		Cadmium	0.020	U	ug/L	P436818	
		Chromium	0.40	U	ug/L	P436818	
		Cobalt	0.162		ug/L	P436818	
		Copper	0.40	U	ug/L	P436818	
		Lead	0.20	U	ug/L	P436818	
		Manganese	112		ug/L	P436818	
		Molybdenum	0.39	I	ug/L	P436818	
		Nickel	0.50	U	ug/L	P436818	
		Selenium	0.20	U	ug/L	P436818	
		Silver	0.010	U	ug/L	P436818	
		Thallium	0.10	U	ug/L	P436818	
	SM 2340 B-2011	Hardness	162		mg/L	P436818	

Ref. Method and Comment:
EPA 200.8 Rev. 5.4: Batch matrix spike recoveries for copper are unavailable for one of two spiked samples because of high analyte concentration in the QC sample.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P436818

Component	Result	Code	Units
Calcium	0.075	U	mg/L
Iron	30	U	ug/L
Magnesium	0.040	U	mg/L
Potassium	0.30	U	mg/L
Sodium	0.50	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: P436818

Component	Result	Code	Units
Aluminum	5.0	U	ug/L
Antimony	0.050	U	ug/L
Arsenic	0.050	U	ug/L
Barium	0.20	U	ug/L
Beryllium	0.010	U	ug/L
Boron	2.0	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

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P436818

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	107		P	85 - 115
Iron	112		P	85 - 115
Magnesium	113		P	85 - 115
Potassium	104		P	85 - 115
Sodium	103		P	85 - 115
Strontium	99.9		P	85 - 115
Tin	99.1		P	85 - 115
Titanium	101		P	85 - 115
Vanadium	99.9		P	85 - 115
Zinc	98.9		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P436818

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	101		P	85 - 115
Antimony	97.5		P	85 - 115
Arsenic	98.7		P	85 - 115
Barium	100		P	85 - 115
Beryllium	94.0		P	85 - 115
Boron	101		P	85 - 115
Cadmium	99.6		P	85 - 115
Chromium	96.2		P	85 - 115
Cobalt	95.3		P	85 - 115
Copper	99.5		P	85 - 115
Lead	91.3		P	85 - 115
Manganese	99.7		P	85 - 115
Molybdenum	97.4		P	85 - 115
Nickel	95.8		P	85 - 115
Selenium	101		P	85 - 115
Silver	105		P	85 - 115
Thallium	98.2		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P436818

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2446026	Calcium	105		P	80 - 120
2446026	Iron	109	110	P/P	80 - 120
2446026	Magnesium	109	110	P/P	80 - 120
2446026	Potassium	101	102	P/P	80 - 120
2446026	Sodium	101		P	80 - 120
2446026	Strontium	98.7	98.5	P/P	80 - 120
2446026	Tin	95.9	95.8	P/P	80 - 120
2446026	Titanium	99.9	98.8	P/P	80 - 120
2446026	Vanadium	98.0	98.1	P/P	80 - 120
2446026	Zinc	96.2	96.4	P/P	80 - 120
2446070	Calcium	101		P	80 - 120
2446070	Iron	108		P	80 - 120
2446070	Magnesium	104		P	80 - 120
2446070	Potassium	102		P	80 - 120
2446070	Sodium	105		P	80 - 120
2446070	Strontium	96.6		P	80 - 120
2446070	Tin	94.6		P	80 - 120
2446070	Titanium	99.0		P	80 - 120
2446070	Vanadium	96.9		P	80 - 120
2446070	Zinc	92.4		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P436818

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2446026	Aluminum	98.2	98.9	P/P	80 - 120
2446026	Antimony	96.1	95.8	P/P	80 - 120
2446026	Arsenic	99.1	97.8	P/P	80 - 120
2446026	Barium	101	99.1	P/P	80 - 120
2446026	Beryllium	95.4	96.5	P/P	80 - 120
2446026	Boron	100	102	P/P	80 - 120
2446026	Cadmium	98.8	97.0	P/P	80 - 120
2446026	Chromium	96.4	96.1	P/P	80 - 120
2446026	Cobalt	95.1	95.1	P/P	80 - 120
2446026	Copper	98.1	97.0	P/P	80 - 120
2446026	Lead	92.2	92.5	P/P	80 - 120
2446026	Manganese	98.6	97.7	P/P	80 - 120
2446026	Molybdenum	96.5	96.2	P/P	80 - 120
2446026	Nickel	96.3	96.5	P/P	80 - 120
2446026	Selenium	98.3	98.8	P/P	80 - 120
2446026	Silver	102	101	P/P	80 - 120
2446026	Thallium	101	101	P/P	80 - 120
2446070	Aluminum	99.6		P	80 - 120
2446070	Antimony	98.6		P	80 - 120
2446070	Arsenic	100		P	80 - 120
2446070	Barium	101		P	80 - 120
2446070	Beryllium	91.4		P	80 - 120
2446070	Boron	107		P	80 - 120
2446070	Cadmium	98.2		P	80 - 120
2446070	Chromium	94.6		P	80 - 120
2446070	Cobalt	94.5		P	80 - 120
2446070	Lead	92.9		P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P436818

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2446070	Manganese	101		P	80 - 120
2446070	Molybdenum	98.8		P	80 - 120
2446070	Nickel	94.7		P	80 - 120
2446070	Selenium	100		P	80 - 120
2446070	Silver	101		P	80 - 120
2446070	Thallium	102		P	80 - 120

Quality Assurance Report
Precision

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P436818

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2446026	Calcium	0.0104	Spike	P	0 - 20
2446026	Iron	0.722	Spike	P	0 - 20
2446026	Magnesium	0.444	Spike	P	0 - 20
2446026	Potassium	0.818	Spike	P	0 - 20
2446026	Sodium	0.00965	Spike	P	0 - 20
2446026	Strontium	0.285	Spike	P	0 - 20
2446026	Tin	0.0207	Spike	P	0 - 20
2446026	Titanium	1.08	Spike	P	0 - 20
2446026	Vanadium	0.142	Spike	P	0 - 20
2446026	Zinc	0.193	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P436818

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2446026	Aluminum	0.637	Spike	P	0 - 20
2446026	Antimony	0.339	Spike	P	0 - 20
2446026	Arsenic	1.35	Spike	P	0 - 20
2446026	Barium	1.39	Spike	P	0 - 20
2446026	Beryllium	1.14	Spike	P	0 - 20
2446026	Boron	1.34	Spike	P	0 - 20
2446026	Cadmium	1.89	Spike	P	0 - 20
2446026	Chromium	0.253	Spike	P	0 - 20
2446026	Cobalt	0.0237	Spike	P	0 - 20
2446026	Copper	1.13	Spike	P	0 - 20
2446026	Lead	0.294	Spike	P	0 - 20
2446026	Manganese	0.798	Spike	P	0 - 20
2446026	Molybdenum	0.273	Spike	P	0 - 20
2446026	Nickel	0.238	Spike	P	0 - 20
2446026	Selenium	0.525	Spike	P	0 - 20
2446026	Silver	0.691	Spike	P	0 - 20
2446026	Thallium	0.234	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: A122295
Included Lab Sample IDs: 2446184

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	104	103	P/P	90 - 110
Iron	103	102	P/P	90 - 110
Magnesium	102	102	P/P	90 - 110
Potassium	100	100	P/P	90 - 110
Sodium	100	100	P/P	90 - 110
Strontium	98.8	99.4	P/P	90 - 110
Tin	101	101	P/P	90 - 110
Titanium	99.7	99.3	P/P	90 - 110
Vanadium	99.5	99.0	P/P	90 - 110
Zinc	100	99.9	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A122297
Included Lab Sample IDs: 2446184

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	101	101	P/P	90 - 110
Antimony	95.0	93.9	P/P	90 - 110
Arsenic	98.0	97.2	P/P	90 - 110
Barium	96.8	96.1	P/P	90 - 110
Beryllium	95.5	95.6	P/P	90 - 110
Boron	106	103	P/P	90 - 110
Cadmium	98.8	96.9	P/P	90 - 110
Chromium	96.8	96.6	P/P	90 - 110
Cobalt	96.1	95.5	P/P	90 - 110
Copper	97.0	96.8	P/P	90 - 110
Lead	92.2	92.2	P/P	90 - 110
Manganese	98.6	97.8	P/P	90 - 110
Molybdenum	97.4	96.4	P/P	90 - 110
Nickel	96.7	96.4	P/P	90 - 110
Selenium	97.6	97.7	P/P	90 - 110
Silver	97.3	96.6	P/P	90 - 110
Thallium	98.0	97.6	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		
						LCS	SMP	MS
EPA 200.7 Rev. 4.4	Calcium	107	105	101				0.0104
	Iron	112	109	110	108			0.722
	Magnesium	113	109	110	104			0.444
	Potassium	104	101	102	102			0.818
	Sodium	103	101	105				0.0096
	Strontium	99.9	98.7	98.5	96.6			0.285
	Tin	99.1	95.9	95.8	94.6			0.0207
	Titanium	101	99.9	98.8	99.0			1.08
	Vanadium	99.9	98.0	98.1	96.9			0.142
	Zinc	98.9	92.4	96.2	96.4			0.193
EPA 200.8 Rev. 5.4	Aluminum	101	98.2	98.9	99.6			0.637
	Antimony	97.5	96.1	95.8	98.6			0.339
	Arsenic	98.7	99.1	97.8	100			1.35
	Barium	100	101	99.1	101			1.39
	Beryllium	94.0	91.4	95.4	96.5			1.14
	Boron	101	100	102	107			1.34
	Cadmium	99.6	98.8	97.0	98.2			1.89
	Chromium	96.2	96.4	96.1	94.6			0.253
	Cobalt	95.3	95.1	95.1	94.5			0.0237
	Copper	99.5	98.1	97.0				1.13
	Lead	91.3	92.2	92.5	92.9			0.294
	Manganese	99.7	98.6	97.7	101			0.798
	Molybdenum	97.4	96.5	96.2	98.8			0.273
	Nickel	95.8	96.3	96.5	94.7			0.238
	Selenium	101	98.3	98.8	100			0.525
	Silver	105	102	101	101			0.691
	Thallium	98.2	101	101	102			0.234

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	2446184
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2446184
SM 2340 B-2011	Hardness by calculation, in aqueous matrices, reported as mg/L CaCO3	2446184

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	10/19/2023	10/20/2023 12:45	George D Taylor	10/23/2023 18:25	Chase Roberts	2446184
EPA 200.8 Rev. 5.4	10/19/2023	10/20/2023 12:45	George D Taylor	10/23/2023 21:13	Conrad Hartmann	2446184
SM 2340 B-2011	10/19/2023			10/23/2023 18:25	Chase Roberts	2446184