Chemical Analysis Report

CEN-DIST-2022-06-23-02

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

Event Description: **Orange Co Sampling - Terrace**
Request ID: **RQ-2022-06-20-12**
Customer: **CEN-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
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3319 Maguire Blvd., Suite 232
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Attn: Matthew Bearden

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Certified by: Thekkekalathil Chandrasekhar, Environmental Consultant Date Certified: 05-JUL-2022 10:10

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: Lake Terrace SW of Center **Collection Date/Time: 06/22/2022 10:45**

Field ID: G4CE0215 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2336854	EPA 200.7 Rev. 4.4	Calcium	19.8		mg/L	P415695	
		Iron	30	U	ug/L	P415695	
		Magnesium	2.86		mg/L	P415695	
		Potassium	3.9		mg/L	P415695	
		Sodium	13.9		mg/L	P415695	
		Strontium	48.1		ug/L	P415695	
		Tin	3.0	U	ug/L	P415695	
		Titanium	0.91	I	ug/L	P415695	
		Vanadium	3.8	I	ug/L	P415695	
		Zinc	5.0	U	ug/L	P415695	
	EPA 200.8 Rev. 5.4	Aluminum	194		ug/L	P415695	
		Antimony	0.32		ug/L	P415695	
		Arsenic	0.48		ug/L	P415695	
		Barium	19.4		ug/L	P415695	
		Beryllium	0.010	U	ug/L	P415695	
		Boron**	32.8		ug/L	P415695	
		Cadmium	0.020	U	ug/L	P415695	
		Chromium	0.40	U	ug/L	P415695	
		Cobalt	0.037	I	ug/L	P415695	
		Copper	3.93		ug/L	P415695	
		Lead	0.34	I	ug/L	P415695	
		Manganese	8.26		ug/L	P415695	
		Molybdenum	0.53	I	ug/L	P415695	
		Nickel	0.50	U	ug/L	P415695	
		Selenium	0.20	U	ug/L	P415695	
		Silver	0.010	U	ug/L	P415695	
		Thallium	0.10	U	ug/L	P415695	
	SM 2340 B-2011	Hardness	61.1		mg/L	P415695	

Quality Assurance Report
Method Blank Results

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P415695

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: P415695

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: P415695

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	104		P	85 - 115
Iron	102		P	85 - 115
Magnesium	104		P	85 - 115
Potassium	110		P	85 - 115
Sodium	102		P	85 - 115
Strontium	102		P	85 - 115
Tin	106		P	85 - 115
Titanium	103		P	85 - 115
Vanadium	94.3		P	85 - 115
Zinc	103		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P415695

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	97.7		P	85 - 115
Antimony	101		P	85 - 115
Arsenic	98.7		P	85 - 115
Barium	103		P	85 - 115
Beryllium	97.4		P	85 - 115
Boron	98.3		P	85 - 115
Cadmium	101		P	85 - 115
Chromium	97.2		P	85 - 115
Cobalt	100		P	85 - 115
Copper	97.0		P	85 - 115
Lead	94.7		P	85 - 115
Manganese	101		P	85 - 115
Molybdenum	100		P	85 - 115
Nickel	98.8		P	85 - 115
Selenium	94.4		P	85 - 115
Silver	99.1		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: P415695

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2336741	Calcium	103	102	P/P	80 - 120
2336741	Iron	104	104	P/P	80 - 120
2336741	Magnesium	105	104	P/P	80 - 120
2336741	Potassium	113	112	P/P	80 - 120
2336741	Sodium	103	102	P/P	80 - 120
2336741	Strontium	102	103	P/P	80 - 120
2336741	Tin	104	104	P/P	80 - 120
2336741	Titanium	103	103	P/P	80 - 120
2336741	Vanadium	94.6	93.9	P/P	80 - 120
2336741	Zinc	103	99.4	P/P	80 - 120
2336854	Calcium	98.6		P	80 - 120
2336854	Iron	106		P	80 - 120
2336854	Magnesium	103		P	80 - 120
2336854	Potassium	105		P	80 - 120
2336854	Sodium	101		P	80 - 120
2336854	Strontium	104		P	80 - 120
2336854	Tin	103		P	80 - 120
2336854	Titanium	102		P	80 - 120
2336854	Vanadium	95.2		P	80 - 120
2336854	Zinc	101		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P415695

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2336741	Aluminum	96.3	96.2	P/P	80 - 120
2336741	Antimony	98.4	98.7	P/P	80 - 120
2336741	Arsenic	94.4	95.2	P/P	80 - 120
2336741	Barium	100	100	P/P	80 - 120
2336741	Beryllium	96.0	95.7	P/P	80 - 120
2336741	Boron	100	101	P/P	80 - 120
2336741	Cadmium	95.7	98.2	P/P	80 - 120
2336741	Chromium	95.2	94.6	P/P	80 - 120
2336741	Cobalt	96.2	97.0	P/P	80 - 120
2336741	Copper	96.6	97.5	P/P	80 - 120
2336741	Lead	93.0	93.8	P/P	80 - 120
2336741	Manganese	95.8	97.2	P/P	80 - 120
2336741	Molybdenum	96.8	97.8	P/P	80 - 120
2336741	Nickel	94.1	94.0	P/P	80 - 120
2336741	Selenium	92.8	93.1	P/P	80 - 120
2336741	Silver	94.6	96.3	P/P	80 - 120
2336741	Thallium	96.8	98.3	P/P	80 - 120
2336854	Aluminum	100		P	80 - 120
2336854	Antimony	101		P	80 - 120
2336854	Arsenic	98.9		P	80 - 120
2336854	Barium	102		P	80 - 120
2336854	Beryllium	100		P	80 - 120
2336854	Boron	104		P	80 - 120
2336854	Cadmium	99.3		P	80 - 120
2336854	Chromium	98.7		P	80 - 120
2336854	Cobalt	99.4		P	80 - 120
2336854	Copper	96.5		P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P415695

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2336854	Lead	96.3		P	80 - 120
2336854	Manganese	99.4		P	80 - 120
2336854	Molybdenum	99.8		P	80 - 120
2336854	Nickel	97.1		P	80 - 120
2336854	Selenium	98.1		P	80 - 120
2336854	Silver	96.0		P	80 - 120
2336854	Thallium	101		P	80 - 120

Quality Assurance Report
Precision

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P415695

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2336741	Calcium	1.12	Spike	P	0 - 20
2336741	Iron	0.142	Spike	P	0 - 20
2336741	Magnesium	0.222	Spike	P	0 - 20
2336741	Potassium	0.532	Spike	P	0 - 20
2336741	Sodium	0.934	Spike	P	0 - 20
2336741	Strontium	1.15	Spike	P	0 - 20
2336741	Tin	0.156	Spike	P	0 - 20
2336741	Titanium	0.303	Spike	P	0 - 20
2336741	Vanadium	0.750	Spike	P	0 - 20
2336741	Zinc	3.85	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P415695

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2336741	Aluminum	0.135	Spike	P	0 - 20
2336741	Antimony	0.300	Spike	P	0 - 20
2336741	Arsenic	0.813	Spike	P	0 - 20
2336741	Barium	0.509	Spike	P	0 - 20
2336741	Beryllium	0.334	Spike	P	0 - 20
2336741	Boron	0.151	Spike	P	0 - 20
2336741	Cadmium	2.55	Spike	P	0 - 20
2336741	Chromium	0.631	Spike	P	0 - 20
2336741	Cobalt	0.805	Spike	P	0 - 20
2336741	Copper	0.959	Spike	P	0 - 20
2336741	Lead	0.894	Spike	P	0 - 20
2336741	Manganese	1.18	Spike	P	0 - 20
2336741	Molybdenum	0.991	Spike	P	0 - 20
2336741	Nickel	0.125	Spike	P	0 - 20
2336741	Selenium	0.306	Spike	P	0 - 20
2336741	Silver	1.86	Spike	P	0 - 20
2336741	Thallium	1.56	Spike	P	0 - 20

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

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A113150
Included Lab Sample IDs: 2336854

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	95.1	95.0	P/P	90 - 110
Antimony	98.8	98.8	P/P	90 - 110
Arsenic	97.8	98.2	P/P	90 - 110
Barium	96.6	98.3	P/P	90 - 110
Beryllium	98.0	98.0	P/P	90 - 110
Boron	93.3	94.9	P/P	90 - 110
Cadmium	97.0	98.3	P/P	90 - 110
Chromium	95.5	98.1	P/P	90 - 110
Cobalt	96.8	98.0	P/P	90 - 110
Copper	95.2	96.5	P/P	90 - 110
Lead	92.3	92.5	P/P	90 - 110
Manganese	96.4	99.5	P/P	90 - 110
Molybdenum	98.5	98.5	P/P	90 - 110
Nickel	96.6	97.8	P/P	90 - 110
Selenium	95.3	98.3	P/P	90 - 110
Silver	98.5	97.2	P/P	90 - 110
Thallium	94.1	94.6	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A113174
Included Lab Sample IDs: 2336854

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	98.6	101	P/P	90 - 110
Iron	101	103	P/P	90 - 110
Magnesium	101	103	P/P	90 - 110
Potassium	101	104	P/P	90 - 110
Sodium	101	104	P/P	90 - 110
Strontium	102	101	P/P	90 - 110
Tin	99.3	99.2	P/P	90 - 110
Titanium	100	98.7	P/P	90 - 110
Vanadium	98.9	99.2	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A113217
Included Lab Sample IDs: 2336854

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Zinc	98.7	99.4	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	104	103	102	98.6			1.12
	Iron	102	104	104	106			0.142
	Magnesium	104	105	104	103			0.222
	Potassium	110	113	112	105			0.532
	Sodium	102	103	102	101			0.934
	Strontium	102	102	103	104			1.15
	Tin	106	104	104	103			0.156
	Titanium	103	103	103	102			0.303
	Vanadium	94.3	94.6	93.9	95.2			0.750
	Zinc	103	103	99.4	101			3.85
EPA 200.8 Rev. 5.4	Aluminum	97.7	100	96.3	96.2			0.135
	Antimony	101	101	98.4	98.7			0.300
	Arsenic	98.7	98.9	94.4	95.2			0.813
	Barium	103	102	100	100			0.509
	Beryllium	97.4	100	96.0	95.7			0.334
	Boron	98.3	104	100	101			0.151
	Cadmium	101	99.3	95.7	98.2			2.55
	Chromium	97.2	98.7	95.2	94.6			0.631
	Cobalt	100	99.4	96.2	97.0			0.805
	Copper	97.0	96.5	96.6	97.5			0.959
	Lead	94.7	96.3	93.0	93.8			0.894
	Manganese	101	99.4	95.8	97.2			1.18
	Molybdenum	100	99.8	96.8	97.8			0.991
	Nickel	98.8	97.1	94.1	94.0			0.125
	Selenium	94.4	98.1	92.8	93.1			0.306
	Silver	99.1	96.0	94.6	96.3			1.86
	Thallium	98.2	101	96.8	98.3			1.56

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	2336854
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2336854
SM 2340 B-2011	Hardness by calculation, in aqueous matrices, reported as mg/L CaCO3	2336854

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	06/23/2022	06/24/2022 09:52	Mackenzie Hunt	06/30/2022 02:03	McKinley C Carter	2336854
	06/23/2022	06/24/2022 09:52	Mackenzie Hunt	06/30/2022 16:52	McKinley C Carter	2336854
EPA 200.8 Rev. 5.4	06/23/2022	06/24/2022 09:52	Mackenzie Hunt	06/28/2022 15:45	Emily M Philpot	2336854
SM 2340 B-2011	06/23/2022			06/30/2022 02:03	McKinley C Carter	2336854