Chemical Analysis Report

CEN-DIST-2020-11-04-01

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

Event Description: **Puzzle Lake Drain/Ruth Lake**
Request ID: **RQ-2020-11-02-53**
Customer: **CEN-DIST**
Project ID: **SMP**

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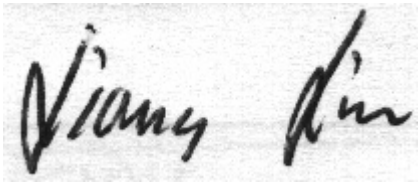
Date Certified: 25-NOV-2020 10:27



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 groups are included in this report: Metals and Nutrients.

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: Ruth Lake @ Center **Collection Date/Time: 11/03/2020 13:20**

Field ID: G3CE0021 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2206254	EPA 180.1 Rev. 2.0	Turbidity	0.95		NTU	P389752	
	EPA 300.0 Rev. 2.1	Chloride	160		mg Cl/L	P389956	
		Sulfate	19		mg SO4/L	P389958	
	SM 2120 B-2011	Color (true)	270		PCU	P389757	
	SM 2320 B-2011	Total Alkalinity	59		mg CaCO3/L	P389920	
	SM 2540 C-2011	TDS	456		mg/L	P390169	
	SM 2540 D-2011	TSS	2	U	mg/L	P390146	
	SM 4500 F-C-2011	Fluoride	0.090	I	mg F/L	P390099	
2206255	EPA 350.1 Rev. 2.0	Ammonia-N	0.019		mg N/L	P389892	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.3		mg N/L	P389838	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.005	I	mg N/L	P389860	
	EPA 365.1 Rev. 2.0	Total-P	0.035		mg P/L	P389802	
	SM 5310 B-2011	Organic Carbon	27		mg C/L	P389907	
2206256	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.013		mg P/L	P389764	

Ref. Method and Comment:
EPA 300.0 Rev. 2.1: Chloride: Batch matrix spike recoveries for one of two spiked samples are unavailable because of high analyte concentration in the QC sample.
SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

Sample Location: Saint Johns River @ 200m Downstream of Hatbill Park Ramp

Collection Date/Time: 11/03/2020 12:50

Field ID: G3CE0006

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2206251	EPA 180.1 Rev. 2.0	Turbidity	1.0		NTU	P389752	
	EPA 300.0 Rev. 2.1	Chloride	140		mg Cl/L	P389956	
		Sulfate	17		mg SO4/L	P389958	
	SM 2120 B-2011	Color (true)	270		PCU	P389756	
	SM 2320 B-2011	Total Alkalinity	57		mg CaCO3/L	P389920	
	SM 2540 C-2011	TDS	393		mg/L	P390169	
	SM 2540 D-2011	TSS	2	U	mg/L	P390146	
	SM 4500 F-C-2011	Fluoride	0.090	I	mg F/L	P390098	
2206252	EPA 350.1 Rev. 2.0	Ammonia-N	0.020		mg N/L	P389892	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.2		mg N/L	P389838	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.009	I	mg N/L	P389860	
	EPA 365.1 Rev. 2.0	Total-P	0.039		mg P/L	P389802	
	SM 5310 B-2011	Organic Carbon	27		mg C/L	P389907	
2206253	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.016		mg P/L	P389764	
2206260	EPA 200.7 Rev. 4.4	Barium	18.7		ug/L	P389749	
		Calcium	31.2		mg/L	P389749	
		Iron	370		ug/L	P389749	
		Magnesium	9.52		mg/L	P389749	
		Potassium	3.1		mg/L	P389749	
		Sodium	70.2		mg/L	P389749	
		Zinc	5.0	U	ug/L	P389749	
	EPA 200.8 Rev. 5.4	Aluminum	35		ug/L	P389749	
		Antimony	0.050	U	ug/L	P389749	
		Arsenic	0.64		ug/L	P389749	
		Beryllium	0.014	I	ug/L	P389749	
		Boron**	38.2		ug/L	P389749	
		Cadmium	0.020	U	ug/L	P389749	
		Chromium	0.40	U	ug/L	P389749	
		Copper	0.40	U	ug/L	P389749	
		Lead	0.20	U	ug/L	P389749	
		Nickel	0.50	U	ug/L	P389749	
		Selenium	0.20	U	ug/L	P389749	
		Silver	0.010	U	ug/L	P389749	
		Thallium	0.10	U	ug/L	P389749	
	SM 2340B	Hardness	117		mg/L	P389749	

Ref. Method and Comment:
EPA 300.0 Rev. 2.1: Chloride: Batch matrix spike recoveries for one of two spiked samples are unavailable because of high analyte concentration in the QC sample.
SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P389752

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P389749

Component	Result	Code	Units
Barium	1.0	U	ug/L
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
Zinc	5.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P389749

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
Boron	2.0	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.40	U	ug/L
Copper	0.40	U	ug/L
Lead	0.20	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 300.0 Rev. 2.1
Batch ID: P389956

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389958

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P389892

Component	Result	Code	Units
Ammonia-N	0.002	U	mg N/L

Quality Assurance Report
Method Blank Results

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P389838

Component	Result	Code	Units
Kjeldahl Nitrogen	0.080	U	mg N/L

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P389860

Component	Result	Code	Units
NO2NO3-N	0.004	U	mg N/L

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P389802

Component	Result	Code	Units
Total-P	0.002	U	mg P/L

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P389764

Component	Result	Code	Units
O-Phosphate-P	0.004	U	mg P/L

Reference Method: SM 2120 B-2011
Batch ID: P389756

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2120 B-2011
Batch ID: P389757

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-2011
Batch ID: P389920

Component	Result	Code	Units
Total Alkalinity	0.65	U	mg CaCO3/L

Reference Method: SM 2540 C-2011
Batch ID: P390169

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-2011
Batch ID: P390146

Component	Result	Code	Units
TSS	2	U	mg/L

Quality Assurance Report
Method Blank Results

Reference Method: SM 4500 F-C-2011
Batch ID: P390098

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 4500 F-C-2011
Batch ID: P390099

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-2011
Batch ID: P389907

Component	Result	Code	Units
Organic Carbon	0.50	U	mg C/L

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P389749

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Barium	95.4		P	85 - 115
Calcium	95.2		P	85 - 115
Iron	96.2		P	85 - 115
Magnesium	96.8		P	85 - 115
Potassium	94.4		P	85 - 115
Sodium	98.8		P	85 - 115
Zinc	93.7		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P389749

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	101		P	85 - 115
Antimony	102		P	85 - 115
Arsenic	102		P	85 - 115
Beryllium	101		P	85 - 115
Boron	102		P	85 - 115
Cadmium	103		P	85 - 115
Chromium	100		P	85 - 115
Copper	98.3		P	85 - 115
Lead	92.7		P	85 - 115
Nickel	100		P	85 - 115
Selenium	100		P	85 - 115
Silver	102		P	85 - 115
Thallium	98.2		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389956

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Chloride	100		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389958

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	101		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P389892

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	101		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P389838

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	102		P	90 - 110

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P389860

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	98.5		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P389802

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	104		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P389764

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	99.2		P	90 - 110

Reference Method: SM 2120 B-2011
Batch ID: P389756

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	103		P	85 - 115

Reference Method: SM 2120 B-2011
Batch ID: P389757

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	103		P	85 - 115

Reference Method: SM 2320 B-2011
Batch ID: P389920

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	100		P	93 - 104

Reference Method: SM 4500 F-C-2011
Batch ID: P390098

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	95.9		P	90 - 106

Reference Method: SM 4500 F-C-2011
Batch ID: P390099

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	94.4		P	90 - 106

Reference Method: SM 5310 B-2011
Batch ID: P389907

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	101		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P389749

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206409	Barium	100	103	P/P	80 - 120
2206409	Calcium	94.7	100	P/P	80 - 120
2206409	Iron	101	104	P/P	80 - 120
2206409	Magnesium	101	104	P/P	80 - 120
2206409	Potassium	97.8	101	P/P	80 - 120
2206409	Sodium	95.5	96.4	P/P	80 - 120
2206409	Zinc	98.3	102	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P389749

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206409	Aluminum	98.9	99.1	P/P	80 - 120
2206409	Antimony	102	101	P/P	80 - 120
2206409	Arsenic	104	101	P/P	80 - 120
2206409	Beryllium	103	98.9	P/P	80 - 120
2206409	Boron	103	102	P/P	80 - 120
2206409	Cadmium	104	103	P/P	80 - 120
2206409	Chromium	101	100	P/P	80 - 120
2206409	Copper	99.9	98.9	P/P	80 - 120
2206409	Lead	93.9	92.4	P/P	80 - 120
2206409	Nickel	101	100	P/P	80 - 120
2206409	Selenium	101	96.5	P/P	80 - 120
2206409	Silver	102	100	P/P	80 - 120
2206409	Thallium	99.3	100	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389956

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2205350	Chloride	99.1		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389958

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2205350	Sulfate	96.0		P	90 - 110
2206213	Sulfate	99.1		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P389892

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206252	Ammonia-N	102	104	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P389838

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206280	Kjeldahl Nitrogen	99.9	106	P/P	90 - 110

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P389860

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206226	NO2NO3-N	96.7	98.2	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P389802

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206252	Total-P	104	105	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P389764

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206163	O-Phosphate-P	97.0	97.8	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Batch ID: P390098

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206795	Fluoride	97.6	98.3	P/P	94 - 107

Reference Method: SM 4500 F-C-2011
Batch ID: P390099

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206538	Fluoride	97.6	98.8	P/P	94 - 107

Reference Method: SM 5310 B-2011
Batch ID: P389907

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2206165	Organic Carbon	103	103	P/P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P389752

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206266	Turbidity	6.70	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P389749

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206409	Barium	2.66	Spike	P	0 - 20
2206409	Calcium	3.63	Spike	P	0 - 20
2206409	Iron	2.41	Spike	P	0 - 20
2206409	Magnesium	3.03	Spike	P	0 - 20
2206409	Potassium	2.73	Spike	P	0 - 20
2206409	Sodium	0.615	Spike	P	0 - 20
2206409	Zinc	3.26	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P389749

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206409	Aluminum	0.196	Spike	P	0 - 20
2206409	Antimony	1.58	Spike	P	0 - 20
2206409	Arsenic	2.26	Spike	P	0 - 20
2206409	Beryllium	4.10	Spike	P	0 - 20
2206409	Boron	1.04	Spike	P	0 - 20
2206409	Cadmium	0.924	Spike	P	0 - 20
2206409	Chromium	1.41	Spike	P	0 - 20
2206409	Copper	1.07	Spike	P	0 - 20
2206409	Lead	1.54	Spike	P	0 - 20
2206409	Nickel	0.844	Spike	P	0 - 20
2206409	Selenium	4.89	Spike	P	0 - 20
2206409	Silver	2.28	Spike	P	0 - 20
2206409	Thallium	0.891	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389956

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2205350	Chloride	0.739	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P389958

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2205350	Sulfate	0.680	Sample	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P389892

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206252	Ammonia-N	0.941	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P389838

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206280	Kjeldahl Nitrogen	3.73	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P389860

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206226	NO2NO3-N	1.54	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P389802

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206252	Total-P	0.949	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P389764

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206163	O-Phosphate-P	0.821	Spike	P	0 - 20

Reference Method: SM 2120 B-2011
Batch ID: P389756

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206155	Color (true)	9.71	Sample	P	0 - 20

Reference Method: SM 2120 B-2011
Batch ID: P389757

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206383	Color (true)	0.0387	Sample	P	0 - 20

Reference Method: SM 2320 B-2011
Batch ID: P389920

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2205881	Total Alkalinity	1.85	Sample	P	0 - 8.1

Quality Assurance Report
Precision

Reference Method: SM 2540 C-2011
Batch ID: P390169

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206164	TDS	7.85	Sample	P	0 - 10

Reference Method: SM 4500 F-C-2011
Batch ID: P390098

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206795	Fluoride	0.520	Spike	P	0 - 2.8

Reference Method: SM 4500 F-C-2011
Batch ID: P390099

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206538	Fluoride	0.984	Spike	P	0 - 2.8

Reference Method: SM 5310 B-2011
Batch ID: P389907

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2206165	Organic Carbon	0.0990	Spike	P	0 - 20

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

Quality Assurance Report
Calibration Verification

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A101959
Included Lab Sample IDs: 2206251, 2206254

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	96.5	97.0	P/P	95 - 105

Reference Method: SM 2120 B-2011
Run ID: A101960
Included Lab Sample IDs: 2206251, 2206254

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	103	106	P/P	90 - 115

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A101961
Included Lab Sample IDs: 2206253, 2206256

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	101	102	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A102003
Included Lab Sample IDs: 2206260

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Barium	103	103	P/P	90 - 110
Calcium	98.5	99.1	P/P	90 - 110
Iron	100	100	P/P	90 - 110
Magnesium	99.1	99.5	P/P	90 - 110
Potassium	98.8	97.8	P/P	90 - 110
Sodium	99.7	98.6	P/P	90 - 110
Zinc	104	104	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A102010
Included Lab Sample IDs: 2206252, 2206255

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	98.5	97.5	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A102027
Included Lab Sample IDs: 2206252, 2206255

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	101	98.2	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A102028
Included Lab Sample IDs: 2206252, 2206255

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	106	104	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: SM 5310 B-2011
Run ID: A102035
Included Lab Sample IDs: 2206252, 2206255

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	102	102	P/P	90 - 110

Reference Method: SM 2320 B-2011
Run ID: A102049
Included Lab Sample IDs: 2206251, 2206254

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	100	98.0	P/P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Run ID: A102065
Included Lab Sample IDs: 2206251, 2206254

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	99.8	99.5	P/P	90 - 110
Sulfate	101	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A102068
Included Lab Sample IDs: 2206252, 2206255

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	97.5	99.5	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A102117
Included Lab Sample IDs: 2206260

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	95.6	97.4	P/P	90 - 110
Antimony	97.9	97.0	P/P	90 - 110
Arsenic	97.4	99.0	P/P	90 - 110
Beryllium	103	98.3	P/P	90 - 110
Boron	102	104	P/P	90 - 110
Cadmium	98.1	97.5	P/P	90 - 110
Chromium	93.8	97.8	P/P	90 - 110
Copper	93.5	101	P/P	90 - 110
Lead	90.8	90.1	P/P	90 - 110
Nickel	94.8	101	P/P	90 - 110
Selenium	97.1	95.6	P/P	90 - 110
Silver	103	103	P/P	90 - 110
Thallium	91.6	90.1	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Run ID: A102147
Included Lab Sample IDs: 2206251, 2206254

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	98.0	98.1	P/P	90 - 110
Fluoride	98.1	96.5	P/P	90 - 110

Quality Assurance Report
Calibration Verification

* 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 180.1 Rev. 2.0	Turbidity					6.70	
EPA 200.7 Rev. 4.4	Barium	95.4	100	103			2.66
	Calcium	95.2	94.7	100			3.63
	Iron	96.2	101	104			2.41
	Magnesium	96.8	101	104			3.03
	Potassium	94.4	97.8	101			2.73
	Sodium	98.8	95.5	96.4			0.615
	Zinc	93.7	98.3	102			3.26
EPA 200.8 Rev. 5.4	Aluminum	101	98.9	99.1			0.196
	Antimony	102	102	101			1.58
	Arsenic	102	104	101			2.26
	Beryllium	101	103	98.9			4.10
	Boron	102	103	102			1.04
	Cadmium	103	104	103			0.924
	Chromium	100	101	100			1.41
	Copper	98.3	99.9	98.9			1.07
	Lead	92.7	93.9	92.4			1.54
	Nickel	100	101	100			0.844
	Selenium	100	101	96.5			4.89
	Silver	102	102	100			2.28
	Thallium	98.2	99.3	100			0.891
EPA 300.0 Rev. 2.1	Chloride	100	99.1			0.739	
	Sulfate	101	96.0	99.1		0.680	
EPA 350.1 Rev. 2.0	Ammonia-N	101	102	104			0.941
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	102	99.9	106			3.73
EPA 353.2 Rev. 2.0	NO2NO3-N	98.5	96.7	98.2			1.54
EPA 365.1 Rev. 2.0	Total-P	104	104	105			0.949
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	99.2	97.0	97.8			0.821
SM 2120 B-2011	Color (true)	103				9.71	
	Color (true)	103				0.0387	
SM 2320 B-2011	Total Alkalinity	100				1.85	
SM 2540 C-2011	TDS					7.85	
SM 4500 F-C-2011	Fluoride	95.9	97.6	98.3			0.520
	Fluoride	94.4	97.6	98.8			0.984
SM 5310 B-2011	Organic Carbon	101	103	103			0.0990

Reference Method Descriptions

Method	Description	Associated Samples
EPA 180.1 Rev. 2.0	Turbidity in aqueous matrices	2206251, 2206254
EPA 200.7 Rev. 4.4	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2206260
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2206260
EPA 300.0 Rev. 2.1	Chloride in aqueous matrices	2206251, 2206254
EPA 300.0 Rev. 2.1	Sulfate in aqueous matrices	2206251, 2206254
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2206252, 2206255
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2206252, 2206255
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2206252, 2206255
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2206252, 2206255
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2206253, 2206256
SM 2120 B-2011	True Color measured at 450 nm (not valid for NPDES monitoring)	2206251, 2206254

Reference Method Descriptions

Method	Description	Associated Samples
SM 2320 B-2011	Alkalinity in aqueous matrices as mg CaCO3/L	2206251, 2206254
SM 2340B	Hardness by calculation, in aqueous matrices, reported as mg/L CaCO3	2206260
SM 2540 C-2011	Total Dissolved Solids in aqueous matrices	2206251, 2206254
SM 2540 D-2011	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2206251, 2206254
SM 4500 F-C-2011	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2206251, 2206254
SM 5310 B-2011	Nonpurgeable Organic Carbon in aqueous matrices	2206252, 2206255

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 180.1 Rev. 2.0	11/04/2020			11/04/2020 15:13	Yen Ta	2206251, 2206254
EPA 200.7 Rev. 4.4	11/04/2020	11/04/2020 15:10	Elliott D. Healy	11/05/2020 18:49	Betina Topolski	2206260
EPA 200.8 Rev. 5.4	11/04/2020	11/04/2020 15:10	Elliott D. Healy	11/12/2020 23:37	Alexander Thompson	2206260
EPA 300.0 Rev. 2.1	11/04/2020			11/10/2020 05:49	Lipi Saha	2206251
	11/04/2020			11/10/2020 06:02	Lipi Saha	2206254
EPA 350.1 Rev. 2.0	11/04/2020			11/07/2020 11:41	Ping Hua	2206252
	11/04/2020			11/07/2020 11:43	Ping Hua	2206255
EPA 351.2 Rev. 2.0	11/04/2020	11/05/2020 14:28	David Boose	11/07/2020 15:57	Elliott Rodriguez	2206252
	11/04/2020	11/05/2020 14:28	David Boose	11/07/2020 15:59	Elliott Rodriguez	2206255
EPA 353.2 Rev. 2.0	11/04/2020			11/06/2020 10:15	Beverly Y. Sanders	2206252
	11/04/2020			11/06/2020 10:16	Beverly Y. Sanders	2206255
EPA 365.1 Rev. 2.0	11/04/2020	11/05/2020 12:58	Yen Ta	11/10/2020 11:16	Shengyu Wang	2206255
	11/04/2020	11/05/2020 12:58	Yen Ta	11/10/2020 11:18	Shengyu Wang	2206252
EPA 365.1 Rev. 2.0 dissolved	11/04/2020			11/04/2020 17:41	Ping Hua	2206253
	11/04/2020			11/04/2020 17:42	Ping Hua	2206256
SM 2120 B-2011	11/04/2020			11/04/2020 16:42	Benjamin T. Nordmann	2206251
	11/04/2020			11/04/2020 16:43	Benjamin T. Nordmann	2206254
SM 2320 B-2011	11/04/2020			11/06/2020 23:45	Dale L. Simmons	2206251
	11/04/2020			11/06/2020 23:58	Dale L. Simmons	2206254
SM 2340B	11/04/2020			11/05/2020 18:49	Betina Topolski	2206260
SM 2540 C-2011	11/04/2020			11/09/2020 13:51	Yijie Li	2206251, 2206254
SM 2540 D-2011	11/04/2020			11/09/2020 13:51	Yijie Li	2206251, 2206254
SM 4500 F-C-2011	11/04/2020			11/13/2020 16:23	Dale L. Simmons	2206251
	11/04/2020			11/13/2020 17:36	Dale L. Simmons	2206254
SM 5310 B-2011	11/04/2020			11/06/2020 17:51	Touraj Touran	2206252
	11/04/2020			11/06/2020 18:03	Touraj Touran	2206255