

Chemical Analysis Report

NW-DIST-2021-03-23-01

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

Event Description: **Escambia River Run**
Request ID: **RQ-2021-03-22-29**
Customer: **NW-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
160 Government Center
Suite 208
Pensacola, FL 32502-5794
Attn: Cheryl Bunch

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: Liang Lin, Environmental Administrator

Date Certified: 13-APR-2021 12:22

A handwritten signature in black ink, appearing to read "Liang Lin", is shown on a light-colored background.

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: Escambia River upstream of Mitchell Creek

Collection Date/Time: 03/22/2021 10:30

Field ID: G4NW0404

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2233193	EPA 180.1 Rev. 2.0	Turbidity	30		NTU	P395386	
	EPA 300.0 Rev. 2.1	Chloride	4.3		mg Cl/L	P395584	
		Sulfate	4.5		mg SO4/L	P395586	
		Color (true)	34	A	PCU	P395383	
	SM 2320 B-2011	Total Alkalinity	21		mg CaCO3/L	P395512	
	SM 2540 C-2011	TDS	63		mg/L	P395816	
	SM 2540 D-2011	TSS	27		mg/L	P395853	
	SM 4500 F-C-2011	Fluoride	0.035	U	mg F/L	P395517	
2233195	EPA 350.1 Rev. 2.0	Ammonia-N	0.046		mg N/L	P395904	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.48		mg N/L	P395719	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.17		mg N/L	P395462	
	EPA 365.1 Rev. 2.0	Total-P	0.057		mg P/L	P395487	
	SM 5310 B-2011	Organic Carbon	6.9		mg C/L	P395668	
2233197	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.014		mg P/L	P395364	
2233201	EPA 200.7 Rev. 4.4	Barium	28.9		ug/L	P395380	
		Calcium	8.66		mg/L	P395380	
		Iron	2.16E+03		ug/L	P395380	
		Magnesium	1.23		mg/L	P395380	
		Manganese	66.4		ug/L	P395380	
		Potassium	1.1	I	mg/L	P395380	
		Sodium	4.6		mg/L	P395380	
	EPA 200.8 Rev. 5.4	Zinc	5.3	I	ug/L	P395380	
		Aluminum	943		ug/L	P395380	
		Antimony	0.050	U	ug/L	P395380	
		Arsenic	0.88		ug/L	P395380	
		Beryllium	0.086		ug/L	P395380	
		Boron**	11.4		ug/L	P395380	
		Cadmium	0.020	U	ug/L	P395380	
		Chromium	2.1		ug/L	P395380	
		Copper	0.86		ug/L	P395380	
		Lead	0.97		ug/L	P395380	
		Nickel	1.0	I	ug/L	P395380	
		Selenium	0.20	U	ug/L	P395380	
		Silver	0.010	U	ug/L	P395380	
		Thallium	0.10	U	ug/L	P395380	
		Hardness	26.7		mg/L	P395380	

Ref. Method and Comment:

SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

EPA 200.8 Rev. 5.4: The lead result was confirmed on 03/30/2021.

Sample Location: Escambia River downstream of Cotton Lake

Collection Date/Time: 03/22/2021 11:30

Field ID: G4NW0403

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2233194	EPA 180.1 Rev. 2.0	Turbidity	29		NTU	P395386	
	EPA 300.0 Rev. 2.1	Chloride	4.3		mg Cl/L	P395584	
		Sulfate	4.3		mg SO4/L	P395586	
		Color (true)	31		PCU	P395383	
	SM 2320 B-2011	Total Alkalinity	21		mg CaCO3/L	P395512	
	SM 2540 C-2011	TDS	64		mg/L	P395816	
	SM 2540 D-2011	TSS	27		mg/L	P395853	
	SM 4500 F-C-2011	Fluoride	0.035	U	mg F/L	P395517	
2233196	EPA 350.1 Rev. 2.0	Ammonia-N	0.035		mg N/L	P395904	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.44		mg N/L	P395719	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.17		mg N/L	P395462	
	EPA 365.1 Rev. 2.0	Total-P	0.051		mg P/L	P395487	
	SM 5310 B-2011	Organic Carbon	6.8		mg C/L	P395668	
2233198	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.012		mg P/L	P395364	
2233202	EPA 200.7 Rev. 4.4	Barium	29.1		ug/L	P395380	
		Calcium	8.93		mg/L	P395380	
		Iron	2.38E+03		ug/L	P395380	
		Magnesium	1.22		mg/L	P395380	
		Manganese	65.2		ug/L	P395380	
		Potassium	1.1	I	mg/L	P395380	
		Sodium	4.4		mg/L	P395380	
		Zinc	5.5	I	ug/L	P395380	
	EPA 200.8 Rev. 5.4	Aluminum	1.11E+03		ug/L	P395380	
		Antimony	0.050	U	ug/L	P395380	
		Arsenic	0.90		ug/L	P395380	
		Beryllium	0.086		ug/L	P395380	
		Boron**	10.9		ug/L	P395380	
		Cadmium	0.020	U	ug/L	P395380	
		Chromium	2.3		ug/L	P395380	
		Copper	0.97		ug/L	P395380	
		Lead	1.02		ug/L	P395380	
		Nickel	1.1	I	ug/L	P395380	
		Selenium	0.20	U	ug/L	P395380	
		Silver	0.010	U	ug/L	P395380	
		Thallium	0.10	U	ug/L	P395380	
	SM 2340B	Hardness	27.3		mg/L	P395380	

Ref. Method and Comment:

SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

EPA 200.8 Rev. 5.4: The lead result was confirmed on 03/30/2021.

Quality Assurance Report Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P395386

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P395380

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
Manganese	1.0	U	ug/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: P395380

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: P395584

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P395586

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P395904

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: P395719

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P395462

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P395487

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P395364

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

Reference Method: SM 2120 B-2011
Batch ID: P395383

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-2011
Batch ID: P395512

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

Reference Method: SM 2540 C-2011
Batch ID: P395816

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-2011
Batch ID: P395853

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-2011
Batch ID: P395517

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Quality Assurance Report

Method Blank Results

Reference Method: SM 5310 B-2011
Batch ID: P395668

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: P395380

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Barium	104		P	80 - 120
Calcium	108		P	80 - 120
Iron	103		P	80 - 120
Magnesium	105		P	80 - 120
Manganese	100		P	80 - 120
Potassium	99.2		P	80 - 120
Sodium	102		P	80 - 120
Zinc	102		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P395380

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	95.9		P	85 - 115
Antimony	102		P	85 - 115
Arsenic	100		P	85 - 115
Beryllium	92.2		P	85 - 115
Boron	96.6		P	85 - 115
Cadmium	99.7		P	85 - 115
Chromium	96.6		P	85 - 115
Copper	99.2		P	85 - 115
Lead	108		P	85 - 115
Nickel	98.1		P	85 - 115
Selenium	101		P	85 - 115
Silver	107		P	85 - 115
Thallium	103		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P395584

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Chloride	97.9		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P395586

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	97.3		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0

Batch ID: P395904

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	99.0		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Batch ID: P395719

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

Quality Assurance Report

Laboratory Control Sample Accuracy

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P395462

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	103		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P395487

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	106		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P395364

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

Reference Method: SM 2120 B-2011
Batch ID: P395383

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	102		P	85 - 115

Reference Method: SM 2320 B-2011
Batch ID: P395512

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	101		P	93 - 104

Reference Method: SM 4500 F-C-2011
Batch ID: P395517

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	98.9		P	90 - 106

Reference Method: SM 5310 B-2011
Batch ID: P395668

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	95.4		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4

Batch ID: P395380

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233048	Barium	106	110	P/P	80 - 120
2233048	Calcium	108		P	80 - 120
2233048	Iron	103	109	P/P	80 - 120
2233048	Magnesium	105	111	P/P	80 - 120
2233048	Manganese	101	106	P/P	80 - 120
2233048	Potassium	107	110	P/P	80 - 120
2233048	Sodium	100	107	P/P	80 - 120
2233048	Zinc	102	102	P/P	80 - 120
2233126	Barium	102		P	80 - 120
2233126	Calcium	109		P	80 - 120
2233126	Iron	104		P	80 - 120
2233126	Magnesium	101		P	80 - 120
2233126	Manganese	98.3		P	80 - 120
2233126	Potassium	100		P	80 - 120
2233126	Sodium	103		P	80 - 120
2233126	Zinc	104		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P395380

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233048	Aluminum	87.7	82.5	P/P	80 - 120
2233048	Antimony	99.5	90.8	P/P	80 - 120
2233048	Arsenic	99.1	90.0	P/P	80 - 120
2233048	Beryllium	92.9	85.6	P/P	80 - 120
2233048	Boron	95.0	88.4	P/P	80 - 120
2233048	Cadmium	101	91.3	P/P	80 - 120
2233048	Chromium	96.6	87.2	P/P	80 - 120
2233048	Copper	98.7	91.3	P/P	80 - 120
2233048	Lead	108	98.2	P/P	80 - 120
2233048	Nickel	97.2	88.7	P/P	80 - 120
2233048	Selenium	97.7	89.8	P/P	80 - 120
2233048	Silver	106	106	P/P	80 - 120
2233048	Thallium	106	96.3	P/P	80 - 120
2233126	Aluminum	95.9		P	80 - 120
2233126	Antimony	100		P	80 - 120
2233126	Arsenic	98.6		P	80 - 120
2233126	Beryllium	93.3		P	80 - 120
2233126	Boron	102		P	80 - 120
2233126	Cadmium	102		P	80 - 120
2233126	Chromium	95.4		P	80 - 120
2233126	Copper	97.9		P	80 - 120
2233126	Lead	108		P	80 - 120
2233126	Nickel	97.1		P	80 - 120
2233126	Selenium	96.4		P	80 - 120
2233126	Silver	106		P	80 - 120
2233126	Thallium	107		P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P395584

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
---------------	-----------	---------	---------	-----------	----------------

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P395584

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233010	Chloride	100		P	90 - 110
2233235	Chloride	100		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P395586

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233010	Sulfate	99.0		P	90 - 110
2233235	Sulfate	98.1		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P395904

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233236	Ammonia-N	95.8	95.4	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P395719

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233098	Kjeldahl Nitrogen	101	90.1	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P395462

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233195	NO2NO3-N	99.5	99.5	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P395487

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233085	Total-P	104	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P395364

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233122	O-Phosphate-P	98.0	97.3	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Batch ID: P395517

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233059	Fluoride	98.7	96.9	P/P	94 - 107

Reference Method: SM 5310 B-2011
Batch ID: P395668

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2233281	Organic Carbon	99.6		P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0

Batch ID: P395386

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233087	Turbidity	1.94	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4

Batch ID: P395380

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233048	Barium	3.29	Spike	P	0 - 20
2233048	Calcium	3.76	Spike	P	0 - 20
2233048	Iron	4.29	Spike	P	0 - 20
2233048	Magnesium	4.28	Spike	P	0 - 20
2233048	Manganese	3.35	Spike	P	0 - 20
2233048	Potassium	3.07	Spike	P	0 - 20
2233048	Sodium	3.80	Spike	P	0 - 20
2233048	Zinc	0.0777	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4

Batch ID: P395380

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233048	Aluminum	3.99	Spike	P	0 - 20
2233048	Antimony	9.11	Spike	P	0 - 20
2233048	Arsenic	9.56	Spike	P	0 - 20
2233048	Beryllium	7.72	Spike	P	0 - 20
2233048	Boron	6.57	Spike	P	0 - 20
2233048	Cadmium	9.82	Spike	P	0 - 20
2233048	Chromium	9.73	Spike	P	0 - 20
2233048	Copper	7.82	Spike	P	0 - 20
2233048	Lead	9.81	Spike	P	0 - 20
2233048	Nickel	9.18	Spike	P	0 - 20
2233048	Selenium	8.42	Spike	P	0 - 20
2233048	Silver	0.831	Spike	P	0 - 20
2233048	Thallium	9.22	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P395584

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233235	Chloride	0.570	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P395586

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233235	Sulfate	0.441	Sample	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0

Batch ID: P395904

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233236	Ammonia-N	0.326	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0

Batch ID: P395719

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233098	Kjeldahl Nitrogen	5.80	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0

Batch ID: P395462

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233195	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0

Batch ID: P395487

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233085	Total-P	0.157	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Batch ID: P395364

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233122	O-Phosphate-P	0.681	Spike	P	0 - 20

Reference Method: SM 2120 B-2011

Batch ID: P395383

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233193	Color (true)	4.08	Sample	P	0 - 20

Reference Method: SM 2320 B-2011

Batch ID: P395512

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233059	Total Alkalinity	0.279	Sample	P	0 - 8.1

Reference Method: SM 2540 C-2011

Batch ID: P395816

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233280	TDS	4.29	Sample	P	0 - 10

Quality Assurance Report Precision

Reference Method: SM 4500 F-C-2011
Batch ID: P395517

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233059	Fluoride	0.946	Spike	P	0 - 2.8

Reference Method: SM 5310 B-2011
Batch ID: P395668

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2233281	Organic Carbon	0.273	Spike	P	0 - 20

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

Quality Assurance Report Calibration Verification

Reference Method: EPA 300.0 Rev. 2.1

Run ID: A104216

Included Lab Sample IDs: 2233193, 2233194

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	99.0	98.9	P/P	90 - 110
Sulfate	98.7	98.9	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A104225

Included Lab Sample IDs: 2233197, 2233198

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	98.3	98.4	P/P	90 - 110

Reference Method: SM 2120 B-2011

Run ID: A104228

Included Lab Sample IDs: 2233193, 2233194

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	98.6	101	P/P	90 - 115

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A104229

Included Lab Sample IDs: 2233193, 2233194

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	99.5	101	P/P	95 - 105

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A104267

Included Lab Sample IDs: 2233195, 2233196

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	104	104	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A104286

Included Lab Sample IDs: 2233201, 2233202

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	99.3	99.1	P/P	90 - 110
Antimony	97.4	95.7	P/P	90 - 110
Arsenic	97.6	96.5	P/P	90 - 110
Beryllium	95.6	96.2	P/P	90 - 110
Boron	102	97.6	P/P	90 - 110
Cadmium	98.0	97.3	P/P	90 - 110
Chromium	96.1	95.6	P/P	90 - 110
Copper	95.7	94.8	P/P	90 - 110
Lead	109	107	P/P	90 - 110
Nickel	95.9	96.1	P/P	90 - 110
Selenium	98.6	98.0	P/P	90 - 110
Silver	102	101	P/P	90 - 110
Thallium	102	99.4	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: SM 2320 B-2011

Run ID: A104288

Included Lab Sample IDs: 2233193, 2233194

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	98.5	98.8	P/P	90 - 110

Reference Method: SM 4500 F-C-2011

Run ID: A104288

Included Lab Sample IDs: 2233193, 2233194

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	101	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A104296

Included Lab Sample IDs: 2233195

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	102	105	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A104298

Included Lab Sample IDs: 2233196

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	97.5	96.5	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A104344

Included Lab Sample IDs: 2233201, 2233202

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Barium	100	106	P/P	90 - 110
Calcium	102	99.7	P/P	90 - 110
Iron	104	101	P/P	90 - 110
Magnesium	102	99.6	P/P	90 - 110
Manganese	98.7	104	P/P	90 - 110
Potassium	100	98.1	P/P	90 - 110
Sodium	97.9	95.6	P/P	90 - 110
Zinc	104	110	P/P	90 - 110

Reference Method: SM 5310 B-2011

Run ID: A104362

Included Lab Sample IDs: 2233195, 2233196

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	96.6	96.2	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A104425

Included Lab Sample IDs: 2233195, 2233196

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	94.4	102	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A104463

Included Lab Sample IDs: 2233195, 2233196

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.9	98.6	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 SMP	MS
			LCS				
EPA 180.1 Rev. 2.0	Turbidity					1.94	
EPA 200.7 Rev. 4.4	Barium	104	106	110	102		3.29
	Calcium	108	108	109			3.76
	Iron	103	103	109	104		4.29
	Magnesium	105	105	111	101		4.28
	Manganese	100	101	106	98.3		3.35
	Potassium	99.2	107	110	100		3.07
	Sodium	102	100	107	103		3.80
	Zinc	102	102	102	104		0.0777
EPA 200.8 Rev. 5.4	Aluminum	95.9	87.7	82.5	95.9		3.99
	Antimony	102	99.5	90.8	100		9.11
	Arsenic	100	98.6	99.1	90.0		9.56
	Beryllium	92.2	92.9	85.6	93.3		7.72
	Boron	96.6	95.0	88.4	102		6.57
	Cadmium	99.7	101	91.3	102		9.82
	Chromium	96.6	96.6	87.2	95.4		9.73
	Copper	99.2	98.7	91.3	97.9		7.82
	Lead	108	108	98.2	108		9.81
	Nickel	98.1	97.2	88.7	97.1		9.18
	Selenium	101	97.7	89.8	96.4		8.42
	Silver	107	106	106	106		0.831
	Thallium	103	106	96.3	107		9.22
EPA 300.0 Rev. 2.1	Chloride	97.9	100	100		0.570	
	Sulfate	97.3	98.1	99.0		0.441	
EPA 350.1 Rev. 2.0	Ammonia-N	99.0	95.8	95.4			0.326
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	106	101	90.1			5.80
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	103	99.5	99.5			0.0
EPA 365.1 Rev. 2.0	Total-P	106	104	104			0.157
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	100	98.0	97.3			0.681
SM 2120 B-2011	Color (true)	102				4.08	
SM 2320 B-2011	Total Alkalinity	101				0.279	
SM 2540 C-2011	TDS					4.29	
SM 4500 F-C-2011	Fluoride	98.9	98.7	96.9			0.946
SM 5310 B-2011	Organic Carbon	95.4	99.6				0.273

Reference Method Descriptions

Method	Description	Associated Samples
EPA 180.1 Rev. 2.0	Turbidity in aqueous matrices	2233193, 2233194
EPA 200.7 Rev. 4.4	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2233201, 2233202
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2233201, 2233202
EPA 300.0 Rev. 2.1	Chloride in aqueous matrices	2233193, 2233194
EPA 300.0 Rev. 2.1	Sulfate in aqueous matrices	2233193, 2233194
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2233195, 2233196
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2233195, 2233196
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2233195, 2233196
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2233195, 2233196
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2233197, 2233198
SM 2120 B-2011	True Color measured at 450 nm (not valid for NPDES monitoring)	2233193, 2233194
SM 2320 B-2011	Alkalinity in aqueous matrices as mg CaCO ₃ /L	2233193, 2233194

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
SM 2340B	Hardness by calculation, in aqueous matrices, reported as mg/L CaCO ₃	2233201, 2233202
SM 2540 C-2011	Total Dissolved Solids in aqueous matrices	2233193, 2233194
SM 2540 D-2011	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2233193, 2233194
SM 4500 F-C-2011	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2233193, 2233194
SM 5310 B-2011	Nonpurgeable Organic Carbon in aqueous matrices	2233195, 2233196

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	03/23/2021			03/23/2021 15:57	Yen Ta	2233193, 2233194
EPA 200.7 Rev. 4.4	03/23/2021	03/23/2021 16:00	Elliott D. Healy	03/29/2021 19:08	Josef B Mick	2233201
	03/23/2021	03/23/2021 16:00	Elliott D. Healy	03/29/2021 19:15	Josef B Mick	2233202
EPA 200.8 Rev. 5.4	03/23/2021	03/23/2021 16:00	Elliott D. Healy	03/25/2021 19:21	McKinley C Carter	2233201
	03/23/2021	03/23/2021 16:00	Elliott D. Healy	03/25/2021 19:29	McKinley C Carter	2233202
EPA 300.0 Rev. 2.1	03/23/2021			03/25/2021 18:02	Lipi Saha	2233193
	03/23/2021			03/25/2021 18:15	Lipi Saha	2233194
EPA 350.1 Rev. 2.0	03/23/2021			04/02/2021 18:47	Ping Hua	2233195
	03/23/2021			04/02/2021 18:48	Ping Hua	2233196
EPA 351.2 Rev. 2.0	03/23/2021	03/31/2021 13:16	Benjamin T. Nordmann	04/01/2021 13:18	Virginia P. Brown	2233195
	03/23/2021	03/31/2021 13:16	Benjamin T. Nordmann	04/01/2021 13:19	Virginia P. Brown	2233196
EPA 353.2 Rev. 2.0	03/23/2021			03/25/2021 09:23	Beverly Y. Sanders	2233195
	03/23/2021			03/25/2021 09:29	Beverly Y. Sanders	2233196
EPA 365.1 Rev. 2.0	03/23/2021	03/25/2021 12:45	Yen Ta	03/26/2021 11:43	Shengyu Ding	2233195
	03/23/2021	03/25/2021 12:45	Yen Ta	03/26/2021 13:24	Shengyu Ding	2233196
EPA 365.1 Rev. 2.0 dissolved	03/23/2021			03/23/2021 14:21	Lipi Saha	2233197
	03/23/2021			03/23/2021 14:22	Lipi Saha	2233198
SM 2120 B-2011	03/23/2021			03/23/2021 16:14	Benjamin T. Nordmann	2233193
	03/23/2021			03/23/2021 16:15	Benjamin T. Nordmann	2233194
SM 2320 B-2011	03/23/2021			03/24/2021 20:30	Dale L. Simmons	2233193
	03/23/2021			03/24/2021 20:44	Dale L. Simmons	2233194
SM 2340B	03/23/2021			03/29/2021 19:08	Josef B Mick	2233201
	03/23/2021			03/29/2021 19:15	Josef B Mick	2233202
SM 2540 C-2011	03/23/2021			03/26/2021 15:08	Yijie Li	2233193, 2233194
SM 2540 D-2011	03/23/2021			03/26/2021 15:08	Yijie Li	2233193, 2233194
SM 4500 F-C-2011	03/23/2021			03/24/2021 20:30	Dale L. Simmons	2233193
	03/23/2021			03/24/2021 20:44	Dale L. Simmons	2233194
SM 5310 B-2011	03/23/2021			03/30/2021 06:31	Madeline Gruver	2233195
	03/23/2021			03/30/2021 06:43	Madeline Gruver	2233196