Chemical Analysis Report

TLH-ROC-2018-11-27-01

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

Event Description: **G1 Run 2**
Request ID: **RQ-2018-11-26-57**
Customer: **TLH-ROC**
Project ID: **SMP**

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Certified by: Dr. rer. nat. Bettina Steinbock, Environmental Administrator Date Certified: 14-DEC-2018 17:29

B. Steinbock

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 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: MIDDLE WARRIOR CREEK **Collection Date/Time: 11/27/2018 10:20**

Field ID: G1TLHR0007 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2043810	EPA 180.1 Rev. 2.0	Turbidity	1.7		NTU	P355152	
	EPA 300.0 Rev. 2.1	Chloride	6.1		mg Cl/L	P355506	
		Sulfate	0.20	U	mg SO4/L	P355508	
	SM 2120 B	Color (true)	340		PCU	P355251	
	SM 2320 B-97	Total Alkalinity	72		mg CaCO3/L	P355470	
	SM 2540 C-97	TDS	131		mg/L	P355529	
	SM 2540 D-97	TSS	3	I	mg/L	P355511	
	SM 4500 F-C-97	Fluoride	0.089	I	mg F/L	P355475	
2043813	EPA 350.1 Rev. 2.0	Ammonia-N	0.003	I	mg N/L	P355442	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.86		mg N/L	P355308	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P355332	
	EPA 365.1 Rev. 2.0	Total-P	0.044		mg P/L	P355276	
	SM 5310 B-00	Organic Carbon	31		mg C/L	P355423	
2043816	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.021		mg P/L	P355293	
2043822	EPA 200.7 Rev. 4.4	Calcium	28.2		mg/L	P355304	
		Iron	1.35E+03		ug/L	P355304	
		Magnesium	5.65		mg/L	P355304	
		Potassium	0.30	U	mg/L	P355304	
		Sodium	3.3		mg/L	P355304	
		Zinc	5.0	U	ug/L	P355304	
	EPA 200.8 Rev. 5.4	Arsenic	0.80		ug/L	P355304	
		Cadmium	0.020	U	ug/L	P355304	
		Chromium	0.42	I	ug/L	P355304	
		Copper	0.20	U	ug/L	P355304	
		Lead	0.050	U	ug/L	P355304	
		Nickel	0.28	I	ug/L	P355304	
		Silver	0.010	U	ug/L	P355304	

Ref. Method and Comment:
SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 200.7 Rev. 4.4: Batch matrix spike recoveries for calcium are unavailable for one of two spiked samples because of high analyte concentration in the QC sample.

Sample Location: Econfina River @ Cabbage Grove Salt Rd **Collection Date/Time: 11/27/2018 14:30**

Field ID: G1TLHR0092 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2043811	EPA 180.1 Rev. 2.0	Turbidity	1.5		NTU	P355152	
	EPA 300.0 Rev. 2.1	Chloride	6.0		mg Cl/L	P355506	
		Sulfate	0.76		mg SO4/L	P355508	
	SM 2120 B	Color (true)	410		PCU	P355251	
	SM 2320 B-97	Total Alkalinity	76		mg CaCO3/L	P355470	
	SM 2540 C-97	TDS	139		mg/L	P355529	
	SM 2540 D-97	TSS	3	I	mg/L	P355511	
	SM 4500 F-C-97	Fluoride	0.076	I	mg F/L	P355475	
2043814	EPA 350.1 Rev. 2.0	Ammonia-N	0.007		mg N/L	P355442	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.94		mg N/L	P355308	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P355332	
	EPA 365.1 Rev. 2.0	Total-P	0.054		mg P/L	P355276	
	SM 5310 B-00	Organic Carbon	35		mg C/L	P355424	
2043817	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.031		mg P/L	P355293	
2043823	EPA 200.7 Rev. 4.4	Calcium	27.7		mg/L	P355304	
		Iron	850		ug/L	P355304	
		Magnesium	6.83		mg/L	P355304	
		Potassium	0.30	U	mg/L	P355304	
		Sodium	3.1		mg/L	P355304	
		Zinc	5.0	U	ug/L	P355304	
	EPA 200.8 Rev. 5.4	Arsenic	0.50		ug/L	P355304	
		Cadmium	0.020	U	ug/L	P355304	
		Chromium	0.74	I	ug/L	P355304	
		Copper	0.20	U	ug/L	P355304	
		Lead	0.25		ug/L	P355304	
		Nickel	0.45	I	ug/L	P355304	
		Silver	0.010	U	ug/L	P355304	

Ref. Method and Comment:
SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 200.7 Rev. 4.4: Batch matrix spike recoveries for calcium are unavailable for one of two spiked samples because of high analyte concentration in the QC sample.

Sample Location: Econfina River 100m upstream of US98 **Collection Date/Time: 11/27/2018 15:00**

Field ID: G1TLHR0070 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2043812	EPA 180.1 Rev. 2.0	Turbidity	1.8		NTU	P355152	
	EPA 300.0 Rev. 2.1	Chloride	5.8		mg Cl/L	P355506	
		Sulfate	1.0		mg SO4/L	P355508	
	SM 2120 B	Color (true)	470		PCU	P355251	
	SM 2320 B-97	Total Alkalinity	98		mg CaCO3/L	P355470	
	SM 2540 C-97	TDS	157		mg/L	P355529	
	SM 2540 D-97	TSS	3	I	mg/L	P355511	
	SM 4500 F-C-97	Fluoride	0.090	I	mg F/L	P355475	
2043815	EPA 350.1 Rev. 2.0	Ammonia-N	0.013		mg N/L	P355442	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.1		mg N/L	P355308	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	I	mg N/L	P355332	
	EPA 365.1 Rev. 2.0	Total-P	0.087		mg P/L	P355276	
	SM 5310 B-00	Organic Carbon	35		mg C/L	P355424	
2043818	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.037		mg P/L	P355293	
2043824	EPA 200.7 Rev. 4.4	Calcium	37.1		mg/L	P355304	
		Iron	2.14E+03		ug/L	P355304	
		Magnesium	9.05		mg/L	P355304	
		Potassium	0.30	U	mg/L	P355304	
		Sodium	3.0		mg/L	P355304	
		Zinc	6.4	I	ug/L	P355304	
	EPA 200.8 Rev. 5.4	Arsenic	0.90		ug/L	P355304	
		Cadmium	0.045	I	ug/L	P355304	
		Chromium	2.0		ug/L	P355304	
		Copper	1.07		ug/L	P355304	
		Lead	1.94		ug/L	P355304	
		Nickel	0.57	I	ug/L	P355304	
		Silver	0.010	U	ug/L	P355304	

Ref. Method and Comment:
SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 200.7 Rev. 4.4: Batch matrix spike recoveries for calcium 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 180.1 Rev. 2.0
Batch ID: P355152

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P355304

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
Zinc	5.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355304

Component	Result	Code	Units
Arsenic	0.050	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.40	U	ug/L
Copper	0.20	U	ug/L
Lead	0.050	U	ug/L
Nickel	0.20	U	ug/L
Silver	0.010	U	ug/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355506

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355508

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355442

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P355308

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

Quality Assurance Report
Method Blank Results

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355332

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355276

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355293

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

Reference Method: SM 2120 B
Batch ID: P355251

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P355470

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

Reference Method: SM 2540 C-97
Batch ID: P355529

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P355511

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P355475

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P355423

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

Quality Assurance Report
Method Blank Results

Reference Method: SM 5310 B-00
Batch ID: P355424

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: P355304

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	106		P	85 - 115
Iron	102		P	85 - 115
Magnesium	104		P	85 - 115
Potassium	95.6		P	85 - 115
Sodium	101		P	85 - 115
Zinc	95.7		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355304

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	108		P	85 - 115
Cadmium	104		P	85 - 115
Chromium	103		P	85 - 115
Copper	106		P	85 - 115
Lead	99.9		P	85 - 115
Nickel	105		P	85 - 115
Silver	105		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355506

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Chloride	99.9		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355508

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	99.9		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355442

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	96.9		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P355308

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	108		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355332

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

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355276

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	99.9		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355293

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

Reference Method: SM 2120 B
Batch ID: P355251

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	101		P	85 - 115

Reference Method: SM 2320 B-97
Batch ID: P355470

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	101		P	98 - 107

Reference Method: SM 4500 F-C-97
Batch ID: P355475

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	99.9		P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P355423

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	95.0		P	85 - 115

Reference Method: SM 5310 B-00
Batch ID: P355424

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	94.4		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P355304

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043856	Calcium	108		P	80 - 120
2043856	Iron	107		P	80 - 120
2043856	Magnesium	104		P	80 - 120
2043856	Potassium	101		P	80 - 120
2043856	Sodium	105		P	80 - 120
2043856	Zinc	94.6		P	80 - 120
2043929	Iron	109	95.7	P/P	80 - 120
2043929	Magnesium	109	94.4	P/P	80 - 120
2043929	Potassium	99.7	92.4	P/P	80 - 120
2043929	Sodium	102		P	80 - 120
2043929	Zinc	101	88.4	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355304

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043856	Arsenic	106		P	80 - 120
2043856	Cadmium	109		P	80 - 120
2043856	Chromium	102		P	80 - 120
2043856	Copper	98.8		P	80 - 120
2043856	Lead	101		P	80 - 120
2043856	Nickel	101		P	80 - 120
2043856	Silver	107		P	80 - 120
2043929	Arsenic	110	109	P/P	80 - 120
2043929	Cadmium	112	107	P/P	80 - 120
2043929	Chromium	104	104	P/P	80 - 120
2043929	Copper	102	102	P/P	80 - 120
2043929	Lead	103	104	P/P	80 - 120
2043929	Nickel	102	102	P/P	80 - 120
2043929	Silver	106	107	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355506

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043583	Chloride	97.4		P	90 - 110
2043811	Chloride	101		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355508

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043583	Sulfate	99.0		P	90 - 110
2043811	Sulfate	98.6		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355442

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043841	Ammonia-N	95.8	95.1	P/P	90 - 110

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P355308

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043841	Kjeldahl Nitrogen	105	104	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355332

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043638	NO2NO3-N	100		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355276

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043844	Total-P	101	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355293

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043850	O-Phosphate-P	93.3	94.7	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P355475

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043583	Fluoride	98.9	98.9	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P355423

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043516	Organic Carbon	98.2	98.3	P/P	85 - 115

Reference Method: SM 5310 B-00
Batch ID: P355424

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2043814	Organic Carbon	97.0		P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P355152

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043753	Turbidity	3.37	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P355304

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043929	Calcium	0.459	Spike	P	0 - 20
2043929	Iron	11.7	Spike	P	0 - 20
2043929	Magnesium	7.50	Spike	P	0 - 20
2043929	Potassium	5.51	Spike	P	0 - 20
2043929	Sodium	2.77	Spike	P	0 - 20
2043929	Zinc	13.5	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355304

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043929	Arsenic	1.30	Spike	P	0 - 20
2043929	Cadmium	5.13	Spike	P	0 - 20
2043929	Chromium	0.223	Spike	P	0 - 20
2043929	Copper	0.365	Spike	P	0 - 20
2043929	Lead	0.601	Spike	P	0 - 20
2043929	Nickel	0.318	Spike	P	0 - 20
2043929	Silver	0.959	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355506

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043583	Chloride	0.375	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355508

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043583	Sulfate	0.196	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355442

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043841	Ammonia-N	0.617	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P355308

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043841	Kjeldahl Nitrogen	0.639	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355332

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043638	NO2NO3-N	0.748	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355276

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043844	Total-P	3.10	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355293

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043850	O-Phosphate-P	1.10	Spike	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P355251

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043828	Color (true)	1.90	Sample	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P355470

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043583	Total Alkalinity	1.51	Sample	P	0 - 1.6

Reference Method: SM 2540 C-97
Batch ID: P355529

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043583	TDS	6.79	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
Batch ID: P355475

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043583	Fluoride	0.0	Spike	P	0 - 3.5

Quality Assurance Report
Precision

Reference Method: SM 5310 B-00
Batch ID: P355423

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043516	Organic Carbon	0.0321	Spike	P	0 - 20

Reference Method: SM 5310 B-00
Batch ID: P355424

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2043814	Organic Carbon	0.771	Spike	P	0 - 20

* Sample, spike and/or laboratory control sample precision (LCS) is reported.
Replicate spike precision may be reported when sample results are below quantifiable levels.

Quality Assurance Report
Calibration Verification

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A87978
Included Lab Sample IDs: 2043810, 2043811, 2043812

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	101	100	P/P	95 - 105

Reference Method: SM 2120 B
Run ID: A88016
Included Lab Sample IDs: 2043810, 2043811, 2043812

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	105	103	P/P	90 - 115

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A88035
Included Lab Sample IDs: 2043816, 2043817, 2043818

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	100	99.6	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A88043
Included Lab Sample IDs: 2043813, 2043814, 2043815

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	100	100	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A88056
Included Lab Sample IDs: 2043813, 2043814, 2043815

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	99.3	100	P/P	90 - 110

Reference Method: SM 5310 B-00
Run ID: A88068
Included Lab Sample IDs: 2043813, 2043814, 2043815

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	94.2	94.8	P/P	90 - 110
Organic Carbon	96.0	94.2	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A88077
Included Lab Sample IDs: 2043813, 2043814, 2043815

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	101	100	P/P	90 - 110
Ammonia-N	98.6	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A88087
Included Lab Sample IDs: 2043815

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A88087
Included Lab Sample IDs: 2043815

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	104	101	P/P	90 - 110

Reference Method: SM 2320 B-97
Run ID: A88097
Included Lab Sample IDs: 2043810, 2043811, 2043812

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	99.3	102	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Run ID: A88097
Included Lab Sample IDs: 2043810, 2043811, 2043812

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

Reference Method: EPA 300.0 Rev. 2.1
Run ID: A88113
Included Lab Sample IDs: 2043810, 2043811, 2043812

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	101	102	P/P	90 - 110
Chloride	102	103	P/P	90 - 110
Sulfate	102	103	P/P	90 - 110
Sulfate	103	103	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A88117
Included Lab Sample IDs: 2043813, 2043814

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

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A88123
Included Lab Sample IDs: 2043822, 2043823, 2043824

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	104	105	P/P	95 - 105
Calcium	105	107	P/P	90 - 110
Iron	105	107	P/P	95 - 105
Iron	107	107	P/P	90 - 110
Magnesium	104	106	P/P	95 - 105
Magnesium	106	106	P/P	90 - 110
Potassium	101	101	P/P	95 - 105
Potassium	101	100	P/P	90 - 110
Sodium	100	104	P/P	90 - 110
Sodium	102	100	P/P	95 - 105
Zinc	102	98.5	P/P	95 - 105
Zinc	98.5	104	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A88217
Included Lab Sample IDs: 2043822, 2043823, 2043824

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	101	101	P/P	90 - 110
Cadmium	102	102	P/P	90 - 110
Chromium	102	102	P/P	90 - 110
Copper	102	102	P/P	90 - 110
Lead	99.7	101	P/P	90 - 110
Nickel	101	102	P/P	90 - 110
Silver	101	103	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 180.1 Rev. 2.0	Turbidity						3.37	
EPA 200.7 Rev. 4.4	Calcium	106	108					0.459
	Iron	102	107	109	95.7			11.7
	Magnesium	104	104	109	94.4			7.50
	Potassium	95.6	101	99.7	92.4			5.51
	Sodium	101	105	102				2.77
	Zinc	95.7	94.6	101	88.4			13.5
EPA 200.8 Rev. 5.4	Arsenic	108	106	110	109			1.30
	Cadmium	104	109	112	107			5.13
	Chromium	103	102	104	104			0.223
	Copper	106	98.8	102	102			0.365
	Lead	99.9	101	103	104			0.601
	Nickel	105	101	102	102			0.318
	Silver	105	107	106	107			0.959
EPA 300.0 Rev. 2.1	Chloride	99.9	97.4	101			0.375	
	Sulfate	99.9	99.0	98.6			0.196	
EPA 350.1 Rev. 2.0	Ammonia-N	96.9	95.8	95.1				0.617
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	108	105	104				0.639
EPA 353.2 Rev. 2.0	NO2NO3-N	99.5	100					0.748
EPA 365.1 Rev. 2.0	Total-P	99.9	101	104				3.10
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.0	93.3	94.7				1.10
SM 2120 B	Color (true)	101					1.90	
SM 2320 B-97	Total Alkalinity	101					1.51	
SM 2540 C-97	TDS						6.79	
SM 4500 F-C-97	Fluoride	99.9	98.9	98.9				0.0
SM 5310 B-00	Organic Carbon	95.0	98.2	98.3				0.0321
	Organic Carbon	94.4	97.0					0.771

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	2043810, 2043811, 2043812
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2043822, 2043823, 2043824
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2043822, 2043823, 2043824
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	2043810, 2043811, 2043812
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	2043810, 2043811, 2043812
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2043813, 2043814, 2043815
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2043813, 2043814, 2043815
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2043813, 2043814, 2043815
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2043813, 2043814, 2043815
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2043816, 2043817, 2043818
SM 2120 B / E31780	True Color measured at 450 nm	2043810, 2043811, 2043812
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO3/L	2043810, 2043811, 2043812
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	2043810, 2043811, 2043812
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2043810, 2043811, 2043812

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2043810, 2043811, 2043812
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	2043813, 2043814, 2043815

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	11/27/2018			11/27/2018 16:56	Julia Storbeck	2043810, 2043811, 2043812
EPA 200.7 Rev. 4.4	11/27/2018	11/29/2018 13:35	Elliott D. Healy	12/04/2018 11:25	Betina Topolski	2043822
	11/27/2018	11/29/2018 13:35	Elliott D. Healy	12/04/2018 11:55	Betina Topolski	2043823
	11/27/2018	11/29/2018 13:35	Elliott D. Healy	12/04/2018 12:02	Betina Topolski	2043824
EPA 200.8 Rev. 5.4	11/27/2018	11/29/2018 13:35	Elliott D. Healy	12/06/2018 23:18	Robert K Palmer	2043822
	11/27/2018	11/29/2018 13:35	Elliott D. Healy	12/06/2018 23:27	Robert K Palmer	2043823
	11/27/2018	11/29/2018 13:35	Elliott D. Healy	12/06/2018 23:36	Robert K Palmer	2043824
EPA 300.0 Rev. 2.1	11/27/2018			12/04/2018 00:37	Lipi Saha	2043811
	11/27/2018			12/04/2018 03:02	Lipi Saha	2043810
	11/27/2018			12/04/2018 03:14	Lipi Saha	2043812
EPA 350.1 Rev. 2.0	11/27/2018			11/30/2018 11:39	Ping Hua	2043814
	11/27/2018			11/30/2018 11:40	Ping Hua	2043815
	11/27/2018			11/30/2018 13:30	Ping Hua	2043813
EPA 351.2 Rev. 2.0	11/27/2018	11/29/2018 13:00	Adrian Shelby	11/30/2018 08:59	Joseph Suarez	2043813
	11/27/2018	11/29/2018 13:00	Adrian Shelby	11/30/2018 09:01	Joseph Suarez	2043814
	11/27/2018	11/29/2018 13:00	Adrian Shelby	11/30/2018 09:02	Joseph Suarez	2043815
EPA 353.2 Rev. 2.0	11/27/2018			11/29/2018 13:11	Lauren Bottorf	2043813
	11/27/2018			11/29/2018 13:12	Lauren Bottorf	2043814
	11/27/2018			11/29/2018 13:14	Lauren Bottorf	2043815
EPA 365.1 Rev. 2.0	11/27/2018	11/29/2018 11:45	Sima Feizi	12/03/2018 09:17	Beverly Y. Sanders	2043815
	11/27/2018	11/29/2018 11:45	Sima Feizi	12/03/2018 13:18	Beverly Y. Sanders	2043813
	11/27/2018	11/29/2018 11:45	Sima Feizi	12/03/2018 13:19	Beverly Y. Sanders	2043814
EPA 365.1 Rev. 2.0 dissolved	11/27/2018			11/28/2018 17:30	Jhamieka S. Greenwood	2043816
	11/27/2018			11/28/2018 17:31	Jhamieka S. Greenwood	2043817
	11/27/2018			11/28/2018 17:32	Jhamieka S. Greenwood	2043818
SM 2120 B	11/27/2018			11/28/2018 14:37	Chelsea Hernandez	2043810
	11/27/2018			11/28/2018 14:38	Chelsea Hernandez	2043811, 2043812
SM 2320 B-97	11/27/2018			11/30/2018 15:52	Dale L. Simmons	2043810
	11/27/2018			11/30/2018 16:02	Dale L. Simmons	2043811
	11/27/2018			11/30/2018 16:13	Dale L. Simmons	2043812
SM 2540 C-97	11/27/2018			11/29/2018 13:42	Yijie Li	2043810, 2043811, 2043812
SM 2540 D-97	11/27/2018			11/29/2018 13:42	Yijie Li	2043810, 2043811, 2043812
SM 4500 F-C-97	11/27/2018			11/30/2018 15:52	Dale L. Simmons	2043810
	11/27/2018			11/30/2018 16:02	Dale L. Simmons	2043811
	11/27/2018			11/30/2018 16:13	Dale L. Simmons	2043812
SM 5310 B-00	11/27/2018			11/30/2018 01:58	Megan Treadwell	2043813
	11/27/2018			11/30/2018 02:40	Megan Treadwell	2043814
	11/27/2018			11/30/2018 04:03	Megan Treadwell	2043815