

Chemical Analysis Report

NW-DIST-2019-09-11-01

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-2019-09-09-48**
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: 02-OCT-2019 13:33

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: 09/10/2019 10:00**

Field ID: G4NW0404

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2117930	EPA 180.1 Rev. 2.0	Turbidity	9.1		NTU	P370495	
	EPA 300.0 Rev. 2.1	Chloride	9.1	A	mg Cl/L	P370811	
		Sulfate	17	A	mg SO4/L	P370814	
	SM 2120 B	Color (true)	44		PCU	P370530	
	SM 2320 B-97	Total Alkalinity	36		mg CaCO3/L	P370695	
	SM 2540 C-97	TDS	99		mg/L	P371062	
	SM 2540 D-97	TSS	11		mg/L	P370876	
	SM 4500 F-C-97	Fluoride	0.039	I	mg F/L	P370698	
2117932	EPA 350.1 Rev. 2.0	Ammonia-N	0.082		mg N/L	P370673	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.40		mg N/L	P370599	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.43		mg N/L	P370554	
	EPA 365.1 Rev. 2.0	Total-P	0.059		mg P/L	P370566	
	SM 5310 B-00	Organic Carbon	4.3		mg C/L	P370678	
2117934	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.040		mg P/L	P370500	
2117944	EPA 200.7 Rev. 4.4	Barium	33.3		ug/L	P370724	
		Calcium	12.0		mg/L	P370724	
		Iron	1.30E+03		ug/L	P370724	
		Magnesium	1.49		mg/L	P370724	
		Potassium	1.4		mg/L	P370724	
		Sodium	14.9		mg/L	P370724	
		Zinc	5.0	U	ug/L	P370724	
	EPA 200.8 Rev. 5.4	Aluminum	244		ug/L	P370724	
		Antimony	0.050	U	ug/L	P370724	
		Arsenic	0.76		ug/L	P370724	
		Boron**	11.8		ug/L	P370724	
		Cadmium	0.020	U	ug/L	P370724	
		Chromium	0.68	I	ug/L	P370724	
		Copper	0.40	U	ug/L	P370724	
		Lead	0.26	I	ug/L	P370724	
		Nickel	0.61	I	ug/L	P370724	
		Selenium	0.20	U	ug/L	P370724	
		Silver	0.010	U	ug/L	P370724	
		Thallium	0.10	U	ug/L	P370724	

Ref. Method and Comment:

SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

Sample Location: ESCAMBIA RIVER DOWNSTREAM OF COTTON LAKE **Collection Date/Time: 09/10/2019 10:40**

Field ID: G4NW0403

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2117931	EPA 180.1 Rev. 2.0	Turbidity	12	A	NTU	P370495	
	EPA 300.0 Rev. 2.1	Chloride	8.7		mg Cl/L	P370811	
		Sulfate	15		mg SO4/L	P370814	
	SM 2120 B	Color (true)	44		PCU	P370530	
	SM 2320 B-97	Total Alkalinity	34		mg CaCO3/L	P370695	
	SM 2540 C-97	TDS	83		mg/L	P371062	
	SM 2540 D-97	TSS	16		mg/L	P370876	
	SM 4500 F-C-97	Fluoride	0.037	I	mg F/L	P370698	
2117933	EPA 350.1 Rev. 2.0	Ammonia-N	0.062		mg N/L	P370673	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.38		mg N/L	P370599	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.46		mg N/L	P370554	
	EPA 365.1 Rev. 2.0	Total-P	0.056		mg P/L	P370566	
	SM 5310 B-00	Organic Carbon	4.4		mg C/L	P370678	
2117935	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.028		mg P/L	P370500	
2117945	EPA 200.7 Rev. 4.4	Barium	33.2		ug/L	P370724	
		Calcium	11.5		mg/L	P370724	
		Iron	1.37E+03		ug/L	P370724	
		Magnesium	1.48		mg/L	P370724	
		Potassium	1.4		mg/L	P370724	
		Sodium	13.7		mg/L	P370724	
		Zinc	5.0	U	ug/L	P370724	
	EPA 200.8 Rev. 5.4	Aluminum	271		ug/L	P370724	
		Antimony	0.050	U	ug/L	P370724	
		Arsenic	0.77		ug/L	P370724	
		Boron**	11.7		ug/L	P370724	
		Cadmium	0.020	U	ug/L	P370724	
		Chromium	0.70	I	ug/L	P370724	
		Copper	0.40	U	ug/L	P370724	
		Lead	0.31	I	ug/L	P370724	
		Nickel	0.64	I	ug/L	P370724	
		Selenium	0.20	U	ug/L	P370724	
		Silver	0.010	U	ug/L	P370724	
		Thallium	0.10	U	ug/L	P370724	

Ref. Method and Comment:

SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

**Sample Location: ESCAMBIA RIVER DOWNSTREAM OF
TENMILE CREEK**

Collection Date/Time: 09/10/2019 11:30

Field ID: G4NW0006

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2117936	EPA 180.1 Rev. 2.0	Turbidity	8.7	A	NTU	P370496	
	EPA 300.0 Rev. 2.1	Chloride	7.8		mg Cl/L	P370811	
		Sulfate	12		mg SO4/L	P370814	
		Color (true)	43		PCU	P370531	
	SM 2320 B-97	Total Alkalinity	31		mg CaCO3/L	P371031	
	SM 2540 C-97	TDS	89		mg/L	P371062	
	SM 2540 D-97	TSS	7	I	mg/L	P370876	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P371509	
2117937	EPA 350.1 Rev. 2.0	Ammonia-N	0.025		mg N/L	P370673	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.29		mg N/L	P370599	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.48		mg N/L	P370554	
	EPA 365.1 Rev. 2.0	Total-P	0.039		mg P/L	P370566	
	SM 5310 B-00	Organic Carbon	4.0		mg C/L	P370678	
2117938	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.017		mg P/L	P370500	
2117946	EPA 200.7 Rev. 4.4	Barium	30.3		ug/L	P370724	
		Calcium	10.6		mg/L	P370724	
		Iron	950		ug/L	P370724	
		Magnesium	1.42		mg/L	P370724	
		Potassium	1.3		mg/L	P370724	
		Sodium	11.0		mg/L	P370724	
		Zinc	5.0	U	ug/L	P370724	
	EPA 200.8 Rev. 5.4	Aluminum	196		ug/L	P370724	
		Antimony	0.050	U	ug/L	P370724	
		Arsenic	0.64		ug/L	P370724	
		Boron**	11.4		ug/L	P370724	
		Cadmium	0.020	U	ug/L	P370724	
		Chromium	0.50	I	ug/L	P370724	
		Copper	0.40	U	ug/L	P370724	
		Lead	0.22	I	ug/L	P370724	
		Nickel	0.52	I	ug/L	P370724	
		Selenium	0.20	U	ug/L	P370724	
		Silver	0.010	U	ug/L	P370724	
		Thallium	0.10	U	ug/L	P370724	

Ref. Method and Comment:

SM 2540 D-97: 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: P370495

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P370496

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P370724

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: P370724

Component	Result	Code	Units
Aluminum	5.0	U	ug/L
Antimony	0.050	U	ug/L
Arsenic	0.050	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: P370811

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P370814

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P370673

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P370599

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P370554

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P370566

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P370500

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

Reference Method: SM 2120 B
Batch ID: P370530

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2120 B
Batch ID: P370531

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P370695

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

Reference Method: SM 2320 B-97
Batch ID: P371031

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

Quality Assurance Report

Method Blank Results

Reference Method: SM 2540 C-97
Batch ID: P371062

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P370876

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P370698

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 4500 F-C-97
Batch ID: P371509

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P370678

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: P370724

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Barium	91.9		P	85 - 115
Calcium	104		P	85 - 115
Iron	100		P	85 - 115
Magnesium	99.8		P	85 - 115
Potassium	98.5		P	85 - 115
Sodium	101		P	85 - 115
Zinc	99.0		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P370724

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	98.1		P	85 - 115
Antimony	95.4		P	85 - 115
Arsenic	99.5		P	85 - 115
Boron	97.8		P	85 - 115
Cadmium	96.6		P	85 - 115
Chromium	90.4		P	85 - 115
Copper	90.6		P	85 - 115
Lead	89.4		P	85 - 115
Nickel	96.5		P	85 - 115
Selenium	97.8		P	85 - 115
Silver	94.4		P	85 - 115
Thallium	102		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P370811

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P370814

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P370673

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	95.7		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P370599

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: P370554

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P370566

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P370500

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

Reference Method: SM 2120 B
Batch ID: P370530

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	98.6		P	85 - 115

Reference Method: SM 2120 B
Batch ID: P370531

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	98.3		P	85 - 115

Reference Method: SM 2320 B-97
Batch ID: P370695

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	104		P	98 - 106

Reference Method: SM 2320 B-97
Batch ID: P371031

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	104		P	98 - 106

Reference Method: SM 4500 F-C-97
Batch ID: P370698

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	98.3		P	92 - 103

Reference Method: SM 4500 F-C-97
Batch ID: P371509

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	95.7		P	92 - 103

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: SM 5310 B-00
Batch ID: P370678

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	104		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P370724

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2118069	Barium	99.5	101	P/P	80 - 120
2118069	Calcium	104		P	80 - 120
2118069	Iron	103	103	P/P	80 - 120
2118069	Magnesium	103	101	P/P	80 - 120
2118069	Potassium	106	106	P/P	80 - 120
2118069	Sodium	102		P	80 - 120
2118069	Zinc	101	98.8	P/P	80 - 120
2118292	Barium	98.5		P	80 - 120
2118292	Calcium	105		P	80 - 120
2118292	Iron	104		P	80 - 120
2118292	Magnesium	104		P	80 - 120
2118292	Potassium	103		P	80 - 120
2118292	Sodium	109		P	80 - 120
2118292	Zinc	101		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P370724

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2118069	Aluminum	98.8	98.0	P/P	80 - 120
2118069	Antimony	94.0	97.4	P/P	80 - 120
2118069	Arsenic	96.1	97.1	P/P	80 - 120
2118069	Boron	100	100	P/P	80 - 120
2118069	Cadmium	94.2	95.4	P/P	80 - 120
2118069	Chromium	91.8	92.9	P/P	80 - 120
2118069	Copper	91.6	93.4	P/P	80 - 120
2118069	Lead	90.6	92.0	P/P	80 - 120
2118069	Nickel	94.0	94.6	P/P	80 - 120
2118069	Selenium	95.5	95.2	P/P	80 - 120
2118069	Silver	94.0	95.3	P/P	80 - 120
2118069	Thallium	103	105	P/P	80 - 120
2118292	Aluminum	95.9		P	80 - 120
2118292	Antimony	98.5		P	80 - 120
2118292	Arsenic	92.8		P	80 - 120
2118292	Boron	101		P	80 - 120
2118292	Cadmium	93.4		P	80 - 120
2118292	Chromium	89.8		P	80 - 120
2118292	Copper	87.7		P	80 - 120
2118292	Lead	89.9		P	80 - 120
2118292	Nickel	89.0		P	80 - 120
2118292	Selenium	92.6		P	80 - 120
2118292	Silver	94.9		P	80 - 120
2118292	Thallium	101		P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P370811

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117930	Chloride	99.5		P	90 - 110
2118051	Chloride	101		P	90 - 110

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P370814

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117930	Sulfate	101		P	90 - 110
2118051	Sulfate	101		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P370673

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117566	Ammonia-N	93.7	96.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P370599

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117932	Kjeldahl Nitrogen	106	107	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P370554

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117714	NO2NO3-N	102	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P370566

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117566	Total-P	96.0	93.7	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P370500

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117938	O-Phosphate-P	96.4	97.4	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P370698

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117328	Fluoride	99.1	98.5	P/P	89 - 106

Reference Method: SM 4500 F-C-97
Batch ID: P371509

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2119156	Fluoride	97.0	97.0	P/P	89 - 106

Reference Method: SM 5310 B-00
Batch ID: P370678

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2117872	Organic Carbon	106	105	P/P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0
 Batch ID: P370495

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117931	Turbidity	3.42	Sample	P	0 - 20

Reference Method: EPA 180.1 Rev. 2.0
 Batch ID: P370496

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117936	Turbidity	7.59	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
 Batch ID: P370724

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2118069	Barium	1.09	Spike	P	0 - 20
2118069	Calcium	0.361	Spike	P	0 - 20
2118069	Iron	0.208	Spike	P	0 - 20
2118069	Magnesium	1.47	Spike	P	0 - 20
2118069	Potassium	0.181	Spike	P	0 - 20
2118069	Sodium	1.32	Spike	P	0 - 20
2118069	Zinc	2.26	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
 Batch ID: P370724

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2118069	Aluminum	0.651	Spike	P	0 - 20
2118069	Antimony	3.55	Spike	P	0 - 20
2118069	Arsenic	0.990	Spike	P	0 - 20
2118069	Boron	0.204	Spike	P	0 - 20
2118069	Cadmium	1.31	Spike	P	0 - 20
2118069	Chromium	1.28	Spike	P	0 - 20
2118069	Copper	1.98	Spike	P	0 - 20
2118069	Lead	1.56	Spike	P	0 - 20
2118069	Nickel	0.604	Spike	P	0 - 20
2118069	Selenium	0.352	Spike	P	0 - 20
2118069	Silver	1.45	Spike	P	0 - 20
2118069	Thallium	1.76	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
 Batch ID: P370811

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117930	Chloride	1.48	Sample	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P370814

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117930	Sulfate	2.22	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P370673

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117566	Ammonia-N	3.00	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P370599

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117932	Kjeldahl Nitrogen	1.29	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P370554

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117714	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P370566

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117566	Total-P	2.26	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P370500

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117938	O-Phosphate-P	0.876	Spike	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P370530

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117500	Color (true)	0.131	Sample	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P370531

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2118050	Color (true)	2.60	Sample	P	0 - 20

Quality Assurance Report Precision

Reference Method: SM 2320 B-97
 Batch ID: P370695

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117328	Total Alkalinity	0.530	Sample	P	0 - 2.8

Reference Method: SM 2320 B-97
 Batch ID: P371031

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2119156	Total Alkalinity	1.59	Sample	P	0 - 2.8

Reference Method: SM 2540 C-97
 Batch ID: P371062

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117960	TDS	4.65	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
 Batch ID: P370698

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117328	Fluoride	0.482	Spike	P	0 - 2.5

Reference Method: SM 4500 F-C-97
 Batch ID: P371509

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2119156	Fluoride	0.0	Spike	P	0 - 2.5

Reference Method: SM 5310 B-00
 Batch ID: P370678

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2117872	Organic Carbon	0.520	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: A94136

Included Lab Sample IDs: 2117930, 2117931, 2117936

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A94137

Included Lab Sample IDs: 2117934, 2117935, 2117938

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	101	99.2	P/P	90 - 110
O-Phosphate-P	99.2	99.9	P/P	90 - 110

Reference Method: SM 2120 B

Run ID: A94152

Included Lab Sample IDs: 2117930, 2117931, 2117936

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	101	100	P/P	90 - 115
Color (true)	99.5	101	P/P	90 - 115

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A94154

Included Lab Sample IDs: 2117932, 2117933, 2117937

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	100	101	P/P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1

Run ID: A94159

Included Lab Sample IDs: 2117930, 2117931, 2117936

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	101	101	P/P	90 - 110
Chloride	101	102	P/P	90 - 110
Sulfate	103	103	P/P	90 - 110
Sulfate	103	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A94202

Included Lab Sample IDs: 2117932, 2117933

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	101	98.5	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A94214

Included Lab Sample IDs: 2117932, 2117933, 2117937

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	97.7	97.3	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: SM 5310 B-00

Run ID: A94219

Included Lab Sample IDs: 2117932, 2117933, 2117937

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

Reference Method: SM 2320 B-97

Run ID: A94232

Included Lab Sample IDs: 2117930, 2117931

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	105	103	P/P	90 - 110

Reference Method: SM 4500 F-C-97

Run ID: A94232

Included Lab Sample IDs: 2117930, 2117931

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	99.5	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A94237

Included Lab Sample IDs: 2117937

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

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A94240

Included Lab Sample IDs: 2117932, 2117933, 2117937

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	100	96.9	P/P	90 - 110
Kjeldahl Nitrogen	99.9	100	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A94285

Included Lab Sample IDs: 2117944, 2117945, 2117946

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Barium	98.1	96.0	P/P	90 - 110
Calcium	98.6	97.7	P/P	90 - 110
Iron	100	99.1	P/P	90 - 110
Magnesium	98.5	97.4	P/P	90 - 110
Potassium	98.7	98.1	P/P	90 - 110
Sodium	97.2	97.4	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A94322

Included Lab Sample IDs: 2117944, 2117945, 2117946

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Zinc	99.2	99.3	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: SM 2320 B-97
Run ID: A94353
Included Lab Sample IDs: 2117936

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A94386
Included Lab Sample IDs: 2117944, 2117945, 2117946

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	102	100	P/P	90 - 110
Arsenic	98.6	96.6	P/P	90 - 110
Boron	96.0	96.3	P/P	90 - 110
Cadmium	95.6	96.1	P/P	90 - 110
Nickel	98.9	96.7	P/P	90 - 110
Selenium	97.2	96.3	P/P	90 - 110
Thallium	98.2	95.2	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A94545
Included Lab Sample IDs: 2117944, 2117945, 2117946

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chromium	92.4	92.8	P/P	90 - 110
Copper	94.2	93.6	P/P	90 - 110
Lead	93.7	93.4	P/P	90 - 110
Silver	94.6	94.0	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Run ID: A94568
Included Lab Sample IDs: 2117936

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A94590
Included Lab Sample IDs: 2117944, 2117945, 2117946

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Antimony	90.9	92.6	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			LCS	Precision	MS
							SMP	
EPA 180.1 Rev. 2.0	Turbidity						3.42	
	Turbidity						7.59	
EPA 200.7 Rev. 4.4	Barium	91.9	99.5	101	98.5			1.09
	Calcium	104	104	105				0.361
	Iron	100	103	103	104			0.208
	Magnesium	99.8	103	101	104			1.47
	Potassium	98.5	106	106	103			0.181
	Sodium	101	102	109				1.32
	Zinc	99.0	101	98.8	101			2.26
EPA 200.8 Rev. 5.4	Aluminum	98.1	98.8	98.0	95.9			0.651
	Antimony	95.4	94.0	97.4	98.5			3.55
	Arsenic	99.5	96.1	97.1	92.8			0.990
	Boron	97.8	100	100	101			0.204
	Cadmium	96.6	94.2	95.4	93.4			1.31
	Chromium	90.4	91.8	92.9	89.8			1.28
	Copper	90.6	91.6	93.4	87.7			1.98
	Lead	89.4	90.6	92.0	89.9			1.56
	Nickel	96.5	94.0	94.6	89.0			0.604
	Selenium	97.8	95.5	95.2	92.6			0.352
	Silver	94.4	94.0	95.3	94.9			1.45
	Thallium	102	103	105	101			1.76
EPA 300.0 Rev. 2.1	Chloride	101	99.5	101			1.48	
	Sulfate	102	101	101			2.22	
EPA 350.1 Rev. 2.0	Ammonia-N	95.7	93.7	96.8				3.00
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	102	106	107				1.29
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	100	102	102				0.0
EPA 365.1 Rev. 2.0	Total-P	97.9	96.0	93.7				2.26
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.0	96.4	97.4				0.876
SM 2120 B	Color (true)	98.6					0.131	
	Color (true)	98.3					2.60	
SM 2320 B-97	Total Alkalinity	104					0.530	
	Total Alkalinity	104					1.59	
SM 2540 C-97	TDS						4.65	
SM 4500 F-C-97	Fluoride	98.3	99.1	98.5				0.482
	Fluoride	95.7	97.0	97.0				0.0
SM 5310 B-00	Organic Carbon	104	106	105				0.520

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	2117930, 2117931, 2117936
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2117944, 2117945, 2117946
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2117944, 2117945, 2117946
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	2117930, 2117931, 2117936
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	2117930, 2117931, 2117936
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2117932, 2117933, 2117937
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2117932, 2117933, 2117937

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2117932, 2117933, 2117937
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2117932, 2117933, 2117937
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2117934, 2117935, 2117938
SM 2120 B / E31780	True Color measured at 450 nm	2117930, 2117931, 2117936
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO ₃ /L	2117930, 2117931, 2117936
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	2117930, 2117931, 2117936
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2117930, 2117931, 2117936
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2117930, 2117931, 2117936
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	2117932, 2117933, 2117937

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	09/11/2019			09/11/2019 16:13	Samantha Davila	2117930, 2117931, 2117936
EPA 200.7 Rev. 4.4	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/17/2019 13:31	Alexander Thompson	2117944
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/17/2019 13:38	Alexander Thompson	2117945
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/17/2019 13:45	Alexander Thompson	2117946
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/18/2019 16:37	Betina Topolski	2117944
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/18/2019 16:43	Betina Topolski	2117945
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/18/2019 16:49	Betina Topolski	2117946
EPA 200.8 Rev. 5.4	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/20/2019 16:49	Justin Cutchin	2117944
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/20/2019 16:58	Justin Cutchin	2117945
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/20/2019 17:08	Justin Cutchin	2117946
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/26/2019 17:15	Robert K Palmer	2117944
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/26/2019 17:21	Robert K Palmer	2117945
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/26/2019 17:27	Robert K Palmer	2117946
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/27/2019 09:14	Robert K Palmer	2117944
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/27/2019 09:20	Robert K Palmer	2117945
	09/11/2019	09/16/2019 14:50	Elliott D. Healy	09/27/2019 09:26	Robert K Palmer	2117946
EPA 300.0 Rev. 2.1	09/11/2019			09/14/2019 00:30	Jhamieka S. Greenwood	2117930
	09/11/2019			09/14/2019 04:08	Jhamieka S. Greenwood	2117931
	09/11/2019			09/14/2019 04:20	Jhamieka S. Greenwood	2117936
EPA 350.1 Rev. 2.0	09/11/2019			09/13/2019 13:01	Ping Hua	2117937
	09/11/2019			09/13/2019 13:10	Ping Hua	2117932
	09/11/2019			09/13/2019 13:12	Ping Hua	2117933
EPA 351.2 Rev. 2.0	09/11/2019	09/12/2019 13:00	Sima Feizi	09/13/2019 17:47	Julia Storbeck	2117932
	09/11/2019	09/12/2019 13:00	Sima Feizi	09/13/2019 17:58	Julia Storbeck	2117933
	09/11/2019	09/12/2019 13:00	Sima Feizi	09/13/2019 18:02	Julia Storbeck	2117937
EPA 353.2 Rev. 2.0	09/11/2019			09/12/2019 10:02	Beverly Y. Sanders	2117932
	09/11/2019			09/12/2019 10:03	Beverly Y. Sanders	2117933
	09/11/2019			09/12/2019 10:04	Beverly Y. Sanders	2117937
EPA 365.1 Rev. 2.0	09/11/2019	09/12/2019 13:45	Lipi Saha	09/13/2019 14:47	Rosalyn Ballman	2117932
	09/11/2019	09/12/2019 13:45	Lipi Saha	09/13/2019 14:48	Rosalyn Ballman	2117933
	09/11/2019	09/12/2019 13:45	Lipi Saha	09/13/2019 18:15	Rosalyn Ballman	2117937
EPA 365.1 Rev. 2.0 dissolved	09/11/2019			09/11/2019 15:56	Jhamieka S. Greenwood	2117938
	09/11/2019			09/11/2019 16:11	Jhamieka S. Greenwood	2117934
	09/11/2019			09/11/2019 16:13	Jhamieka S. Greenwood	2117935
SM 2120 B	09/11/2019			09/11/2019 17:32	Madeline Funaro	2117930, 2117931
	09/11/2019			09/11/2019 17:36	Madeline Funaro	2117936
SM 2320 B-97	09/11/2019			09/14/2019 05:03	Dale L. Simmons	2117930
	09/11/2019			09/14/2019 05:16	Dale L. Simmons	2117931
	09/11/2019			09/18/2019 03:17	Dale L. Simmons	2117936
SM 2540 C-97	09/11/2019			09/13/2019 15:21	Yijie Li	2117930, 2117931, 2117936

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
SM 2540 D-97	09/11/2019			09/13/2019 15:21	Yijie Li	2117930, 2117931, 2117936
SM 4500 F-C-97	09/11/2019			09/14/2019 05:03	Dale L. Simmons	2117930
	09/11/2019			09/14/2019 05:16	Dale L. Simmons	2117931
	09/11/2019			09/25/2019 17:38	Dale L. Simmons	2117936
SM 5310 B-00	09/11/2019			09/14/2019 03:52	Madeline Funaro	2117932
	09/11/2019			09/14/2019 04:04	Madeline Funaro	2117933
	09/11/2019			09/14/2019 04:16	Madeline Funaro	2117937