

Chemical Analysis Report

WQAP-2016-02-16-01

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

Event Description: **Wakulla Springs and Sally Ward Springs**

Request ID: **RQ-2016-02-15-27**

Customer: **WQAP**

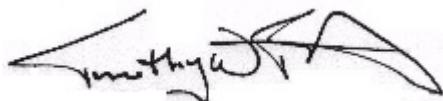
Project ID: **SMP**

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Certified by: Timothy Fitzpatrick, Program Administrator

Date Certified: 10-MAR-2016 10:46

A handwritten signature in black ink, appearing to read 'Timothy Fitzpatrick', with a stylized flourish at the end.

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: Wakulla River @ CR 365 Bridge

Collection Date/Time: 02/16/2016 15:27

Field ID: 34879

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1771581	EPA 180.1 Rev. 2.0	Turbidity	1.1	A	NTU	P298790	
	EPA 300.0 Rev. 2.1	Chloride	7.9		mg Cl/L	P298902	
	EPA 353.2 Rev. 2.0	Nitrite-N	0.003	U	mg N/L	P298720	
	SM 2120 B	Color (true)	24		PCU	P298750	
	SM 2320 B-97	Total Alkalinity	141		mg CaCO3/L	P299387	RPD
	SM 2540 C-97	TDS	182		mg/L	P299452	
	SM 2540 D-97	TSS	2	U	mg/L	P299283	
	SM 4500 F-C-97	Fluoride	0.12		mg F/L	P299044	
1771583	EPA 350.1 Rev. 2.0	Ammonia-N	0.006		mg N/L	P299252	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.15	I	mg N/L	P299001	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.35		mg N/L	P299062	
	EPA 365.1 Rev. 2.0	Total-P	0.060		mg P/L	P298897	
	SM 5310 B-00	Organic Carbon	2.4		mg C/L	P299138	
1771585	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.026		mg P/L	P298745	
1771595	EPA 200.7 Rev. 4.4	Calcium	45.5		mg/L	P299007	
		Iron	30	U	ug/L	P299007	
		Magnesium	9.15		mg/L	P299007	
		Potassium	0.52	I	mg/L	P299007	
		Sodium	5.0		mg/L	P299007	
		Zinc	5.0	U	ug/L	P299007	
	EPA 200.8 Rev. 5.4	Arsenic	0.62		ug/L	P299007	
		Cadmium	0.024	I	ug/L	P299007	
		Chromium	0.92		ug/L	P299007	
		Copper	0.10	U	ug/L	P299007	
		Lead	0.050	U	ug/L	P299007	
		Nickel	0.13	I	ug/L	P299528	
		Silver	0.0050	U	ug/L	P299007	

Ref. Method and Comment:

SM 2540 C-97: The reported result is consistent with the laboratory conductivity, 299 umhos/cm.

SM 2540 D-97: The precision data is unavailable due to the low analyte concentration in the QC sample.

EPA 200.8 Rev. 5.4: The nickel matrix spike recovery data for one of two spiked samples is unavailable due to high analyte concentration in the QC sample.

Sample Location: Wakulla River @ Boat Tram

Collection Date/Time: 02/16/2016 11:05

Field ID: 44059

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1771582	EPA 180.1 Rev. 2.0	Turbidity	0.40		NTU	P298790	
	EPA 300.0 Rev. 2.1	Chloride	8.1		mg Cl/L	P298902	
	EPA 353.2 Rev. 2.0	Nitrite-N	0.003	U	mg N/L	P298720	
	SM 2120 B	Color (true)	26		PCU	P298750	
	SM 2320 B-97	Total Alkalinity	141		mg CaCO3/L	P299387	RPD
	SM 2540 C-97	TDS	185		mg/L	P299452	
	SM 2540 D-97	TSS	2	I	mg/L	P299283	
	SM 4500 F-C-97	Fluoride	0.12		mg F/L	P299044	

Field ID: 44059

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1771584	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	I	mg N/L	P299252	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.10	I	mg N/L	P299001	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.41		mg N/L	P299062	
	EPA 365.1 Rev. 2.0	Total-P	0.033		mg P/L	P298897	
	SM 5310 B-00	Organic Carbon	2.5		mg C/L	P299138	
1771586	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.028		mg P/L	P298745	
1771596	EPA 200.7 Rev. 4.4	Calcium	44.6		mg/L	P299007	
		Iron	30	U	ug/L	P299007	
		Magnesium	9.18		mg/L	P299007	
		Potassium	0.53	I	mg/L	P299007	
		Sodium	5.1		mg/L	P299007	
		Zinc	5.0	U	ug/L	P299007	
	EPA 200.8 Rev. 5.4	Arsenic	0.62		ug/L	P299007	
		Cadmium	0.021	I	ug/L	P299007	
		Chromium	0.82		ug/L	P299007	
		Copper	0.23	I	ug/L	P299007	
		Lead	0.050	U	ug/L	P299007	
		Nickel	0.10	I	ug/L	P299528	
		Silver	0.0050	U	ug/L	P299007	

Ref. Method and Comment:

SM 2540 D-97: The precision data is unavailable due to the low analyte concentration in the QC sample.

EPA 200.8 Rev. 5.4: The nickel matrix spike recovery data for one of two spiked samples is unavailable due to high analyte concentration in the QC sample.

Sample Location: Sally Ward Spring @ Wakulla Park Dr.

Collection Date/Time: 02/16/2016 13:15

Field ID: G1WA0021

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1771578	EPA 180.1 Rev. 2.0	Turbidity	0.15		NTU	P298790	
	EPA 300.0 Rev. 2.1	Chloride	8.5		mg Cl/L	P298902	
	EPA 353.2 Rev. 2.0	Nitrite-N	0.002	U	mg N/L	P298776	
	SM 2120 B	Color (true)	2.5	U	PCU	P298750	
	SM 2320 B-97	Total Alkalinity	156		mg CaCO3/L	P299387	RPD
	SM 2540 C-97	TDS	195	A	mg/L	P299452	
	SM 2540 D-97	TSS	3	I	mg/L	P299283	
	SM 4500 F-C-97	Fluoride	0.14		mg F/L	P299044	
1771579	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P298874	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.13	I	mg N/L	P299001	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.65		mg N/L	P299062	
	EPA 365.1 Rev. 2.0	Total-P	0.035		mg P/L	P298897	
	SM 5310 B-00	Organic Carbon	0.60	I	mg C/L	P299138	
1771580	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.032		mg P/L	P298745	

Ref. Method and Comment:

SM 2540 D-97: The precision data is unavailable due to the low analyte concentration in the QC sample.

Quality Assurance Report Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P298790

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P299007

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: P299007

Component	Result	Code	Units
Arsenic	0.050	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.050	U	ug/L
Copper	0.10	U	ug/L
Lead	0.050	U	ug/L
Silver	0.0050	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299528

Component	Result	Code	Units
Nickel	0.050	U	ug/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P298902

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P298874

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P299252

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P299001

Component	Result	Code	Units
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Quality Assurance Report Method Blank Results

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P299001

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298720

Component	Result	Code	Units
Nitrite-N	0.003	U	mg N/L

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298776

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P299062

Component	Result	Code	Units
NO ₂ NO ₃ -N	0.004	U	mg N/L

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P298897

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P298745

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

Reference Method: SM 2120 B
Batch ID: P298750

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P299387

Component	Result	Code	Units
Total Alkalinity	0.65	U	mg CaCO ₃ /L

Reference Method: SM 2540 C-97
Batch ID: P299452

Component	Result	Code	Units
TDS	15	U	mg/L

Quality Assurance Report Method Blank Results

Reference Method: SM 2540 D-97
Batch ID: P299283

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P299044

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P299138

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: P299007

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	105		P	85 - 115
Iron	105		P	85 - 115
Magnesium	103		P	85 - 115
Potassium	99.8		P	85 - 115
Sodium	103		P	85 - 115
Zinc	104		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299007

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	96.1		P	85 - 115
Cadmium	97.1		P	85 - 115
Chromium	97.6		P	85 - 115
Copper	93.1		P	85 - 115
Lead	91.6		P	85 - 115
Silver	95.8		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299528

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Nickel	96.1		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P298902

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

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P298874

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P299252

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P299001

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	97.2		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298720

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Nitrite-N	95.3		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298776

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Nitrite-N	96.5		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P299062

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO ₂ NO ₃ -N	100		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P298897

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P298745

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

Reference Method: SM 2320 B-97
Batch ID: P299387

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	105		P	95 - 105

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: SM 4500 F-C-97
Batch ID: P299044

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	98.0		P	94 - 108

Reference Method: SM 5310 B-00
Batch ID: P299138

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	97.4		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P299007

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771596	Calcium	107		P	80 - 120
1771596	Iron	105	106	P/P	80 - 120
1771596	Magnesium	105		P	80 - 120
1771596	Potassium	101	105	P/P	80 - 120
1771596	Sodium	108		P	80 - 120
1771596	Zinc	101	103	P/P	80 - 120
1772636	Calcium	108		P	80 - 120
1772636	Iron	101		P	80 - 120
1772636	Magnesium	104		P	80 - 120
1772636	Potassium	106		P	80 - 120
1772636	Sodium	105		P	80 - 120
1772636	Zinc	102		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299007

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771596	Arsenic	97.0	96.9	P/P	80 - 120
1771596	Cadmium	97.8	97.9	P/P	80 - 120
1771596	Chromium	98.0	97.0	P/P	80 - 120
1771596	Copper	89.2	88.0	P/P	80 - 120
1771596	Lead	93.5	93.2	P/P	80 - 120
1771596	Silver	98.0	95.2	P/P	80 - 120
1772636	Arsenic	97.8		P	80 - 120
1772636	Cadmium	95.6		P	80 - 120
1772636	Chromium	95.9		P	80 - 120
1772636	Copper	90.9		P	80 - 120
1772636	Lead	90.1		P	80 - 120
1772636	Silver	94.9		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299528

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1773279	Nickel	91.9		P	80 - 120

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P298902

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771406	Chloride	102		P	90 - 110
1771612	Chloride	102		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P298874

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771421	Ammonia-N	98.9	100	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P299252

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771618	Ammonia-N	97.6	97.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P299001

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771549	Kjeldahl Nitrogen	96.7	94.6	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298720

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771581	Nitrite-N	98.8	99.0	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298776

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771578	Nitrite-N	96.3	97.3	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P299062

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771550	NO2NO3-N	96.8		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P298897

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771548	Total-P	102	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P298745

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771622	O-Phosphate-P	102	102	P/P	90 - 110

Quality Assurance Report Matrix Spike Accuracy

Reference Method: SM 4500 F-C-97
Batch ID: P299044

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771613	Fluoride	98.8	98.3	P/P	94 - 107

Reference Method: SM 5310 B-00
Batch ID: P299138

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1771547	Organic Carbon	92.8	93.0	P/P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P298790

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771581	Turbidity	10.9	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P299007

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771596	Calcium	0.303	Spike	P	0 - 20
1771596	Iron	1.04	Spike	P	0 - 20
1771596	Magnesium	1.09	Spike	P	0 - 20
1771596	Potassium	2.71	Spike	P	0 - 20
1771596	Sodium	0.426	Spike	P	0 - 20
1771596	Zinc	2.17	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299007

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771596	Arsenic	0.0550	Spike	P	0 - 20
1771596	Cadmium	0.109	Spike	P	0 - 20
1771596	Chromium	1.03	Spike	P	0 - 20
1771596	Copper	1.38	Spike	P	0 - 20
1771596	Lead	0.324	Spike	P	0 - 20
1771596	Silver	2.86	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P299528

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1775201	Nickel	5.51	Spike	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P298902

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771406	Chloride	0.0473	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P298874

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771421	Ammonia-N	0.728	Spike	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P299252

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771618	Ammonia-N	0.0901	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P299001

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771549	Kjeldahl Nitrogen	2.05	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298720

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771581	Nitrite-N	0.168	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P298776

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771578	Nitrite-N	1.03	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P299062

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771550	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P298897

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771548	Total-P	0.288	Spike	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P298745

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771622	O-Phosphate-P	0.293	Spike	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P298750

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771614	Color (true)	0.232	Sample	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P299387

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771612	Total Alkalinity	5.00	Sample	F	0 - 4.8

Reference Method: SM 2540 C-97
Batch ID: P299452

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771578	TDS	1.03	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
Batch ID: P299044

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771613	Fluoride	0.487	Spike	P	0 - 3.7

Reference Method: SM 5310 B-00
Batch ID: P299138

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1771547	Organic Carbon	0.173	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 300.0 Rev. 2.1
Run ID: A67638
Included Lab Sample IDs: 1771578, 1771581, 1771582

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

Quality Assurance Report Calibration Verification

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A67642

Included Lab Sample IDs: 1771581, 1771582

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Nitrite-N	100	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A67652

Included Lab Sample IDs: 1771580, 1771585, 1771586

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.3	99.4	P/P	90 - 110

Reference Method: SM 2120 B

Run ID: A67654

Included Lab Sample IDs: 1771578, 1771581, 1771582

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	97.5	99.0	P/P	90 - 115

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A67656

Included Lab Sample IDs: 1771578

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Nitrite-N	102	103	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A67661

Included Lab Sample IDs: 1771578, 1771581, 1771582

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

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A67680

Included Lab Sample IDs: 1771579

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.9	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A67717

Included Lab Sample IDs: 1771583

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

Reference Method: SM 4500 F-C-97

Run ID: A67743

Included Lab Sample IDs: 1771578, 1771581, 1771582

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	100	99.5	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A67744

Included Lab Sample IDs: 1771579, 1771584

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	97.5	99.0	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A67752

Included Lab Sample IDs: 1771579, 1771583, 1771584

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

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A67757

Included Lab Sample IDs: 1771579, 1771583, 1771584

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

Reference Method: SM 5310 B-00

Run ID: A67778

Included Lab Sample IDs: 1771579, 1771583, 1771584

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	94.9	94.0	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A67833

Included Lab Sample IDs: 1771583, 1771584

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	98.7	98.7	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A67853

Included Lab Sample IDs: 1771595, 1771596

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	99.5	100	P/P	90 - 110
Iron	96.2	97.4	P/P	90 - 110
Magnesium	98.1	98.4	P/P	90 - 110
Potassium	99.8	101	P/P	90 - 110
Sodium	97.6	98.2	P/P	90 - 110
Zinc	103	102	P/P	90 - 110

Reference Method: SM 2320 B-97

Run ID: A67871

Included Lab Sample IDs: 1771578, 1771581, 1771582

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	104	100	P/P	90 - 110
Total Alkalinity	99.5	104	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A67887
Included Lab Sample IDs: 1771595, 1771596

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	98.7	100	P/P	90 - 110
Cadmium	99.0	100	P/P	90 - 110
Chromium	99.5	101	P/P	90 - 110
Copper	97.3	97.0	P/P	90 - 110
Lead	95.9	97.6	P/P	90 - 110
Silver	96.3	97.6	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A67972
Included Lab Sample IDs: 1771595, 1771596

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Nickel	96.3	96.2	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 SMP	MS
EPA 180.1 Rev. 2.0	Turbidity						10.9	
EPA 200.7 Rev. 4.4	Calcium	105	107	108				0.303
	Iron	105	105	106	101			1.04
	Magnesium	103	105	104				1.09
	Potassium	99.8	101	105	106			2.71
	Sodium	103	108	105				0.426
	Zinc	104	101	103	102			2.17
EPA 200.8 Rev. 5.4	Arsenic	96.1	97.0	96.9	97.8			0.0550
	Cadmium	97.1	97.8	97.9	95.6			0.109
	Chromium	97.6	98.0	97.0	95.9			1.03
	Copper	93.1	89.2	88.0	90.9			1.38
	Lead	91.6	93.5	93.2	90.1			0.324
	Nickel	96.1	91.9					5.51
	Silver	95.8	98.0	95.2	94.9			2.86
EPA 300.0 Rev. 2.1	Chloride	104	102	102			0.0473	
EPA 350.1 Rev. 2.0	Ammonia-N	97.9	98.9	100				0.728
	Ammonia-N	97.7	97.6	97.8				0.0901
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	97.2	96.7	94.6				2.05
EPA 353.2 Rev. 2.0	Nitrite-N	95.3	98.8	99.0				0.168
	Nitrite-N	96.5	96.3	97.3				1.03
	NO2NO3-N	100	96.8					0.0
EPA 365.1 Rev. 2.0	Total-P	99.2	102	102				0.288
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	102	102	102				0.293
SM 2120 B	Color (true)						0.232	
SM 2320 B-97	Total Alkalinity	105					5.00	
SM 2540 C-97	TDS						1.03	
SM 4500 F-C-97	Fluoride	98.0	98.8	98.3				0.487

Quality Assurance Report Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery	Precision
			LCS	SMP
SM 5310 B-00	Organic Carbon	97.4	92.8 93.0	MS 0.173

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	1771578, 1771581, 1771582
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	1771595, 1771596
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	1771595, 1771596
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	1771578, 1771581, 1771582
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	1771579, 1771583, 1771584
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	1771579, 1771583, 1771584
EPA 353.2 Rev. 2.0 / E31780	Nitrite in aqueous matrices as mg N/L	1771578, 1771581, 1771582
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	1771579, 1771583, 1771584
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	1771579, 1771583, 1771584
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	1771580, 1771585, 1771586
SM 2120 B / E31780	True Color measured at 450 nm	1771578, 1771581, 1771582
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO3/L	1771578, 1771581, 1771582
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	1771578, 1771581, 1771582
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices	1771578, 1771581, 1771582
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	1771578, 1771581, 1771582
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	1771579, 1771583, 1771584

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	02/16/2016			02/17/2016 16:45	Sima Feizi	1771578, 1771581, 1771582
EPA 200.7 Rev. 4.4	02/16/2016	02/22/2016	Elliott D. Healy	02/25/2016	Joshua Ayres	1771595, 1771596
EPA 200.8 Rev. 5.4	02/16/2016	02/22/2016	Elliott D. Healy	02/26/2016	Charles J. Peterson	1771595, 1771596
	02/16/2016	03/01/2016	Elliott D. Healy	03/02/2016	Charles J. Peterson	1771595, 1771596
EPA 300.0 Rev. 2.1	02/16/2016			02/18/2016	Ping Hua	1771578, 1771581, 1771582
EPA 350.1 Rev. 2.0	02/16/2016			02/18/2016	Diana M. Turner	1771579
	02/16/2016			02/24/2016	Diana M. Turner	1771583, 1771584
EPA 351.2 Rev. 2.0	02/16/2016	02/22/2016	Christopher Armour	02/23/2016	Bryan A. Werth	1771579, 1771583, 1771584
EPA 353.2 Rev. 2.0	02/16/2016			02/17/2016 11:33	Virginia P. Brown	1771581
	02/16/2016			02/17/2016 11:36	Virginia P. Brown	1771582
	02/16/2016			02/17/2016 14:10	Rochelle Y Jackson	1771578
	02/16/2016			02/22/2016	Diana M. Turner	1771579, 1771583, 1771584
EPA 365.1 Rev. 2.0	02/16/2016	02/19/2016	Christopher Armour	02/19/2016	Lipi Saha	1771583
	02/16/2016	02/19/2016	Christopher Armour	02/22/2016	Lipi Saha	1771579, 1771584
EPA 365.1 Rev. 2.0 dissolved	02/16/2016			02/17/2016 14:45	Bryan A. Werth	1771580
	02/16/2016			02/17/2016 14:46	Bryan A. Werth	1771585
	02/16/2016			02/17/2016 14:47	Bryan A. Werth	1771586
SM 2120 B	02/16/2016			02/17/2016 14:52	Rochelle Y Jackson	1771578
	02/16/2016			02/17/2016 14:53	Rochelle Y Jackson	1771581
	02/16/2016			02/17/2016 14:54	Rochelle Y Jackson	1771582
SM 2320 B-97	02/16/2016			02/27/2016	Dale L. Simmons	1771578, 1771581, 1771582
SM 2540 C-97	02/16/2016			02/19/2016	Yijie Li	1771578, 1771581, 1771582
SM 2540 D-97	02/16/2016			02/19/2016	Yijie Li	1771578, 1771581, 1771582
SM 4500 F-C-97	02/16/2016			02/22/2016	Dale L. Simmons	1771578, 1771581
	02/16/2016			02/23/2016	Dale L. Simmons	1771582
SM 5310 B-00	02/16/2016			02/23/2016	Sofia Elnemr	1771579, 1771583, 1771584