

Chemical Analysis Report

CEN-DIST-2018-08-14-02

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

Event Description: **Lk Winnemissett X3**

Request ID: **RQ-2018-08-13-51**

Customer: **CEN-DIST**

Project ID: **SMP**

Send Reports to:

FL Dept. of Environmental Protection
FL Dept. of Environmental Protection
3319 Maguire Blvd., Suite 232
Orlando, FL 32803-3767
Attn: Mike Linger

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: Thekkekalathil Chandrasekhar, Chemist Administrator

Date Certified: 30-AUG-2018 15:19



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: LAKE WINNEMISSETT @ 375 NORTH OF CENTER

Collection Date/Time: 08/13/2018 12:43

Field ID: G2CE0185

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2016825	EPA 180.1 Rev. 2.0	Turbidity	0.50		NTU	P350098	
	EPA 300.0 Rev. 2.1	Chloride	26		mg Cl/L	P350216	
		Sulfate	21		mg SO4/L	P350218	
		Color (true)	4.7	I	PCU	P350087	
	SM 2320 B-97	Total Alkalinity	5.9	A	mg CaCO3/L	P350185	
	SM 2540 C-97	TDS	83		mg/L	P350515	
	SM 2540 D-97	TSS	2	U	mg/L	P350398	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P350188	
2016828	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P350443	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.37		mg N/L	P350203	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P350362	
	EPA 365.1 Rev. 2.0	Total-P	0.005		mg P/L	P350434	
	SM 5310 B-00	Organic Carbon	3.9		mg C/L	P350386	
2016831	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P350088	
2016846	EPA 200.7 Rev. 4.4	Calcium	8.88		mg/L	P350165	
		Iron	30	U	ug/L	P350165	
		Magnesium	2.12		mg/L	P350165	
		Potassium	1.8		mg/L	P350165	
		Sodium	17.3		mg/L	P350165	
		Zinc	5.0	U	ug/L	P350165	
	EPA 200.8 Rev. 5.4	Arsenic	1.19		ug/L	P350165	
		Cadmium	0.020	U	ug/L	P350165	
		Chromium	0.40	U	ug/L	P350165	
		Copper	0.20	U	ug/L	P350165	
		Lead	0.050	U	ug/L	P350165	
		Nickel	0.20	U	ug/L	P350165	
		Silver	0.010	U	ug/L	P350165	

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: LAKE WINNEMISSETT @ CENTER

Collection Date/Time: 08/13/2018 12:30

Field ID: G2CE0184

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2016826	EPA 180.1 Rev. 2.0	Turbidity	0.50		NTU	P350098	
	EPA 300.0 Rev. 2.1	Chloride	27		mg Cl/L	P350216	
		Sulfate	22		mg SO4/L	P350218	
		Color (true)	3.3	I	PCU	P350087	
	SM 2320 B-97	Total Alkalinity	5.9		mg CaCO3/L	P350185	
	SM 2540 C-97	TDS	73		mg/L	P350515	
	SM 2540 D-97	TSS	2	I	mg/L	P350398	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P350188	
2016829	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P350443	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.38		mg N/L	P350203	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P350362	
	EPA 365.1 Rev. 2.0	Total-P	0.005		mg P/L	P350434	
	SM 5310 B-00	Organic Carbon	3.7		mg C/L	P350386	
2016832	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P350088	
2016847	EPA 200.7 Rev. 4.4	Calcium	8.74		mg/L	P350165	
		Iron	30	U	ug/L	P350165	
		Magnesium	2.13		mg/L	P350165	
		Potassium	1.8		mg/L	P350165	
		Sodium	17.0		mg/L	P350165	
		Zinc	5.0	U	ug/L	P350165	
	EPA 200.8 Rev. 5.4	Arsenic	1.15		ug/L	P350165	
		Cadmium	0.020	U	ug/L	P350165	
		Chromium	0.40	U	ug/L	P350165	
		Copper	0.20	U	ug/L	P350165	
		Lead	0.050	U	ug/L	P350165	
		Nickel	0.20	U	ug/L	P350165	
		Silver	0.010	U	ug/L	P350165	

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: LAKE WINNEMISSETT @ 350M SOUTH OF CENTER

Collection Date/Time: 08/13/2018 12:15

Field ID: G2CE0186

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2016827	EPA 180.1 Rev. 2.0	Turbidity	0.65		NTU	P350098	
	EPA 300.0 Rev. 2.1	Chloride	27		mg Cl/L	P350216	
		Sulfate	22		mg SO4/L	P350218	
		Color (true)	4.0	I	PCU	P350087	
	SM 2320 B-97	Total Alkalinity	5.7		mg CaCO3/L	P350185	
	SM 2540 C-97	TDS	81		mg/L	P350515	
	SM 2540 D-97	TSS	2	I	mg/L	P350398	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P350188	
2016830	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P350443	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.32		mg N/L	P350203	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P350363	
	EPA 365.1 Rev. 2.0	Total-P	0.005		mg P/L	P350434	
	SM 5310 B-00	Organic Carbon	3.7		mg C/L	P350386	
2016833	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P350088	
2016848	EPA 200.7 Rev. 4.4	Calcium	8.83		mg/L	P350165	
		Iron	30	U	ug/L	P350165	
		Magnesium	2.13		mg/L	P350165	
		Potassium	1.8		mg/L	P350165	
		Sodium	17.0		mg/L	P350165	
		Zinc	5.0	U	ug/L	P350165	
	EPA 200.8 Rev. 5.4	Arsenic	1.17		ug/L	P350165	
		Cadmium	0.020	U	ug/L	P350165	
		Chromium	0.40	U	ug/L	P350165	
		Copper	0.20	U	ug/L	P350165	
		Lead	0.050	U	ug/L	P350165	
		Nickel	0.20	U	ug/L	P350165	
		Silver	0.010	U	ug/L	P350165	

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: P350098

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P350165

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: P350165

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: P350216

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350218

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P350443

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P350203

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: P350362

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350363

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: P350434

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P350088

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

Reference Method: SM 2120 B
Batch ID: P350087

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P350185

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

Reference Method: SM 2540 C-97
Batch ID: P350515

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P350398

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P350188

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Quality Assurance Report

Method Blank Results

Reference Method: SM 5310 B-00
Batch ID: P350386

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: P350165

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	103		P	85 - 115
Iron	102		P	85 - 115
Magnesium	105		P	85 - 115
Potassium	97.5		P	85 - 115
Sodium	99.6		P	85 - 115
Zinc	95.9		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350165

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	100		P	85 - 115
Cadmium	99.7		P	85 - 115
Chromium	98.1		P	85 - 115
Copper	97.7		P	85 - 115
Lead	98.2		P	85 - 115
Nickel	101		P	85 - 115
Silver	100		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350216

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350218

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	98.2		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P350443

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P350203

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350362

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

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350363

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	99.0		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P350434

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	98.6		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P350088

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

Reference Method: SM 2120 B
Batch ID: P350087

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	96.8		P	85 - 115

Reference Method: SM 2320 B-97
Batch ID: P350185

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	103		P	98 - 107

Reference Method: SM 4500 F-C-97
Batch ID: P350188

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	98.5		P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P350386

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	97.3		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P350165

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016847	Calcium	102		P	80 - 120
2016847	Iron	100	104	P/P	80 - 120
2016847	Magnesium	101	106	P/P	80 - 120
2016847	Potassium	96.2	99.8	P/P	80 - 120
2016847	Sodium	95.8		P	80 - 120
2016847	Zinc	98.4	97.9	P/P	80 - 120
2017023	Calcium	105		P	80 - 120
2017023	Iron	104		P	80 - 120
2017023	Magnesium	104		P	80 - 120
2017023	Potassium	101		P	80 - 120
2017023	Sodium	97.1		P	80 - 120
2017023	Zinc	98.6		P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350165

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016847	Arsenic	99.7	101	P/P	80 - 120
2016847	Cadmium	99.9	100	P/P	80 - 120
2016847	Chromium	95.1	95.2	P/P	80 - 120
2016847	Copper	96.2	97.1	P/P	80 - 120
2016847	Lead	96.3	98.0	P/P	80 - 120
2016847	Nickel	96.7	97.0	P/P	80 - 120
2016847	Silver	98.0	98.9	P/P	80 - 120
2017023	Arsenic	102		P	80 - 120
2017023	Cadmium	101		P	80 - 120
2017023	Chromium	97.5		P	80 - 120
2017023	Copper	93.1		P	80 - 120
2017023	Lead	98.1		P	80 - 120
2017023	Nickel	96.1		P	80 - 120
2017023	Silver	99.5		P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350216

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016726	Chloride	103		P	90 - 110
2016782	Chloride	94.7		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350218

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016726	Sulfate	99.9		P	90 - 110
2016782	Sulfate	91.2		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P350443

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016828	Ammonia-N	100	101	P/P	90 - 110

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P350203

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016829	Kjeldahl Nitrogen	100	95.7	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350362

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016783	NO2NO3-N	101	101	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350363

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016830	NO2NO3-N	101	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P350434

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016828	Total-P	95.9	95.6	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P350088

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016764	O-Phosphate-P	95.9	97.3	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P350188

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016825	Fluoride	104	103	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P350386

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2016729	Organic Carbon	98.0	94.7	P/P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P350098

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016862	Turbidity	1.12	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P350165

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016847	Calcium	0.796	Spike	P	0 - 20
2016847	Iron	3.50	Spike	P	0 - 20
2016847	Magnesium	3.19	Spike	P	0 - 20
2016847	Potassium	2.51	Spike	P	0 - 20
2016847	Sodium	0.419	Spike	P	0 - 20
2016847	Zinc	0.517	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350165

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016847	Arsenic	0.801	Spike	P	0 - 20
2016847	Cadmium	0.406	Spike	P	0 - 20
2016847	Chromium	0.0612	Spike	P	0 - 20
2016847	Copper	0.965	Spike	P	0 - 20
2016847	Lead	1.70	Spike	P	0 - 20
2016847	Nickel	0.384	Spike	P	0 - 20
2016847	Silver	0.963	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350216

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016726	Chloride	2.35	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P350218

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016726	Sulfate	2.35	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P350443

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016828	Ammonia-N	0.718	Spike	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P350203

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016829	Kjeldahl Nitrogen	3.26	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350362

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016783	NO2NO3-N	0.345	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P350363

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016830	NO2NO3-N	0.496	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P350434

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016828	Total-P	0.235	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P350088

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016764	O-Phosphate-P	1.45	Spike	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P350087

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016852	Color (true)	1.26	Sample	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P350185

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016825	Total Alkalinity	0.331	Sample	P	0 - 1.6

Reference Method: SM 2540 C-97
Batch ID: P350515

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016760	TDS	5.03	Sample	P	0 - 10

Quality Assurance Report Precision

Reference Method: SM 4500 F-C-97
Batch ID: P350188

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016825	Fluoride	0.479	Spike	P	0 - 3.5

Reference Method: SM 5310 B-00
Batch ID: P350386

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2016729	Organic Carbon	2.87	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: A85845

Included Lab Sample IDs: 2016825, 2016826, 2016827

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	95.6	96.2	P/P	90 - 110
Sulfate	94.3	94.4	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A85864

Included Lab Sample IDs: 2016831, 2016832, 2016833

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.6	98.9	P/P	90 - 110

Reference Method: SM 2120 B

Run ID: A85865

Included Lab Sample IDs: 2016825, 2016826, 2016827

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	98.1	98.5	P/P	90 - 115

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A85866

Included Lab Sample IDs: 2016825, 2016826, 2016827

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	102	102	P/P	95 - 105

Reference Method: SM 2320 B-97

Run ID: A85905

Included Lab Sample IDs: 2016825, 2016826, 2016827

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	101	103	P/P	90 - 110

Reference Method: SM 4500 F-C-97

Run ID: A85905

Included Lab Sample IDs: 2016825, 2016826, 2016827

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

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A85942

Included Lab Sample IDs: 2016846, 2016847, 2016848

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	103	104	P/P	90 - 110
Calcium	104	103	P/P	95 - 105
Iron	100	100	P/P	95 - 105
Iron	100	102	P/P	90 - 110
Magnesium	101	101	P/P	95 - 105
Magnesium	101	103	P/P	90 - 110
Potassium	99.0	99.1	P/P	95 - 105
Potassium	99.1	100	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A85942

Included Lab Sample IDs: 2016846, 2016847, 2016848

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Sodium	100	98.8	P/P	95 - 105
Sodium	98.8	98.8	P/P	90 - 110
Zinc	97.7	97.1	P/P	90 - 110
Zinc	99.9	97.7	P/P	95 - 105

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A85961

Included Lab Sample IDs: 2016846, 2016847, 2016848

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	94.4	95.9	P/P	90 - 110
Arsenic	95.9	94.7	P/P	90 - 110
Cadmium	93.6	94.6	P/P	90 - 110
Cadmium	94.1	93.6	P/P	90 - 110
Chromium	93.8	94.3	P/P	90 - 110
Chromium	94.0	93.8	P/P	90 - 110
Copper	93.6	94.7	P/P	90 - 110
Copper	94.7	92.7	P/P	90 - 110
Lead	99.1	99.1	P/P	90 - 110
Lead	99.1	98.4	P/P	90 - 110
Nickel	93.3	94.1	P/P	90 - 110
Nickel	94.1	92.9	P/P	90 - 110
Silver	96.3	96.2	P/P	90 - 110
Silver	97.0	96.3	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A85973

Included Lab Sample IDs: 2016828, 2016829, 2016830

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

Reference Method: SM 5310 B-00

Run ID: A85977

Included Lab Sample IDs: 2016828, 2016829, 2016830

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	95.4	95.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A85982

Included Lab Sample IDs: 2016828, 2016829, 2016830

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	95.6	97.6	P/P	90 - 110
Kjeldahl Nitrogen	95.8	95.6	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A86004

Included Lab Sample IDs: 2016828, 2016829, 2016830

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

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A86028

Included Lab Sample IDs: 2016828, 2016829, 2016830

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

* Pass/Fail determinations are made for each bracketing calibration verification check.

Control limits for initial calibration checks may be different from those for continuing checks, depending on method requirements.

Where they are different, both control limits are provided.

Quality Assurance Report Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery			Precision SMP	MS
			LCS				
EPA 180.1 Rev. 2.0	Turbidity					1.12	
EPA 200.7 Rev. 4.4	Calcium	103	102	105			0.796
	Iron	102	100	104	104		3.50
	Magnesium	105	101	106	104		3.19
	Potassium	97.5	96.2	99.8	101		2.51
	Sodium	99.6	95.8	97.1			0.419
	Zinc	95.9	98.4	97.9	98.6		0.517
EPA 200.8 Rev. 5.4	Arsenic	100	99.7	101	102		0.801
	Cadmium	99.7	99.9	100	101		0.406
	Chromium	98.1	95.1	95.2	97.5		0.0612
	Copper	97.7	96.2	97.1	93.1		0.965
	Lead	98.2	96.3	98.0	98.1		1.70
	Nickel	101	96.7	97.0	96.1		0.384
	Silver	100	98.0	98.9	99.5		0.963
EPA 300.0 Rev. 2.1	Chloride	97.9	103	94.7		2.35	
	Sulfate	98.2	99.9	91.2		2.35	
EPA 350.1 Rev. 2.0	Ammonia-N	98.0	100	101			0.718
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	105	100	95.7			3.26
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	101	101	101			0.345
	NO ₂ NO ₃ -N	99.0	101	100			0.496
EPA 365.1 Rev. 2.0	Total-P	98.6	95.9	95.6			0.235
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	97.8	95.9	97.3			1.45
SM 2120 B	Color (true)	96.8				1.26	
SM 2320 B-97	Total Alkalinity	103				0.331	
SM 2540 C-97	TDS					5.03	
SM 4500 F-C-97	Fluoride	98.5	104	103			0.479
SM 5310 B-00	Organic Carbon	97.3	98.0	94.7			2.87

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	2016825, 2016826, 2016827
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2016846, 2016847, 2016848
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2016846, 2016847, 2016848
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	2016825, 2016826, 2016827
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	2016825, 2016826, 2016827
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2016828, 2016829, 2016830
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2016828, 2016829, 2016830
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2016828, 2016829, 2016830
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2016828, 2016829, 2016830
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2016831, 2016832, 2016833
SM 2120 B / E31780	True Color measured at 450 nm	2016825, 2016826, 2016827
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO ₃ /L	2016825, 2016826, 2016827
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	2016825, 2016826, 2016827
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2016825, 2016826, 2016827

Reference Method Descriptions

Method / DoH Cert #	Description	<u>Associated Samples</u>
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2016825, 2016826, 2016827
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	2016828, 2016829, 2016830

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	08/14/2018			08/14/2018 15:06	William L. Brown IV	2016825, 2016826, 2016827
EPA 200.7 Rev. 4.4	08/14/2018	08/15/2018 16:20	Elliott D. Healy	08/16/2018 14:39	Betina Topolski	2016846
	08/14/2018	08/15/2018 16:20	Elliott D. Healy	08/16/2018 15:11	Betina Topolski	2016847
	08/14/2018	08/15/2018 16:20	Elliott D. Healy	08/16/2018 15:37	Betina Topolski	2016848
EPA 200.8 Rev. 5.4	08/14/2018	08/15/2018 16:20	Elliott D. Healy	08/16/2018 18:28	Allison Taylor	2016846
	08/14/2018	08/15/2018 16:20	Elliott D. Healy	08/16/2018 19:06	Allison Taylor	2016847
	08/14/2018	08/15/2018 16:20	Elliott D. Healy	08/16/2018 19:35	Allison Taylor	2016848
EPA 300.0 Rev. 2.1	08/14/2018			08/16/2018 00:57	Lipi Saha	2016825
	08/14/2018			08/16/2018 01:09	Lipi Saha	2016826
	08/14/2018			08/16/2018 01:21	Lipi Saha	2016827
EPA 350.1 Rev. 2.0	08/14/2018			08/17/2018 12:00	Ping Hua	2016828
	08/14/2018			08/17/2018 12:05	Ping Hua	2016829
	08/14/2018			08/17/2018 12:06	Ping Hua	2016830
EPA 351.2 Rev. 2.0	08/14/2018	08/16/2018 15:30	Adrian Shelby	08/17/2018 12:58	Joseph Suarez	2016828
	08/14/2018	08/16/2018 15:30	Adrian Shelby	08/17/2018 13:00	Joseph Suarez	2016829
	08/14/2018	08/16/2018 15:30	Adrian Shelby	08/17/2018 13:08	Joseph Suarez	2016830
EPA 353.2 Rev. 2.0	08/14/2018			08/17/2018 12:56	Lauren Bottorf	2016828
	08/14/2018			08/17/2018 12:57	Lauren Bottorf	2016829
	08/14/2018			08/17/2018 13:04	Lauren Bottorf	2016830
EPA 365.1 Rev. 2.0	08/14/2018	08/20/2018 12:57	Sima Feizi	08/21/2018 11:58	Beverly Y. Sanders	2016828, 2016829
	08/14/2018	08/20/2018 12:57	Sima Feizi	08/21/2018 11:59	Beverly Y. Sanders	2016830
EPA 365.1 Rev. 2.0 dissolved	08/14/2018			08/14/2018 16:03	Julia Storbeck	2016831
	08/14/2018			08/14/2018 16:04	Julia Storbeck	2016832, 2016833
SM 2120 B	08/14/2018			08/14/2018 15:54	Tanya Welborn	2016825
	08/14/2018			08/14/2018 15:55	Tanya Welborn	2016826
	08/14/2018			08/14/2018 15:56	Tanya Welborn	2016827
SM 2320 B-97	08/14/2018			08/15/2018 23:06	Dale L. Simmons	2016825
	08/14/2018			08/15/2018 23:27	Dale L. Simmons	2016826
	08/14/2018			08/15/2018 23:39	Dale L. Simmons	2016827
SM 2540 C-97	08/14/2018			08/15/2018 15:06	Yijie Li	2016825, 2016826, 2016827
SM 2540 D-97	08/14/2018			08/15/2018 15:06	Yijie Li	2016825, 2016826, 2016827
SM 4500 F-C-97	08/14/2018			08/15/2018 22:58	Dale L. Simmons	2016825
	08/14/2018			08/15/2018 23:27	Dale L. Simmons	2016826
	08/14/2018			08/15/2018 23:39	Dale L. Simmons	2016827
SM 5310 B-00	08/14/2018			08/17/2018 09:23	Megan Treadwell	2016828
	08/14/2018			08/17/2018 09:36	Megan Treadwell	2016829
	08/14/2018			08/17/2018 09:53	Megan Treadwell	2016830