

Chemical Analysis Report

CEN-DIST-2018-11-09-01

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

Event Description: **Cow Creek + D&B**
Request ID: **RQ-2018-11-05-25**
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: Dr. rer. nat. Bettina Steinbock, Environmental Administrator

Date Certified: 30-NOV-2018 18:37



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: Cow Creek at Osteen-Maytown road (2952)

Collection Date/Time: 11/08/2018 11:05

Field ID: G2CE0086

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2040554	EPA 180.1 Rev. 2.0	Turbidity	1.4	Q	NTU	P354698	
	EPA 300.0 Rev. 2.1	Chloride	20		mg Cl/L	P355117	
		Sulfate	0.22	I	mg SO4/L	P355120	
		Color (true)	650	A	PCU	P354524	
	SM 2320 B-97	Total Alkalinity	0.65	U	mg CaCO3/L	P354960	
	SM 2540 C-97	TDS	165		mg/L	P354850	
	SM 2540 D-97	TSS	2	I	mg/L	P354797	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P354962	
2040555	EPA 350.1 Rev. 2.0	Ammonia-N	0.076		mg N/L	P354695	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	2.2		mg N/L	P354716	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P354818	
	EPA 365.1 Rev. 2.0	Total-P	0.056		mg P/L	P354827	
	SM 5310 B-00	Organic Carbon	63		mg C/L	P354625	
2040556	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.029		mg P/L	P354521	
2040571	EPA 200.7 Rev. 4.4	Calcium	7.31		mg/L	P354593	
		Iron	1.50E+03		ug/L	P354593	
		Magnesium	2.02		mg/L	P354593	
		Potassium	0.88	I	mg/L	P354593	
		Sodium	10.6		mg/L	P354593	
		Zinc	7.2	I	ug/L	P354593	
	EPA 200.8 Rev. 5.4	Arsenic	0.62		ug/L	P354593	
		Cadmium	0.051	I	ug/L	P354593	
		Chromium	0.64	I	ug/L	P354593	
		Copper	0.34	I	ug/L	P354593	
		Lead	0.69		ug/L	P354593	
		Nickel	0.62	I	ug/L	P354593	
		Silver	0.010	U	ug/L	P354593	

Ref. Method and Comment:

EPA 180.1 Rev. 2.0: The sample was analyzed out of holding time due to analytical difficulties.

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

EPA 351.2 Rev. 2.0: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

EPA 200.8 Rev. 5.4: The lead result was confirmed in the undigested sample on 11/19/2018.

Sample Location: Cow Creek at Osteen-Maytown road (2952)

Collection Date/Time: 11/08/2018 11:15

Field ID: G2CE0086_DUP

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2040557	EPA 180.1 Rev. 2.0	Turbidity	1.3		NTU	P354522	
	EPA 300.0 Rev. 2.1	Chloride	20		mg Cl/L	P355117	
		Sulfate	0.20	I	mg SO4/L	P355120	
		Color (true)	650		PCU	P354524	
	SM 2120 B	Total Alkalinity	0.65	U	mg CaCO3/L	P354960	
	SM 2540 C-97	TDS	170		mg/L	P354850	
	SM 2540 D-97	TSS	3	IA	mg/L	P354797	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P354962	
2040558	EPA 350.1 Rev. 2.0	Ammonia-N	0.077		mg N/L	P354695	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	2.3		mg N/L	P354716	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P354818	
	EPA 365.1 Rev. 2.0	Total-P	0.058		mg P/L	P354827	
	SM 5310 B-00	Organic Carbon	63		mg C/L	P354626	
2040559	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.028		mg P/L	P354521	
2040572	EPA 200.7 Rev. 4.4	Calcium	7.38		mg/L	P354593	
		Iron	1.53E+03		ug/L	P354593	
		Magnesium	2.05		mg/L	P354593	
		Potassium	0.91	I	mg/L	P354593	
		Sodium	10.6		mg/L	P354593	
		Zinc	5.2	I	ug/L	P354593	
	EPA 200.8 Rev. 5.4	Arsenic	0.59		ug/L	P354593	
		Cadmium	0.024	I	ug/L	P354593	
		Chromium	0.63	I	ug/L	P354593	
		Copper	0.41	I	ug/L	P354593	
		Lead	0.70		ug/L	P354593	
		Nickel	0.61	I	ug/L	P354593	
		Silver	0.010	U	ug/L	P354593	

Ref. Method and Comment:

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

EPA 351.2 Rev. 2.0: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

SM 5310 B-00: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

EPA 200.8 Rev. 5.4: The lead result was confirmed in the undigested sample on 11/19/2018.

Sample Location: DI Source - Washroom

Collection Date/Time: 11/08/2018 11:35

Field ID: Blank_11082018

Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2040560	EPA 180.1 Rev. 2.0	Turbidity	0.10	U	NTU	P354522	
	EPA 300.0 Rev. 2.1	Chloride	0.20	U	mg Cl/L	P355116	
		Sulfate	0.20	U	mg SO4/L	P355119	
		Color (true)	2.5	U	PCU	P354524	
	SM 2320 B-97	Total Alkalinity	0.65	U	mg CaCO3/L	P354960	
	SM 2540 C-97	TDS	15	U	mg/L	P354850	
	SM 2540 D-97	TSS	2	U	mg/L	P354797	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P354962	
2040561	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P354697	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.080	U	mg N/L	P354716	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P354818	
	EPA 365.1 Rev. 2.0	Total-P	0.002	U	mg P/L	P354827	
	SM 5310 B-00	Organic Carbon	0.50	U	mg C/L	P354626	
2040562	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P354521	
2040573	EPA 200.7 Rev. 4.4	Calcium	0.075	U	mg/L	P354593	
		Iron	30	U	ug/L	P354593	
		Magnesium	0.040	U	mg/L	P354593	
		Potassium	0.30	U	mg/L	P354593	
		Sodium	0.50	U	mg/L	P354593	
		Zinc	5.0	U	ug/L	P354593	
		Arsenic	0.050	U	ug/L	P354593	
	EPA 200.8 Rev. 5.4	Cadmium	0.020	U	ug/L	P354593	
		Chromium	0.40	U	ug/L	P354593	
		Copper	0.20	U	ug/L	P354593	
		Lead	0.050	U	ug/L	P354593	
		Nickel	0.20	U	ug/L	P354593	
		Silver	0.010	U	ug/L	P354593	

Ref. Method and Comment:

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

EPA 351.2 Rev. 2.0: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

SM 5310 B-00: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

Quality Assurance Report Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P354522

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P354698

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P354593

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: P354593

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: P355116

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355117

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355119

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Quality Assurance Report

Method Blank Results

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355120

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354695

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354697

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P354716

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P354818

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P354827

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P354521

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

Reference Method: SM 2120 B
Batch ID: P354524

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P354960

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: P354850

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P354797

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P354962

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P354625

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

Reference Method: SM 5310 B-00
Batch ID: P354626

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: P354593

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	104		P	85 - 115
Iron	104		P	85 - 115
Magnesium	107		P	85 - 115
Potassium	102		P	85 - 115
Sodium	107		P	85 - 115
Zinc	99.9		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P354593

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	107		P	85 - 115
Cadmium	106		P	85 - 115
Chromium	105		P	85 - 115
Copper	104		P	85 - 115
Lead	104		P	85 - 115
Nickel	105		P	85 - 115
Silver	102		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355116

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355117

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355119

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355120

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354695

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	99.6		P	90 - 110

Quality Assurance Report

Laboratory Control Sample Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354697

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P354716

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P354818

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P354827

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P354521

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	96.7		P	90 - 110

Reference Method: SM 2120 B
Batch ID: P354524

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	99.1		P	90 - 110

Reference Method: SM 2320 B-97
Batch ID: P354960

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

Reference Method: SM 4500 F-C-97
Batch ID: P354962

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	97.7		P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P354625

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	96.8		P	85 - 115

Quality Assurance Report

Laboratory Control Sample Accuracy

Reference Method: SM 5310 B-00
Batch ID: P354626

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	97.5		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P354593

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2039716	Calcium	106	107	P/P	80 - 120
2039716	Iron	108	109	P/P	80 - 120
2039716	Magnesium	110	110	P/P	80 - 120
2039716	Potassium	103	105	P/P	80 - 120
2039716	Sodium	104	104	P/P	80 - 120
2039716	Zinc	101	106	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P354593

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2039716	Arsenic	107	106	P/P	80 - 120
2039716	Cadmium	105	106	P/P	80 - 120
2039716	Chromium	103	103	P/P	80 - 120
2039716	Copper	105	103	P/P	80 - 120
2039716	Lead	104	104	P/P	80 - 120
2039716	Nickel	105	102	P/P	80 - 120
2039716	Silver	101	102	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355116

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2039201	Chloride	101		P	90 - 110
2039941	Chloride	94.8		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355117

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040257	Chloride	98.5		P	90 - 110
2040258	Chloride	101		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355119

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2039201	Sulfate	99.3		P	90 - 110
2039941	Sulfate	95.7		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355120

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040257	Sulfate	96.5		P	90 - 110
2040258	Sulfate	98.0		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354695

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040263	Ammonia-N	97.2	98.7	P/P	90 - 110

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354697

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040262	Ammonia-N	101	101	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P354818

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040485	NO2NO3-N	104	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P354827

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040848	Total-P	98.2	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P354521

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040556	O-Phosphate-P	94.8	94.2	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P354962

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040905	Fluoride	100	99.5	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P354625

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2040262	Organic Carbon	98.2	98.2	P/P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P354522

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040417	Turbidity	2.94	Sample	P	0 - 20

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P354698

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040901	Turbidity	1.33	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P354593

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2039716	Calcium	0.422	Spike	P	0 - 20
2039716	Iron	0.756	Spike	P	0 - 20
2039716	Magnesium	0.0229	Spike	P	0 - 20
2039716	Potassium	1.51	Spike	P	0 - 20
2039716	Sodium	0.00482	Spike	P	0 - 20
2039716	Zinc	4.08	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P354593

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2039716	Arsenic	1.29	Spike	P	0 - 20
2039716	Cadmium	0.665	Spike	P	0 - 20
2039716	Chromium	0.281	Spike	P	0 - 20
2039716	Copper	1.79	Spike	P	0 - 20
2039716	Lead	0.0361	Spike	P	0 - 20
2039716	Nickel	2.63	Spike	P	0 - 20
2039716	Silver	0.913	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355116

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2039201	Chloride	0.198	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355117

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040257	Chloride	0.381	Sample	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355119

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2039201	Sulfate	1.41	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P355120

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040257	Sulfate	0.822	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354695

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040263	Ammonia-N	1.34	Spike	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P354697

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040262	Ammonia-N	0.237	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P354716

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040720	Kjeldahl Nitrogen	3.36	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P354818

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040485	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P354827

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040848	Total-P	2.10	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P354521

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040556	O-Phosphate-P	0.486	Spike	P	0 - 20

Quality Assurance Report Precision

Reference Method: SM 2120 B
 Batch ID: P354524

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040554	Color (true)	0.392	Sample	P	0 - 20

Reference Method: SM 2320 B-97
 Batch ID: P354960

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040905	Total Alkalinity	1.24	Sample	P	0 - 1.6

Reference Method: SM 2540 C-97
 Batch ID: P354850

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040516	TDS	5.18	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
 Batch ID: P354962

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040905	Fluoride	0.473	Spike	P	0 - 3.5

Reference Method: SM 5310 B-00
 Batch ID: P354625

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040262	Organic Carbon	0.0496	Spike	P	0 - 20

Reference Method: SM 5310 B-00
 Batch ID: P354626

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2040558	Organic Carbon	0.272	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 365.1 Rev. 2.0 dissolved

Run ID: A87676

Included Lab Sample IDs: 2040556, 2040559, 2040562

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.5	98.7	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A87677

Included Lab Sample IDs: 2040557, 2040560

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

Reference Method: SM 2120 B

Run ID: A87678

Included Lab Sample IDs: 2040554, 2040557, 2040560

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	100	99.1	P/P	85 - 115
Color (true)	101	100	P/P	85 - 115

Reference Method: SM 5310 B-00

Run ID: A87733

Included Lab Sample IDs: 2040555, 2040558, 2040561

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	98.2	94.0	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A87758

Included Lab Sample IDs: 2040571, 2040572, 2040573

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	103	103	P/P	95 - 105
Calcium	105	103	P/P	90 - 110
Iron	102	103	P/P	95 - 105
Iron	106	103	P/P	90 - 110
Magnesium	102	103	P/P	95 - 105
Magnesium	106	103	P/P	90 - 110
Potassium	100	102	P/P	95 - 105
Potassium	104	101	P/P	90 - 110
Sodium	103	107	P/P	95 - 105
Sodium	108	105	P/P	90 - 110
Zinc	101	99.8	P/P	95 - 105
Zinc	102	104	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A87762

Included Lab Sample IDs: 2040555, 2040558, 2040561

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	98.3	98.8	P/P	90 - 110
Ammonia-N	99.5	98.3	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A87763

Included Lab Sample IDs: 2040554

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

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A87823

Included Lab Sample IDs: 2040555, 2040558, 2040561

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

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A87842

Included Lab Sample IDs: 2040555, 2040558, 2040561

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	101	105	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A87853

Included Lab Sample IDs: 2040555, 2040558

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

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A87854

Included Lab Sample IDs: 2040571, 2040572, 2040573

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	104	105	P/P	90 - 110
Arsenic	105	104	P/P	90 - 110
Cadmium	104	103	P/P	90 - 110
Chromium	103	104	P/P	90 - 110
Chromium	104	103	P/P	90 - 110
Copper	105	103	P/P	90 - 110
Copper	105	105	P/P	90 - 110
Lead	104	104	P/P	90 - 110
Lead	104	104	P/P	90 - 110
Nickel	104	105	P/P	90 - 110
Nickel	105	103	P/P	90 - 110
Silver	101	99.7	P/P	90 - 110
Silver	99.7	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A87863

Included Lab Sample IDs: 2040561

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

Quality Assurance Report Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A87881

Included Lab Sample IDs: 2040571, 2040572

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Cadmium	96.3	94.9	P/P	90 - 110

Reference Method: SM 2320 B-97

Run ID: A87886

Included Lab Sample IDs: 2040554, 2040557, 2040560

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	102	99.0	P/P	90 - 110

Reference Method: SM 4500 F-C-97

Run ID: A87886

Included Lab Sample IDs: 2040554, 2040557, 2040560

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

Reference Method: EPA 300.0 Rev. 2.1

Run ID: A87936

Included Lab Sample IDs: 2040554, 2040557, 2040560

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	101	102	P/P	90 - 110
Chloride	102	103	P/P	90 - 110
Chloride	103	103	P/P	90 - 110
Sulfate	100	101	P/P	90 - 110
Sulfate	102	103	P/P	90 - 110
Sulfate	102	102	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					2.94	
	Turbidity					1.33	
EPA 200.7 Rev. 4.4	Calcium	104	106	107			0.422
	Iron	104	108	109			0.756
	Magnesium	107	110	110			0.0229
	Potassium	102	103	105			1.51
	Sodium	107	104	104			0.0048
	Zinc	99.9	101	106			4.08
EPA 200.8 Rev. 5.4	Arsenic	107	107	106			1.29
	Cadmium	106	105	106			0.665
	Chromium	105	103	103			0.281
	Copper	104	105	103			1.79
	Lead	104	104	104			0.0361
	Nickel	105	105	102			2.63
	Silver	102	101	102			0.913
EPA 300.0 Rev. 2.1	Chloride	98.6	101	94.8		0.198	
	Chloride	99.2	98.5	101		0.381	
	Sulfate	97.7	99.3	95.7		1.41	
	Sulfate	98.5	96.5	98.0		0.822	
EPA 350.1 Rev. 2.0	Ammonia-N	99.6	97.2	98.7			1.34
	Ammonia-N	99.5	101	101			0.237
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	107					3.36
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	99.5	104	104			0.0
EPA 365.1 Rev. 2.0	Total-P	102	98.2	101			2.10
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	96.7	94.8	94.2			0.486
SM 2120 B	Color (true)	99.1				0.392	
SM 2320 B-97	Total Alkalinity	101				1.24	
SM 2540 C-97	TDS					5.18	
SM 4500 F-C-97	Fluoride	97.7	100	99.5			0.473
SM 5310 B-00	Organic Carbon	96.8	98.2	98.2			0.0496
	Organic Carbon	97.5					0.272

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	2040554, 2040557, 2040560
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2040571, 2040572, 2040573
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2040571, 2040572, 2040573
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	2040554, 2040557, 2040560
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	2040554, 2040557, 2040560
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2040555, 2040558, 2040561
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2040555, 2040558, 2040561
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2040555, 2040558, 2040561
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2040555, 2040558, 2040561
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2040556, 2040559, 2040562

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
SM 2120 B / E31780	True Color measured at 450 nm	2040554, 2040557, 2040560
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO ₃ /L	2040554, 2040557, 2040560
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	2040554, 2040557, 2040560
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2040554, 2040557, 2040560
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2040554, 2040557, 2040560
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	2040555, 2040558, 2040561

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 180.1 Rev. 2.0	11/09/2018			11/09/2018 16:38	Megan Treadwell	2040557, 2040560
	11/09/2018			11/14/2018 15:20	Megan Treadwell	2040554
EPA 200.7 Rev. 4.4	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/14/2018 13:27	Betina Topolski	2040573
	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/14/2018 15:37	Betina Topolski	2040571
	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/14/2018 15:44	Betina Topolski	2040572
EPA 200.8 Rev. 5.4	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/15/2018 16:11	Allison Taylor	2040573
	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/15/2018 18:26	Allison Taylor	2040571
	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/15/2018 18:36	Allison Taylor	2040572
	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/19/2018 19:25	Allison Taylor	2040571
	11/09/2018	11/13/2018 14:15	Elliott D. Healy	11/19/2018 19:32	Allison Taylor	2040572
EPA 300.0 Rev. 2.1	11/09/2018			11/26/2018 19:31	Lipi Saha	2040560
	11/09/2018			11/27/2018 01:46	Lipi Saha	2040554
	11/09/2018			11/27/2018 05:35	Lipi Saha	2040557
EPA 350.1 Rev. 2.0	11/09/2018			11/14/2018 13:02	Ping Hua	2040555
	11/09/2018			11/14/2018 13:04	Ping Hua	2040558
	11/09/2018			11/14/2018 13:32	Ping Hua	2040561
EPA 351.2 Rev. 2.0	11/09/2018	11/15/2018 11:30	Adrian Shelby	11/17/2018 00:08	Joseph Suarez	2040555
	11/09/2018	11/15/2018 11:30	Adrian Shelby	11/17/2018 00:10	Joseph Suarez	2040558
	11/09/2018	11/15/2018 11:30	Adrian Shelby	11/17/2018 00:11	Joseph Suarez	2040561
EPA 353.2 Rev. 2.0	11/09/2018			11/16/2018 10:42	Beverly Y. Sanders	2040561
	11/09/2018			11/16/2018 10:43	Beverly Y. Sanders	2040555
	11/09/2018			11/16/2018 10:44	Beverly Y. Sanders	2040558
EPA 365.1 Rev. 2.0	11/09/2018	11/16/2018 12:50	Sima Feizi	11/19/2018 09:29	Beverly Y. Sanders	2040555
	11/09/2018	11/16/2018 12:50	Sima Feizi	11/19/2018 09:30	Beverly Y. Sanders	2040558
	11/09/2018	11/16/2018 12:50	Sima Feizi	11/19/2018 12:36	Beverly Y. Sanders	2040561
EPA 365.1 Rev. 2.0 dissolved	11/09/2018			11/09/2018 15:56	Jhamieka S. Greenwood	2040556
	11/09/2018			11/09/2018 15:59	Jhamieka S. Greenwood	2040559
	11/09/2018			11/09/2018 16:00	Jhamieka S. Greenwood	2040562
SM 2120 B	11/09/2018			11/09/2018 16:29	Chelsea Hernandez	2040560
	11/09/2018			11/09/2018 16:32	Chelsea Hernandez	2040554
	11/09/2018			11/09/2018 16:33	Chelsea Hernandez	2040557
SM 2320 B-97	11/09/2018			11/15/2018 23:44	Dale L. Simmons	2040554
	11/09/2018			11/15/2018 23:52	Dale L. Simmons	2040557
	11/09/2018			11/16/2018 00:05	Dale L. Simmons	2040560
SM 2540 C-97	11/09/2018			11/09/2018 16:54	Yijie Li	2040554, 2040557, 2040560
SM 2540 D-97	11/09/2018			11/09/2018 16:54	Yijie Li	2040554, 2040557, 2040560
SM 4500 F-C-97	11/09/2018			11/15/2018 23:44	Dale L. Simmons	2040554
	11/09/2018			11/15/2018 23:52	Dale L. Simmons	2040557
	11/09/2018			11/16/2018 00:05	Dale L. Simmons	2040560
SM 5310 B-00	11/09/2018			11/14/2018 01:53	Megan Treadwell	2040555

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
SM 5310 B-00	11/09/2018			11/14/2018 02:30	Megan Treadwell	2040558
	11/09/2018			11/14/2018 03:19	Megan Treadwell	2040561