

Chemical Analysis Report

CEN-DIST-2018-12-07-01

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

Event Description: **Puzzle + D&B**
Request ID: **RQ-2018-12-03-52**
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.
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Dr. rer. nat. Bettina Steinbock
Thekkekalathil Chandrasekhar, Ph.D, QA Officer
Phone (850) 245-8085

Certified by: Liang Lin, Environmental Administrator

Date Certified: 09-JAN-2019 14:55

A handwritten signature in black ink, appearing to read "Liang Lin", on a light-colored background.

NON-CONFORMANCE REPORT INCLUDED

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: Saint Johns River @ 300m downstream of
Hatbill Park Ramp**

Collection Date/Time: 12/06/2018 12:35

Field ID: G3CE0006

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2047222	EPA 180.1 Rev. 2.0	Turbidity	16		NTU	P355843	
	EPA 300.0 Rev. 2.1	Chloride	870		mg Cl/L	P356074	
		Sulfate	360		mg SO4/L	P356076	
		Color (true)	74		PCU	P355852	
	SM 2320 B-97	Total Alkalinity	62		mg CaCO3/L	P355947	
	SM 2540 C-97	TDS	1.96E+03		mg/L	P356303	
	SM 2540 D-97	TSS	18		mg/L	P356081	
	SM 4500 F-C-97	Fluoride	0.12		mg F/L	P355950	
2047223	EPA 350.1 Rev. 2.0	Ammonia-N	0.19	Y	mg N/L	P355970	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.8	Y	mg N/L	P356225	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.19	Y	mg N/L	P355927	
	EPA 365.1 Rev. 2.0	Total-P	0.094	Y	mg P/L	P355995	
	SM 5310 B-00	Organic Carbon	19	Y	mg C/L	P355980	
2047224	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.007	I	mg P/L	P355847	
2047234	EPA 200.7 Rev. 4.4	Calcium	125		mg/L	P355944	
		Iron	1.17E+03		ug/L	P355944	
		Magnesium	63.7		mg/L	P355944	
		Potassium	14.3		mg/L	P355944	
		Sodium	462		mg/L	P355944	
	EPA 200.8 Rev. 5.4	Zinc	5.0	U	ug/L	P355944	
		Arsenic	0.83		ug/L	P355944	
		Cadmium	0.020	U	ug/L	P355944	
		Chromium	0.52	I	ug/L	P355944	
		Copper	0.61	I	ug/L	P356730	
		Lead	0.90		ug/L	P355944	
		Nickel	0.67	I	ug/L	P355944	
		Silver	0.010	U	ug/L	P355944	

Ref. Method and Comment:

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

EPA 350.1 Rev. 2.0: Sample stored outside of the acceptable temperature range, should be stored below 6 degC.

EPA 351.2 Rev. 2.0: Sample stored outside of the acceptable temperature range, should be stored below 6 degC.

EPA 353.2 Rev. 2.0: Sample stored outside of the acceptable temperature range, should be stored below 6 degC.

EPA 365.1 Rev. 2.0: Sample stored outside of the acceptable temperature range, should be stored below 6 degC.

SM 5310 B-00: Sample stored outside of the acceptable temperature range, should be stored below 6 degC.

**Sample Location: Saint Johns River @ 300m downstream of
 Hatbill Park Ramp**

Collection Date/Time: 12/06/2018 12:38

Field ID: G3CE0006_DUP

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2047225	EPA 180.1 Rev. 2.0	Turbidity	16		NTU	P355844	
	EPA 300.0 Rev. 2.1	Chloride	890		mg Cl/L	P356074	
		Sulfate	370		mg SO4/L	P356076	
		Color (true)	74		PCU	P355852	
	SM 2320 B-97	Total Alkalinity	63		mg CaCO3/L	P355947	
	SM 2540 C-97	TDS	1.87E+03		mg/L	P356304	
	SM 2540 D-97	TSS	18		mg/L	P356082	
	SM 4500 F-C-97	Fluoride	0.13		mg F/L	P355950	
2047226	EPA 350.1 Rev. 2.0	Ammonia-N	0.18		mg N/L	P355970	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.8		mg N/L	P356225	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.19		mg N/L	P355927	
	EPA 365.1 Rev. 2.0	Total-P	0.090		mg P/L	P355995	
	SM 5310 B-00	Organic Carbon	19		mg C/L	P355980	
2047227	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.007	I	mg P/L	P355847	
2047235	EPA 200.7 Rev. 4.4	Calcium	128		mg/L	P355944	
		Iron	1.17E+03		ug/L	P355944	
		Magnesium	65.4		mg/L	P355944	
		Potassium	14.9		mg/L	P355944	
		Sodium	487		mg/L	P355944	
	EPA 200.8 Rev. 5.4	Zinc	5.0	U	ug/L	P355944	
		Arsenic	0.84		ug/L	P355944	
		Cadmium	0.020	U	ug/L	P355944	
		Chromium	0.55	I	ug/L	P355944	
		Copper	0.63	I	ug/L	P356730	
		Lead	0.94		ug/L	P355944	
		Nickel	0.70	I	ug/L	P355944	
		Silver	0.010	U	ug/L	P355944	

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: Blank_12042018

Collection Date/Time: 12/06/2018 13:00

Field ID: Blank_12042018

Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2047228	EPA 180.1 Rev. 2.0	Turbidity	0.15		NTU	P355844	
	EPA 300.0 Rev. 2.1	Chloride	0.20	U	mg Cl/L	P356074	
		Sulfate	0.20	U	mg SO4/L	P356076	
		Color (true)	2.5	U	PCU	P355850	
	SM 2120 B	Total Alkalinity	0.65	U	mg CaCO3/L	P355947	
	SM 2540 C-97	TDS	15	U	mg/L	P356302	
	SM 2540 D-97	TSS	2	U	mg/L	P356080	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P355950	
2047229	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P355970	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.080	U	mg N/L	P356225	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P355927	
	EPA 365.1 Rev. 2.0	Total-P	0.002	U	mg P/L	P355995	
	SM 5310 B-00	Organic Carbon	0.50	U	mg C/L	P355980	
2047230	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P355847	
2047236	EPA 200.7 Rev. 4.4	Calcium	0.075	U	mg/L	P355944	
		Iron	30	U	ug/L	P355944	
		Magnesium	0.040	U	mg/L	P355944	
		Potassium	0.30	U	mg/L	P355944	
		Sodium	0.50	U	mg/L	P355944	
		Zinc	5.0	U	ug/L	P355944	
	EPA 200.8 Rev. 5.4	Arsenic	0.050	U	ug/L	P355944	
		Cadmium	0.020	U	ug/L	P355944	
		Chromium	0.40	U	ug/L	P355944	
		Copper	0.20	U	ug/L	P355944	
		Lead	0.050	U	ug/L	P355944	
		Nickel	0.20	U	ug/L	P355944	
		Silver	0.010	U	ug/L	P355944	

Ref. Method and Comment:

EPA 180.1 Rev. 2.0: The result was confirmed on 12/07/2018.

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

Non-Conformance Report

NCR ID: 7380

Event(s)

CEN-DIST-2018-12-07-01

Job(s)

TLH-2018-12-07-18

Sample(s)

2047223

Test(s)

NCR Type: CUSTODY

NCR Category: General

Observation: Sample stored outside of the acceptable temperature range for more than 24 hours.

Resolution: Sample returned to acceptable temperature. Customer contacted, data will be qualified as appropriate.

Authorized by/Date: Joshua Ayres 12/19/2018

The Non-Conformance Report details exceptions or problems encountered with the events/jobs/samples/test.
Please address questions to:

Chemistry	Colin Wright	(850) 245-8085
Biology	Cheryl Swanson	(850) 245-8177

Quality Assurance Report Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P355843

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P355844

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P355944

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: P355944

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 200.8 Rev. 5.4
Batch ID: P356730

Component	Result	Code	Units
Copper	0.20	U	ug/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356074

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356076

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355970

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P356225

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355927

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355995

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355847

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

Reference Method: SM 2120 B
Batch ID: P355850

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2120 B
Batch ID: P355852

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P355947

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

Reference Method: SM 2540 C-97
Batch ID: P356302

Component	Result	Code	Units
TDS	15	U	mg/L

Quality Assurance Report

Method Blank Results

Reference Method: SM 2540 C-97
Batch ID: P356303

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 C-97
Batch ID: P356304

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P356080

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P356081

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P356082

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P355950

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P355980

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: P355944

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	106		P	85 - 115
Iron	105		P	85 - 115
Magnesium	109		P	85 - 115
Potassium	105		P	85 - 115
Sodium	108		P	85 - 115
Zinc	99.0		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355944

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	103		P	85 - 115
Cadmium	104		P	85 - 115
Chromium	102		P	85 - 115
Copper	99.3		P	85 - 115
Lead	102		P	85 - 115
Nickel	101		P	85 - 115
Silver	100		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P356730

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Copper	97.0		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356074

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356076

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355970

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P356225

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

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355927

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355995

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355847

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	99.8		P	90 - 110

Reference Method: SM 2120 B
Batch ID: P355850

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	99.7		P	90 - 110

Reference Method: SM 2120 B
Batch ID: P355852

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	97.6		P	90 - 110

Reference Method: SM 2320 B-97
Batch ID: P355947

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

Reference Method: SM 4500 F-C-97
Batch ID: P355950

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	99.4		P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P355980

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	92.0		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P355944

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047184	Calcium	104		P	80 - 120
2047184	Iron	103		P	80 - 120
2047184	Magnesium	109		P	80 - 120
2047184	Potassium	103		P	80 - 120
2047184	Sodium	108		P	80 - 120
2047184	Zinc	101		P	80 - 120
2047437	Calcium	102		P	80 - 120
2047437	Iron	99.0	102	P/P	80 - 120
2047437	Magnesium	99.3	104	P/P	80 - 120
2047437	Potassium	100	106	P/P	80 - 120
2047437	Sodium	109		P	80 - 120
2047437	Zinc	98.3	94.7	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355944

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047184	Arsenic	103		P	80 - 120
2047184	Cadmium	103		P	80 - 120
2047184	Chromium	102		P	80 - 120
2047184	Copper	105		P	80 - 120
2047184	Lead	103		P	80 - 120
2047184	Nickel	102		P	80 - 120
2047184	Silver	98.9		P	80 - 120
2047437	Arsenic	106	106	P/P	80 - 120
2047437	Cadmium	103	105	P/P	80 - 120
2047437	Chromium	104	105	P/P	80 - 120
2047437	Copper	103	107	P/P	80 - 120
2047437	Lead	104	104	P/P	80 - 120
2047437	Nickel	104	104	P/P	80 - 120
2047437	Silver	89.3	100	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P356730

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047169	Copper	98.3		P	80 - 120
2047436	Copper	98.6	97.8	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356074

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047126	Chloride	106		P	90 - 110
2047188	Chloride	105		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356076

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047126	Sulfate	102		P	90 - 110
2047188	Sulfate	105		P	90 - 110

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355970

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047218	Ammonia-N	97.6	98.4	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P356225

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047196	Kjeldahl Nitrogen	92.2	100	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355927

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047189	NO2NO3-N	99.4	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355995

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047218	Total-P	107	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355847

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047250	O-Phosphate-P	93.6	95.0	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P355950

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047124	Fluoride	102	101	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P355980

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2047218	Organic Carbon	93.8	92.6	P/P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P355843

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047174	Turbidity	2.17	Sample	P	0 - 20

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P355844

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047267	Turbidity	0.452	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P355944

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047437	Calcium	1.92	Spike	P	0 - 20
2047437	Iron	2.91	Spike	P	0 - 20
2047437	Magnesium	3.05	Spike	P	0 - 20
2047437	Potassium	3.36	Spike	P	0 - 20
2047437	Sodium	1.67	Spike	P	0 - 20
2047437	Zinc	3.69	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P355944

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047437	Arsenic	0.118	Spike	P	0 - 20
2047437	Cadmium	2.05	Spike	P	0 - 20
2047437	Chromium	1.00	Spike	P	0 - 20
2047437	Copper	2.39	Spike	P	0 - 20
2047437	Lead	0.359	Spike	P	0 - 20
2047437	Nickel	0.470	Spike	P	0 - 20
2047437	Silver	11.8	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P356730

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047436	Copper	0.750	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356074

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047126	Chloride	0.976	Sample	P	0 - 20

Quality Assurance Report Precision

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P356076

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047126	Sulfate	1.72	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P355970

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047218	Ammonia-N	0.581	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P356225

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047196	Kjeldahl Nitrogen	4.49	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P355927

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047189	NO2NO3-N	2.31	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P355995

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047218	Total-P	4.62	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P355847

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047250	O-Phosphate-P	1.16	Spike	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P355850

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047281	Color (true)	0.280	Sample	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P355852

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047188	Color (true)	5.64	Sample	P	0 - 20

Quality Assurance Report Precision

Reference Method: SM 2320 B-97
 Batch ID: P355947

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047124	Total Alkalinity	0.0475	Sample	P	0 - 1.6

Reference Method: SM 2540 C-97
 Batch ID: P356302

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2046863	TDS	3.40	Sample	P	0 - 10

Reference Method: SM 2540 C-97
 Batch ID: P356303

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047088	TDS	6.32	Sample	P	0 - 10

Reference Method: SM 2540 C-97
 Batch ID: P356304

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047281	TDS	5.05	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
 Batch ID: P355950

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047124	Fluoride	0.979	Spike	P	0 - 3.5

Reference Method: SM 5310 B-00
 Batch ID: P355980

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2047218	Organic Carbon	0.667	Spike	P	0 - 20

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

Quality Assurance Report Calibration Verification

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A88234

Included Lab Sample IDs: 2047222, 2047225, 2047228

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A88235

Included Lab Sample IDs: 2047224, 2047227, 2047230

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	97.7	97.8	P/P	90 - 110
O-Phosphate-P	97.8	96.8	P/P	90 - 110

Reference Method: SM 2120 B

Run ID: A88236

Included Lab Sample IDs: 2047222, 2047225, 2047228

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	101	102	P/P	85 - 115
Color (true)	99.9	100	P/P	85 - 115

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A88269

Included Lab Sample IDs: 2047223, 2047226, 2047229

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

Reference Method: SM 2320 B-97

Run ID: A88275

Included Lab Sample IDs: 2047222, 2047225, 2047228

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

Reference Method: SM 4500 F-C-97

Run ID: A88275

Included Lab Sample IDs: 2047222, 2047225, 2047228

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

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A88285

Included Lab Sample IDs: 2047223, 2047226, 2047229

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	97.6	99.4	P/P	90 - 110
Ammonia-N	99.4	99.3	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: SM 5310 B-00

Run ID: A88287

Included Lab Sample IDs: 2047223, 2047226, 2047229

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	94.7	92.6	P/P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1

Run ID: A88324

Included Lab Sample IDs: 2047222, 2047225, 2047228

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

Reference Method: EPA 200.7 Rev. 4.4

Run ID: A88336

Included Lab Sample IDs: 2047234, 2047235, 2047236

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	101	95.9	P/P	90 - 110
Calcium	102	101	P/P	95 - 105
Iron	101	97.2	P/P	90 - 110
Iron	102	100	P/P	95 - 105
Magnesium	102	98.1	P/P	90 - 110
Magnesium	102	101	P/P	95 - 105
Potassium	102	102	P/P	95 - 105
Potassium	103	103	P/P	90 - 110
Sodium	104	105	P/P	95 - 105
Sodium	105	103	P/P	90 - 110
Zinc	100	96.4	P/P	90 - 110
Zinc	99.0	101	P/P	95 - 105

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A88344

Included Lab Sample IDs: 2047223, 2047226

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

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A88362

Included Lab Sample IDs: 2047229

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

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A88384

Included Lab Sample IDs: 2047234, 2047235, 2047236

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	104	104	P/P	90 - 110
Arsenic	97.9	101	P/P	90 - 110
Cadmium	101	101	P/P	90 - 110
Cadmium	103	101	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A88384

Included Lab Sample IDs: 2047234, 2047235, 2047236

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chromium	104	103	P/P	90 - 110
Chromium	99.4	101	P/P	90 - 110
Lead	102	103	P/P	90 - 110
Lead	105	104	P/P	90 - 110
Nickel	105	105	P/P	90 - 110
Nickel	97.8	101	P/P	90 - 110
Silver	100	99.6	P/P	90 - 110
Silver	98.5	99.1	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A88412

Included Lab Sample IDs: 2047223, 2047226, 2047229

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	108	104	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A88523

Included Lab Sample IDs: 2047236

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Copper	103	104	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4

Run ID: A88625

Included Lab Sample IDs: 2047234, 2047235

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Copper	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					2.17	
	Turbidity					0.452	
EPA 200.7 Rev. 4.4	Calcium	106	104	102			1.92
	Iron	105	103	99.0	102		2.91
	Magnesium	109	109	99.3	104		3.05
	Potassium	105	103	100	106		3.36
	Sodium	108	108	109			1.67
	Zinc	99.0	101	98.3	94.7		3.69
EPA 200.8 Rev. 5.4	Arsenic	103	103	106	106		0.118
	Cadmium	104	103	103	105		2.05
	Chromium	102	102	104	105		1.00
	Copper	99.3	105	103	107		2.39
	Copper	97.0	98.3	98.6	97.8		0.750
	Lead	102	103	104	104		0.359
	Nickel	101	102	104	104		0.470
	Silver	100	98.9	89.3	100		11.8
EPA 300.0 Rev. 2.1	Chloride	107	106	105		0.976	
	Sulfate	105	102	105		1.72	
EPA 350.1 Rev. 2.0	Ammonia-N	96.9	97.6	98.4			0.581
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	102	92.2	100			4.49
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	100	99.4	102			2.31
EPA 365.1 Rev. 2.0	Total-P	106	107	100			4.62
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	99.8	93.6	95.0			1.16
SM 2120 B	Color (true)	99.7				0.280	
	Color (true)	97.6				5.64	
SM 2320 B-97	Total Alkalinity	101				0.0475	
SM 2540 C-97	TDS					3.40	
	TDS					6.32	
	TDS					5.05	
SM 4500 F-C-97	Fluoride	99.4	102	101			0.979
SM 5310 B-00	Organic Carbon	92.0	93.8	92.6			0.667

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	2047222, 2047225, 2047228
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2047234, 2047235, 2047236
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2047234, 2047235, 2047236
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	2047222, 2047225, 2047228
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	2047222, 2047225, 2047228
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2047223, 2047226, 2047229
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2047223, 2047226, 2047229
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2047223, 2047226, 2047229
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2047223, 2047226, 2047229
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2047224, 2047227, 2047230

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
SM 2120 B / E31780	True Color measured at 450 nm	2047222, 2047225, 2047228
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO ₃ /L	2047222, 2047225, 2047228
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	2047222, 2047225, 2047228
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2047222, 2047225, 2047228
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2047222, 2047225, 2047228
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	2047223, 2047226, 2047229

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	12/07/2018			12/07/2018 16:13	Megan Treadwell	2047222, 2047225, 2047228
EPA 200.7 Rev. 4.4	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/13/2018 14:26	Betina Topolski	2047236
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/13/2018 16:49	Betina Topolski	2047234
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/13/2018 16:56	Betina Topolski	2047234
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/13/2018 17:03	Betina Topolski	2047235
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/13/2018 17:11	Betina Topolski	2047235
EPA 200.8 Rev. 5.4	12/07/2018	01/02/2019 12:20	Elliott D. Healy	01/03/2019 19:14	Robert K Palmer	2047234
	12/07/2018	01/02/2019 12:20	Elliott D. Healy	01/03/2019 19:24	Robert K Palmer	2047235
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/14/2018 22:58	Allison Taylor	2047236
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/15/2018 03:18	Allison Taylor	2047234
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/15/2018 03:27	Allison Taylor	2047235
	12/07/2018	12/11/2018 14:55	Elliott D. Healy	12/26/2018 17:27	Allison Taylor	2047236
EPA 300.0 Rev. 2.1	12/07/2018			12/13/2018 05:52	Lipi Saha	2047222
	12/07/2018			12/13/2018 06:04	Lipi Saha	2047225
	12/07/2018			12/13/2018 06:16	Lipi Saha	2047228
EPA 350.1 Rev. 2.0	12/07/2018			12/11/2018 14:26	Ping Hua	2047223
	12/07/2018			12/11/2018 14:33	Ping Hua	2047226
	12/07/2018			12/11/2018 14:35	Ping Hua	2047229
EPA 351.2 Rev. 2.0	12/07/2018	12/14/2018 12:30	Adrian Shelby	12/18/2018 10:26	Chelsea Hernandez	2047223
	12/07/2018	12/14/2018 12:30	Adrian Shelby	12/18/2018 10:28	Chelsea Hernandez	2047226
	12/07/2018	12/14/2018 12:30	Adrian Shelby	12/18/2018 10:30	Chelsea Hernandez	2047229
EPA 353.2 Rev. 2.0	12/07/2018			12/11/2018 10:59	Beverly Y. Sanders	2047229
	12/07/2018			12/11/2018 11:06	Beverly Y. Sanders	2047223
	12/07/2018			12/11/2018 11:07	Beverly Y. Sanders	2047226
EPA 365.1 Rev. 2.0	12/07/2018	12/12/2018 11:00	Sima Feizi	12/13/2018 17:48	Beverly Y. Sanders	2047223
	12/07/2018	12/12/2018 11:00	Sima Feizi	12/13/2018 17:49	Beverly Y. Sanders	2047226
	12/07/2018	12/12/2018 11:00	Sima Feizi	12/14/2018 15:08	Beverly Y. Sanders	2047229
EPA 365.1 Rev. 2.0 dissolved	12/07/2018			12/07/2018 15:54	Jhamieka S. Greenwood	2047224
	12/07/2018			12/07/2018 15:55	Jhamieka S. Greenwood	2047227
	12/07/2018			12/07/2018 16:11	Jhamieka S. Greenwood	2047230
SM 2120 B	12/07/2018			12/07/2018 16:10	Chelsea Hernandez	2047228
	12/07/2018			12/07/2018 16:28	Chelsea Hernandez	2047222
	12/07/2018			12/07/2018 16:29	Chelsea Hernandez	2047225
SM 2320 B-97	12/07/2018			12/11/2018 08:53	Lauren Bottorf	2047228
	12/07/2018			12/11/2018 09:42	Lauren Bottorf	2047222
	12/07/2018			12/11/2018 09:52	Lauren Bottorf	2047225
SM 2540 C-97	12/07/2018			12/11/2018 16:05	Yijie Li	2047222, 2047225, 2047228
SM 2540 D-97	12/07/2018			12/11/2018 16:05	Yijie Li	2047222, 2047225, 2047228
SM 4500 F-C-97	12/07/2018			12/11/2018 08:53	Lauren Bottorf	2047228
	12/07/2018			12/11/2018 09:42	Lauren Bottorf	2047222

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
SM 4500 F-C-97	12/07/2018			12/11/2018 09:52	Lauren Bottorf	2047225
SM 5310 B-00	12/07/2018			12/11/2018 22:32	Megan Treadwell	2047223
	12/07/2018			12/11/2018 22:45	Megan Treadwell	2047226
	12/07/2018			12/11/2018 22:59	Megan Treadwell	2047229