Chemical Analysis Report

CEN-DIST-2018-08-07-01

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

Event Description: **Lk Pearl + LVI + D&B**
Request ID: **RQ-2018-08-06-28**
Customer: **CEN-DIST**
Project ID: **SMP**

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Certified by: Dr. rer. nat. Bettina Steinbock, Environmental Administrator Date Certified: 29-AUG-2018 10:04

B. Steinbock

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 PEARL @ CENTER (3009J) **Collection Date/Time: 08/06/2018 09:16**

Field ID: G2CE0192 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2014141	EPA 180.1 Rev. 2.0	Turbidity	4.1		NTU	P349768	
	EPA 300.0 Rev. 2.1	Chloride	22	A	mg Cl/L	P349838	
		Sulfate	7.4	A	mg SO4/L	P349839	
	SM 2120 B	Color (true)	57		PCU	P349741	
	SM 2320 B-97	Total Alkalinity	16		mg CaCO3/L	P350415	
	SM 2540 C-97	TDS	86		mg/L	P350059	
	SM 2540 D-97	TSS	5	I	mg/L	P349957	
	SM 4500 F-C-97	Fluoride	0.077	I	mg F/L	P350108	
2014142	EPA 350.1 Rev. 2.0	Ammonia-N	0.004	I	mg N/L	P349879	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.95		mg N/L	P349763	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P349802	
	EPA 365.1 Rev. 2.0	Total-P	0.029		mg P/L	P349910	
	SM 5310 B-00	Organic Carbon	14		mg C/L	P350131	
2014143	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P349743	
2014175	EPA 200.7 Rev. 4.4	Calcium	10.2		mg/L	P349729	
		Iron	190		ug/L	P349729	
		Magnesium	2.18		mg/L	P349729	
		Potassium	2.1		mg/L	P349729	
		Sodium	11.6		mg/L	P349729	
		Zinc	5.0	U	ug/L	P349729	
	EPA 200.8 Rev. 5.4	Arsenic	3.81		ug/L	P349729	
		Cadmium	0.020	U	ug/L	P349729	
		Chromium	0.40	U	ug/L	P349729	
		Copper	0.96		ug/L	P349729	
		Lead	0.19	I	ug/L	P349729	
		Nickel	0.20	U	ug/L	P349729	
		Silver	0.010	U	ug/L	P349729	

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: (3009J) **Collection Date/Time: 08/06/2018 09:18**

Field ID: G2CE0192_dup Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2014144	EPA 180.1 Rev. 2.0	Turbidity	4.0		NTU	P349768	
	EPA 300.0 Rev. 2.1	Chloride	23		mg Cl/L	P349838	
		Sulfate	7.6		mg SO4/L	P349839	
	SM 2120 B	Color (true)	57		PCU	P349741	
	SM 2320 B-97	Total Alkalinity	16		mg CaCO3/L	P350186	
	SM 2540 C-97	TDS	82		mg/L	P350059	
	SM 2540 D-97	TSS	6	I	mg/L	P349957	
	SM 4500 F-C-97	Fluoride	0.077	I	mg F/L	P350109	
2014145	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	I	mg N/L	P349879	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.95		mg N/L	P349763	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P349802	
	EPA 365.1 Rev. 2.0	Total-P	0.027		mg P/L	P349910	
	SM 5310 B-00	Organic Carbon	14		mg C/L	P350131	
2014146	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P349743	
2014176	EPA 200.7 Rev. 4.4	Calcium	10.3		mg/L	P349729	
		Iron	190		ug/L	P349729	
		Magnesium	2.23		mg/L	P349729	
		Potassium	2.1		mg/L	P349729	
		Sodium	11.8		mg/L	P349729	
		Zinc	5.0	U	ug/L	P349729	
	EPA 200.8 Rev. 5.4	Arsenic	3.86		ug/L	P349729	
		Cadmium	0.025	I	ug/L	P349729	
		Chromium	0.40	U	ug/L	P349729	
		Copper	0.96		ug/L	P349729	
		Lead	0.19	I	ug/L	P349729	
		Nickel	0.20	U	ug/L	P349729	
		Silver	0.010	U	ug/L	P349729	

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: Washroom **Collection Date/Time: 08/06/2018 10:25**

Field ID: BLANK_08062018 Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2014147	EPA 180.1 Rev. 2.0	Turbidity	0.10	U	NTU	P349768	
	EPA 300.0 Rev. 2.1	Chloride	0.20	U	mg Cl/L	P349838	
		Sulfate	0.20	U	mg SO4/L	P349839	
	SM 2120 B	Color (true)	2.5	U	PCU	P349741	
	SM 2320 B-97	Total Alkalinity	0.65	U	mg CaCO3/L	P350186	
	SM 2540 C-97	TDS	15	U	mg/L	P350057	
	SM 2540 D-97	TSS	2	U	mg/L	P349955	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P350109	
2014148	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P349879	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.080	U	mg N/L	P349763	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P349802	
	EPA 365.1 Rev. 2.0	Total-P	0.002	U	mg P/L	P349910	
	SM 5310 B-00	Organic Carbon	0.50	U	mg C/L	P350131	
2014149	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P349743	
2014177	EPA 200.7 Rev. 4.4	Calcium	0.075	U	mg/L	P349792	
		Iron	30	U	ug/L	P349792	
		Magnesium	0.040	U	mg/L	P349792	
		Potassium	0.30	U	mg/L	P349792	
		Sodium	0.50	U	mg/L	P349792	
		Zinc	5.0	U	ug/L	P349792	
	EPA 200.8 Rev. 5.4	Arsenic	0.050	U	ug/L	P349792	
		Cadmium	0.020	U	ug/L	P349792	
		Chromium	0.40	U	ug/L	P349792	
		Copper	0.83		ug/L	P349792	
		Lead	0.050	U	ug/L	P349792	
		Nickel	0.20	U	ug/L	P349792	
		Silver	0.010	U	ug/L	P350464	

Ref. Method and Comment:
SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 200.8 Rev. 5.4: The copper result was confirmed in the undigested sample on 08/09/2018.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P349768

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P349729

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 200.7 Rev. 4.4
Batch ID: P349792

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: P349729

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: P349792

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

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350464

Component	Result	Code	Units
Silver	0.010	U	ug/L

Quality Assurance Report
Method Blank Results

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349838

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349839

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P349879

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P349763

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P349802

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P349910

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P349743

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

Reference Method: SM 2120 B
Batch ID: P349741

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P350186

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

Quality Assurance Report
Method Blank Results

Reference Method: SM 2320 B-97
Batch ID: P350415

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

Reference Method: SM 2540 C-97
Batch ID: P350057

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 C-97
Batch ID: P350059

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P349955

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P349957

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P350108

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 4500 F-C-97
Batch ID: P350109

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P350131

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: P349729

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	105		P	85 - 115
Iron	102		P	85 - 115
Magnesium	105		P	85 - 115
Potassium	100		P	85 - 115
Sodium	100		P	85 - 115
Zinc	104		P	85 - 115

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P349792

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	104		P	85 - 115
Iron	101		P	85 - 115
Magnesium	106		P	85 - 115
Potassium	99.6		P	85 - 115
Sodium	99.9		P	85 - 115
Zinc	98.3		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P349729

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	102		P	85 - 115
Cadmium	103		P	85 - 115
Chromium	92.3		P	85 - 115
Copper	98.9		P	85 - 115
Lead	98.2		P	85 - 115
Nickel	101		P	85 - 115
Silver	96.7		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P349792

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	102		P	85 - 115
Cadmium	101		P	85 - 115
Chromium	97.9		P	85 - 115
Copper	99.6		P	85 - 115
Lead	96.9		P	85 - 115
Nickel	102		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350464

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Silver	90.9		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349838

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

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349839

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P349879

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P349763

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P349802

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P349910

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P349743

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	94.6		P	90 - 110

Reference Method: SM 2120 B
Batch ID: P349741

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	98.4		P	90 - 110

Reference Method: SM 2320 B-97
Batch ID: P350186

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

Reference Method: SM 2320 B-97
Batch ID: P350415

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	102		P	98 - 107

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: SM 4500 F-C-97
Batch ID: P350108

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	97.4		P	91 - 105

Reference Method: SM 4500 F-C-97
Batch ID: P350109

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	97.9		P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P350131

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	97.6		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P349729

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2013686	Calcium	103		P	80 - 120
2013686	Iron	105	104	P/P	80 - 120
2013686	Magnesium	107	106	P/P	80 - 120
2013686	Potassium	103	102	P/P	80 - 120
2013686	Sodium	101		P	80 - 120
2013686	Zinc	104	103	P/P	80 - 120

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P349792

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014202	Calcium	106	104	P/P	80 - 120
2014202	Iron	104	102	P/P	80 - 120
2014202	Magnesium	109	106	P/P	80 - 120
2014202	Potassium	106	104	P/P	80 - 120
2014202	Sodium	100	98.9	P/P	80 - 120
2014202	Zinc	101	99.1	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P349729

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2013686	Arsenic	104	102	P/P	80 - 120
2013686	Cadmium	104	104	P/P	80 - 120
2013686	Chromium	96.3	96.2	P/P	80 - 120
2013686	Copper	96.1	95.5	P/P	80 - 120
2013686	Lead	103	105	P/P	80 - 120
2013686	Nickel	98.4	98.1	P/P	80 - 120
2013686	Silver	94.7	94.3	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P349792

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014202	Arsenic	102	101	P/P	80 - 120
2014202	Cadmium	100	99.4	P/P	80 - 120
2014202	Chromium	101	97.6	P/P	80 - 120
2014202	Copper	101	99.3	P/P	80 - 120
2014202	Lead	96.3	95.8	P/P	80 - 120
2014202	Nickel	103	100	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350464

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014241	Silver	88.9	89.3	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349838

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014141	Chloride	93.9		P	90 - 110

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349838

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014209	Chloride	105		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349839

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014141	Sulfate	94.1		P	90 - 110
2014209	Sulfate	102		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P349879

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014142	Ammonia-N	101	103	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P349763

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014145	Kjeldahl Nitrogen	99.5	96.1	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P349802

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014142	NO2NO3-N	99.5	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P349910

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014142	Total-P	95.7	96.2	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P349743

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014154	O-Phosphate-P	93.8	93.9	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P350108

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2015347	Fluoride	96.2	97.3	P/P	91 - 105

Reference Method: SM 4500 F-C-97
Batch ID: P350109

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2014647	Fluoride	98.6	99.3	P/P	91 - 105

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: SM 5310 B-00
Batch ID: P350131

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2012022	Organic Carbon	104		P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P349768

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014224	Turbidity	1.10	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P349729

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2013686	Calcium	0.339	Spike	P	0 - 20
2013686	Iron	0.762	Spike	P	0 - 20
2013686	Magnesium	0.605	Spike	P	0 - 20
2013686	Potassium	0.533	Spike	P	0 - 20
2013686	Sodium	0.413	Spike	P	0 - 20
2013686	Zinc	0.600	Spike	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P349792

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014202	Calcium	1.65	Spike	P	0 - 20
2014202	Iron	2.06	Spike	P	0 - 20
2014202	Magnesium	1.97	Spike	P	0 - 20
2014202	Potassium	1.36	Spike	P	0 - 20
2014202	Sodium	1.08	Spike	P	0 - 20
2014202	Zinc	1.71	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P349729

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2013686	Arsenic	1.51	Spike	P	0 - 20
2013686	Cadmium	0.468	Spike	P	0 - 20
2013686	Chromium	0.0849	Spike	P	0 - 20
2013686	Copper	0.477	Spike	P	0 - 20
2013686	Lead	2.09	Spike	P	0 - 20
2013686	Nickel	0.296	Spike	P	0 - 20
2013686	Silver	0.402	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P349792

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014202	Arsenic	1.35	Spike	P	0 - 20
2014202	Cadmium	0.624	Spike	P	0 - 20
2014202	Chromium	3.01	Spike	P	0 - 20
2014202	Copper	2.19	Spike	P	0 - 20
2014202	Lead	0.555	Spike	P	0 - 20
2014202	Nickel	2.64	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P350464

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014241	Silver	0.459	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349838

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014141	Chloride	3.51	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P349839

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014141	Sulfate	3.23	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P349879

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014142	Ammonia-N	1.56	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P349763

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014145	Kjeldahl Nitrogen	1.95	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P349802

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014142	NO2NO3-N	4.42	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P349910

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014142	Total-P	0.415	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P349743

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014154	O-Phosphate-P	0.107	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: SM 2120 B
Batch ID: P349741

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014519	Color (true)	1.90	Sample	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P350186

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014647	Total Alkalinity	0.655	Sample	P	0 - 1.6

Reference Method: SM 2320 B-97
Batch ID: P350415

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2017137	Total Alkalinity	1.45	Sample	P	0 - 1.6

Reference Method: SM 2540 C-97
Batch ID: P350057

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2012875	TDS	3.42	Sample	P	0 - 10

Reference Method: SM 2540 C-97
Batch ID: P350059

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2013622	TDS	6.50	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
Batch ID: P350108

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2015347	Fluoride	1.00	Spike	P	0 - 3.5

Reference Method: SM 4500 F-C-97
Batch ID: P350109

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2014647	Fluoride	0.473	Spike	P	0 - 3.5

Reference Method: SM 5310 B-00
Batch ID: P350131

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2012022	Organic Carbon	0.286	Spike	P	0 - 20

Quality Assurance Report
Precision

* 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: A85712
Included Lab Sample IDs: 2014141, 2014144, 2014147

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	101	101	P/P	90 - 110
Chloride	97.6	101	P/P	90 - 110
Sulfate	101	100	P/P	90 - 110
Sulfate	96.4	101	P/P	90 - 110

Reference Method: SM 2120 B
Run ID: A85731
Included Lab Sample IDs: 2014141, 2014144, 2014147

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	99.4	99.5	P/P	85 - 115

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A85732
Included Lab Sample IDs: 2014143, 2014146, 2014149

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	96.9	97.1	P/P	90 - 110
O-Phosphate-P	98.5	96.9	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A85741
Included Lab Sample IDs: 2014141, 2014144, 2014147

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	100	102	P/P	95 - 105

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A85754
Included Lab Sample IDs: 2014142, 2014145, 2014148

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	99.5	100	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A85761
Included Lab Sample IDs: 2014175, 2014176

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

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A85773
Included Lab Sample IDs: 2014142, 2014145, 2014148

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits

Quality Assurance Report
Calibration Verification

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A85773
Included Lab Sample IDs: 2014142, 2014145, 2014148

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	95.6	98.3	P/P	90 - 110
Kjeldahl Nitrogen	98.3	95.6	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A85780
Included Lab Sample IDs: 2014177

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	100	102	P/P	95 - 105
Iron	99.8	100	P/P	95 - 105
Magnesium	101	101	P/P	95 - 105
Potassium	99.5	99.0	P/P	95 - 105
Sodium	97.9	97.9	P/P	95 - 105
Zinc	100	98.0	P/P	95 - 105

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A85788
Included Lab Sample IDs: 2014142, 2014145, 2014148

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A85796
Included Lab Sample IDs: 2014175, 2014176, 2014177

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	103	102	P/P	90 - 110
Arsenic	100	101	P/P	90 - 110
Cadmium	101	102	P/P	90 - 110
Cadmium	99.6	99.0	P/P	90 - 110
Copper	102	100	P/P	90 - 110
Copper	99.0	100	P/P	90 - 110
Lead	102	101	P/P	90 - 110
Lead	99.9	99.8	P/P	90 - 110
Nickel	102	101	P/P	90 - 110
Nickel	99.4	99.9	P/P	90 - 110
Silver	92.9	93.1	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A85833
Included Lab Sample IDs: 2014142, 2014145, 2014148

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

Reference Method: SM 4500 F-C-97
Run ID: A85868
Included Lab Sample IDs: 2014141, 2014144, 2014147

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits

Quality Assurance Report
Calibration Verification

Reference Method: SM 4500 F-C-97
Run ID: A85868
Included Lab Sample IDs: 2014141, 2014144, 2014147

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

Reference Method: SM 5310 B-00
Run ID: A85886
Included Lab Sample IDs: 2014142, 2014145, 2014148

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	99.7	99.2	P/P	90 - 110

Reference Method: SM 2320 B-97
Run ID: A85905
Included Lab Sample IDs: 2014144, 2014147

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A85912
Included Lab Sample IDs: 2014175, 2014176, 2014177

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chromium	93.0	92.9	P/P	90 - 110
Chromium	94.4	93.0	P/P	90 - 110

Reference Method: SM 2320 B-97
Run ID: A85991
Included Lab Sample IDs: 2014141

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	104	101	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A86106
Included Lab Sample IDs: 2014177

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Silver	97.7	98.9	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		
					LCS	SMP	MS
EPA 180.1 Rev. 2.0	Turbidity					1.10	
EPA 200.7 Rev. 4.4	Calcium	105	103				0.339
	Calcium	104	106	104			1.65
	Iron	102	105	104			0.762
	Iron	101	104	102			2.06
	Magnesium	105	107	106			0.605
	Magnesium	106	109	106			1.97
	Potassium	100	103	102			0.533
	Potassium	99.6	106	104			1.36
	Sodium	100	101				0.413
	Sodium	99.9	100	98.9			1.08
	Zinc	104	104	103			0.600
	Zinc	98.3	101	99.1			1.71
EPA 200.8 Rev. 5.4	Arsenic	102	104	102			1.51
	Arsenic	102	102	101			1.35
	Cadmium	103	104	104			0.468
	Cadmium	101	100	99.4			0.624
	Chromium	92.3	96.3	96.2			0.0849
	Chromium	97.9	101	97.6			3.01
	Copper	98.9	96.1	95.5			0.477
	Copper	99.6	101	99.3			2.19
	Lead	98.2	103	105			2.09
	Lead	96.9	96.3	95.8			0.555
	Nickel	101	98.4	98.1			0.296
	Nickel	102	103	100			2.64
	Silver	96.7	94.7	94.3			0.402
	Silver	90.9	88.9	89.3			0.459
EPA 300.0 Rev. 2.1	Chloride	97.2	93.9	105		3.51	
	Sulfate	96.3	94.1	102		3.23	
EPA 350.1 Rev. 2.0	Ammonia-N	102	101	103			1.56
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	101	99.5	96.1			1.95
EPA 353.2 Rev. 2.0	NO2NO3-N	102	99.5	104			4.42
EPA 365.1 Rev. 2.0	Total-P	95.6	95.7	96.2			0.415
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	94.6	93.8	93.9			0.107
SM 2120 B	Color (true)	98.4				1.90	
SM 2320 B-97	Total Alkalinity	103				0.655	
	Total Alkalinity	102				1.45	
SM 2540 C-97	TDS					3.42	
	TDS					6.50	
SM 4500 F-C-97	Fluoride	97.4	96.2	97.3			1.00
	Fluoride	97.9	98.6	99.3			0.473
SM 5310 B-00	Organic Carbon	97.6	104				0.286

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	2014141, 2014144, 2014147
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2014175, 2014176, 2014177
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2014175, 2014176, 2014177
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	2014141, 2014144, 2014147

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	2014141, 2014144, 2014147
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2014142, 2014145, 2014148
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2014142, 2014145, 2014148
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2014142, 2014145, 2014148
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2014142, 2014145, 2014148
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2014143, 2014146, 2014149
SM 2120 B / E31780	True Color measured at 450 nm	2014141, 2014144, 2014147
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO3/L	2014141, 2014144, 2014147
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	2014141, 2014144, 2014147
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2014141, 2014144, 2014147
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2014141, 2014144, 2014147
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	2014142, 2014145, 2014148

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	08/07/2018			08/07/2018 16:41	William L. Brown IV	2014141, 2014144, 2014147
EPA 200.7 Rev. 4.4	08/07/2018	08/07/2018 13:45	Elliott D. Healy	08/08/2018 17:20	Betina Topolski	2014175
	08/07/2018	08/07/2018 13:45	Elliott D. Healy	08/08/2018 17:27	Betina Topolski	2014176
	08/07/2018	08/08/2018 15:00	Elliott D. Healy	08/09/2018 13:01	Betina Topolski	2014177
EPA 200.8 Rev. 5.4	08/07/2018	08/07/2018 13:45	Elliott D. Healy	08/09/2018 22:09	Allison Taylor	2014175
	08/07/2018	08/07/2018 13:45	Elliott D. Healy	08/09/2018 22:19	Allison Taylor	2014176
	08/07/2018	08/07/2018 13:45	Elliott D. Healy	08/15/2018 18:00	Allison Taylor	2014175
	08/07/2018	08/07/2018 13:45	Elliott D. Healy	08/15/2018 18:10	Allison Taylor	2014176
	08/07/2018	08/08/2018 15:00	Elliott D. Healy	08/09/2018 15:44	Allison Taylor	2014177
	08/07/2018	08/08/2018 15:00	Elliott D. Healy	08/15/2018 18:58	Allison Taylor	2014177
	08/07/2018	08/20/2018 16:10	Elliott D. Healy	08/24/2018 00:28	Allison Taylor	2014177
EPA 300.0 Rev. 2.1	08/07/2018			08/08/2018 14:47	Lipi Saha	2014141
	08/07/2018			08/08/2018 16:11	Lipi Saha	2014144
	08/07/2018			08/08/2018 16:47	Lipi Saha	2014147
EPA 350.1 Rev. 2.0	08/07/2018			08/09/2018 12:40	Adrian Shelby	2014142
	08/07/2018			08/09/2018 12:44	Adrian Shelby	2014145
	08/07/2018			08/09/2018 12:46	Adrian Shelby	2014148
EPA 351.2 Rev. 2.0	08/07/2018	08/08/2018 10:30	Adrian Shelby	08/09/2018 09:52	Joseph Suarez	2014142
	08/07/2018	08/08/2018 10:30	Adrian Shelby	08/09/2018 09:53	Joseph Suarez	2014145
	08/07/2018	08/08/2018 10:30	Adrian Shelby	08/09/2018 10:01	Joseph Suarez	2014148
EPA 353.2 Rev. 2.0	08/07/2018			08/08/2018 12:17	Lauren Bottorf	2014142
	08/07/2018			08/08/2018 12:23	Lauren Bottorf	2014145
	08/07/2018			08/08/2018 12:24	Lauren Bottorf	2014148
EPA 365.1 Rev. 2.0	08/07/2018	08/10/2018 10:50	Sima Feizi	08/13/2018 11:33	Beverly Y. Sanders	2014142
	08/07/2018	08/10/2018 10:50	Sima Feizi	08/13/2018 11:34	Beverly Y. Sanders	2014145
	08/07/2018	08/10/2018 10:50	Sima Feizi	08/13/2018 11:35	Beverly Y. Sanders	2014148
EPA 365.1 Rev. 2.0 dissolved	08/07/2018			08/07/2018 15:06	Megan Treadwell	2014143
	08/07/2018			08/07/2018 15:12	Megan Treadwell	2014146, 2014149
SM 2120 B	08/07/2018			08/07/2018 15:14	Tanya Welborn	2014141, 2014144
	08/07/2018			08/07/2018 15:15	Tanya Welborn	2014147
SM 2320 B-97	08/07/2018			08/16/2018 03:11	Dale L. Simmons	2014144
	08/07/2018			08/16/2018 03:18	Dale L. Simmons	2014147
	08/07/2018			08/17/2018 03:28	Dale L. Simmons	2014141
SM 2540 C-97	08/07/2018			08/08/2018 15:01	Yijie Li	2014141, 2014144, 2014147
SM 2540 D-97	08/07/2018			08/08/2018 15:01	Yijie Li	2014141, 2014144, 2014147
SM 4500 F-C-97	08/07/2018			08/14/2018 03:14	Dale L. Simmons	2014141
	08/07/2018			08/14/2018 04:18	Dale L. Simmons	2014144
	08/07/2018			08/14/2018 04:31	Dale L. Simmons	2014147
SM 5310 B-00	08/07/2018			08/14/2018 14:56	Megan Treadwell	2014142
	08/07/2018			08/14/2018 15:24	Megan Treadwell	2014145

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
SM 5310 B-00	08/07/2018			08/14/2018 15:37	Megan Treadwell	2014148