Chemical Analysis Report

SO-DIST-2017-04-12-01

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

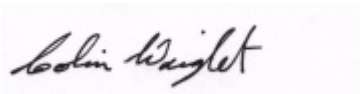
Event Description: **SMP: Florida Keys**
Request ID: **RQ-2017-04-03-26**
Customer: **SO-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
FLDEP South District Office
2295 Victoria Ave. Suite 364
Fort Myers, FL 33901
Attn: Ben Paswater

For additional information please contact
Colin Wright, Ph.D.
Liang-Tsair Lin, Ph.D.
Thekkekalathil Chandrasekhar, PhD, QA Officer
Phone (850) 245-8085

Certified by: Colin Wright, Program Administrator

Date Certified: 08-MAY-2017 10:13



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: INDIAN KEY FILL AT SW END **Collection Date/Time: 04/11/2017 14:00**

Field ID: G5SD041117-1 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1887959	EPA 180.1 Rev. 2.0	Turbidity	6.1		NTU	P323268	
	SM 2320 B-97	Total Alkalinity	123		mg CaCO3/L	P323535	
	SM 2540 D-97	TSS	30		mg/L	P323903	
	SM 4500 F-C-97	Fluoride	0.88		mg F/L	P323537	
1887963	EPA 350.1 Rev. 2.0	Ammonia-N	0.009		mg N/L	P323274	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.32	I	mg N/L	P323380	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.027		mg N/L	P323570	
	EPA 365.1 Rev. 2.0	Total-P	0.020		mg P/L	P323427	
	SM 5310 B-00	Organic Carbon	1.8	I	mg C/L	P323370	
1887967	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.005	I	mg P/L	P323297	
1887979	EPA 200.7 Rev. 4.4	Iron	120	U	ug/L	P323748	
	EPA 200.8 Rev. 5.4	Arsenic	2.48		ug/L	P323748	
		Cadmium	0.080	U	ug/L	P323748	
		Chromium	1.6	U	ug/L	P323748	
		Copper	0.80	U	ug/L	P323748	
		Lead	0.28	I	ug/L	P323748	
		Nickel	0.80	U	ug/L	P323748	
		Silver	0.040	U	ug/L	P323748	
		Zinc	4.7	I	ug/L	P323748	

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: GRASSY KEY @ CURRY HAMMOCK SP CREEK Collection Date/Time: 04/11/2017 15:05

Field ID: G5SD041117-4 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1887960	EPA 180.1 Rev. 2.0	Turbidity	2.0		NTU	P323268	
	SM 2320 B-97	Total Alkalinity	140		mg CaCO3/L	P323535	
	SM 2540 D-97	TSS	4	I	mg/L	P323903	
	SM 4500 F-C-97	Fluoride	1.3		mg F/L	P323537	
1887964	EPA 350.1 Rev. 2.0	Ammonia-N	0.016		mg N/L	P323274	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.38	I	mg N/L	P323380	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P323570	
	EPA 365.1 Rev. 2.0	Total-P	0.014		mg P/L	P323427	
	SM 5310 B-00	Organic Carbon	3.9		mg C/L	P323370	
1887968	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P323297	
1887980	EPA 200.7 Rev. 4.4	Iron	120	U	ug/L	P323748	
	EPA 200.8 Rev. 5.4	Arsenic	2.53		ug/L	P323748	
		Cadmium	0.080	U	ug/L	P323748	
		Chromium	1.6	U	ug/L	P323748	
		Copper	0.80	U	ug/L	P323748	
		Lead	0.25	U	ug/L	P323748	
		Nickel	0.80	U	ug/L	P323748	
		Silver	0.040	U	ug/L	P323748	

Field ID: G5SD041117-4 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1887980	EPA 200.8 Rev. 5.4	Zinc	4.0	U	ug/L	P323748	

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: FIELD BLANK **Collection Date/Time: 04/11/2017 17:20**

Field ID: G5SD041117-8 Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1887961	EPA 180.1 Rev. 2.0	Turbidity	0.10	U	NTU	P323268	
	SM 2320 B-97	Total Alkalinity	0.65	U	mg CaCO3/L	P323889	
	SM 2540 D-97	TSS	2	U	mg/L	P323892	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P324305	
1887965	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P323275	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.080	U	mg N/L	P323382	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P323400	
	EPA 365.1 Rev. 2.0	Total-P	0.002	U	mg P/L	P323425	
	SM 5310 B-00	Organic Carbon	0.50	U	mg C/L	P323470	
1887969	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P323297	
1887981	EPA 200.7 Rev. 4.4	Iron	30	U	ug/L	P323578	
	EPA 200.8 Rev. 5.4	Arsenic	0.050	U	ug/L	P323578	
		Cadmium	0.020	U	ug/L	P323578	
		Chromium	0.40	U	ug/L	P323578	
		Copper	0.20	U	ug/L	P323578	
		Lead	0.050	U	ug/L	P323578	
		Nickel	0.20	U	ug/L	P323578	
		Silver	0.010	U	ug/L	P323578	
		Zinc	1.0	U	ug/L	P323578	

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.

Sample Location: 6012C BY BRIDGE NO NAME KEY **Collection Date/Time: 04/11/2017 16:10**

Field ID: G5SD041117-6 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1887962	EPA 180.1 Rev. 2.0	Turbidity	1.4		NTU	P323268	
	SM 2320 B-97	Total Alkalinity	125		mg CaCO3/L	P323535	
	SM 2540 D-97	TSS	3	U	mg/L	P323903	
	SM 4500 F-C-97	Fluoride	1.3		mg F/L	P323537	
1887966	EPA 350.1 Rev. 2.0	Ammonia-N	0.003	I	mg N/L	P323274	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.34	I	mg N/L	P323380	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P323570	
	EPA 365.1 Rev. 2.0	Total-P	0.008	I	mg P/L	P323427	
	SM 5310 B-00	Organic Carbon	2.4		mg C/L	P323370	
1887970	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P323297	
1887982	EPA 200.7 Rev. 4.4	Iron	120	U	ug/L	P323748	

Field ID: G5SD041117-6 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1887982	EPA 200.8 Rev. 5.4	Arsenic	1.78		ug/L	P323748	
		Cadmium	0.080	U	ug/L	P323748	
		Chromium	1.6	U	ug/L	P323748	
		Copper	0.80	U	ug/L	P323748	
		Lead	0.25	U	ug/L	P323748	
		Nickel	0.80	U	ug/L	P323748	
		Silver	0.040	U	ug/L	P323748	
		Zinc	4.0	U	ug/L	P323748	

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

Quality Assurance Report
Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P323268

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323578

Component	Result	Code	Units
Iron	30	U	ug/L

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323748

Component	Result	Code	Units
Iron	30	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323578

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
Zinc	1.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323748

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

Quality Assurance Report
Method Blank Results

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323748

Component	Result	Code	Units
Nickel	0.20	U	ug/L
Silver	0.010	U	ug/L
Zinc	1.0	U	ug/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323274

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323275

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323380

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323382

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323400

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323570

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323425

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323427

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

Quality Assurance Report
Method Blank Results

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P323297

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

Reference Method: SM 2320 B-97
Batch ID: P323535

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

Reference Method: SM 2320 B-97
Batch ID: P323889

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

Reference Method: SM 2540 D-97
Batch ID: P323892

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P323903

Component	Result	Code	Units
TSS	3	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P323537

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 4500 F-C-97
Batch ID: P324305

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P323370

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

Reference Method: SM 5310 B-00
Batch ID: P323470

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: P323578

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Iron	103		P	85 - 115

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323748

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Iron	100		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323578

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	92.8		P	85 - 115
Cadmium	94.4		P	85 - 115
Chromium	99.8		P	85 - 115
Copper	91.0		P	85 - 115
Lead	96.1		P	85 - 115
Nickel	91.9		P	85 - 115
Silver	96.0		P	85 - 115
Zinc	95.7		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323748

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	98.0		P	85 - 115
Cadmium	96.0		P	85 - 115
Chromium	96.7		P	85 - 115
Copper	96.8		P	85 - 115
Lead	94.9		P	85 - 115
Nickel	97.5		P	85 - 115
Silver	96.1		P	85 - 115
Zinc	97.2		P	85 - 115

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323274

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323275

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323380

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	96.8		P	90 - 110

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323382

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	96.2		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323400

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	96.0		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323570

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	98.0		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323425

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	98.8		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323427

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P323297

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

Reference Method: SM 2320 B-97
Batch ID: P323535

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	103		P	95 - 108

Reference Method: SM 2320 B-97
Batch ID: P323889

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	105		P	95 - 108

Reference Method: SM 4500 F-C-97
Batch ID: P323537

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	95.0		P	92 - 103

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: SM 4500 F-C-97
Batch ID: P324305

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	95.9		P	92 - 103

Reference Method: SM 5310 B-00
Batch ID: P323370

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	107		P	85 - 115

Reference Method: SM 5310 B-00
Batch ID: P323470

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	105		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323578

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887977	Iron	106		P	80 - 120
1888375	Iron	104	106	P/P	80 - 120

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323748

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887121	Iron	102		P	70 - 130
1887254	Iron	94.1	93.5	P/P	70 - 130

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323578

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887977	Arsenic	95.1		P	80 - 120
1887977	Cadmium	97.4		P	80 - 120
1887977	Chromium	104		P	80 - 120
1887977	Copper	95.9		P	80 - 120
1887977	Lead	98.4		P	80 - 120
1887977	Nickel	93.8		P	80 - 120
1887977	Silver	98.3		P	80 - 120
1887977	Zinc	98.1		P	80 - 120
1888375	Arsenic	95.2	94.4	P/P	80 - 120
1888375	Cadmium	98.1	96.9	P/P	80 - 120
1888375	Chromium	101	101	P/P	80 - 120
1888375	Copper	89.5	90.2	P/P	80 - 120
1888375	Lead	96.8	96.8	P/P	80 - 120
1888375	Nickel	92.0	92.4	P/P	80 - 120
1888375	Silver	97.7	97.8	P/P	80 - 120
1888375	Zinc	95.9	96.4	P/P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323748

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887121	Arsenic	110		P	70 - 130
1887121	Cadmium	99.9		P	70 - 130
1887121	Chromium	94.6		P	70 - 130
1887121	Copper	98.3		P	70 - 130
1887121	Lead	103		P	70 - 130
1887121	Nickel	102		P	70 - 130
1887121	Silver	96.1		P	70 - 130
1887121	Zinc	100		P	70 - 130
1887254	Arsenic	108	107	P/P	70 - 130
1887254	Cadmium	101	101	P/P	70 - 130
1887254	Chromium	91.4	91.1	P/P	70 - 130
1887254	Copper	93.7	93.9	P/P	70 - 130
1887254	Lead	103	103	P/P	70 - 130
1887254	Nickel	99.8	99.2	P/P	70 - 130
1887254	Silver	93.9	94.3	P/P	70 - 130
1887254	Zinc	94.8	92.6	P/P	70 - 130

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323274

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887709	Ammonia-N	105	103	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323275

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887691	Ammonia-N	102	97.9	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323380

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887963	Kjeldahl Nitrogen	93.0	93.6	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323400

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887941	NO2NO3-N	95.0	94.0	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323570

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887851	NO2NO3-N	97.7	97.7	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323425

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1888101	Total-P	103	100	P/P	90 - 110

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323427

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887966	Total-P	93.2	96.3	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P323297

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887967	O-Phosphate-P	97.6	96.7	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P323537

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887371	Fluoride	93.7	95.3	P/P	91 - 105

Reference Method: SM 4500 F-C-97
Batch ID: P324305

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887806	Fluoride	95.8	93.6	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P323370

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1887173	Organic Carbon	105	105	P/P	85 - 115

Reference Method: SM 5310 B-00
Batch ID: P323470

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1888031	Organic Carbon	104	104	P/P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P323268

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887933	Turbidity	0.425	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323578

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1888375	Iron	1.91	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P323748

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887254	Iron	0.612	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323578

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1888375	Arsenic	0.771	Spike	P	0 - 20
1888375	Cadmium	1.24	Spike	P	0 - 20
1888375	Chromium	0.513	Spike	P	0 - 20
1888375	Copper	0.821	Spike	P	0 - 20
1888375	Lead	0.0618	Spike	P	0 - 20
1888375	Nickel	0.464	Spike	P	0 - 20
1888375	Silver	0.0724	Spike	P	0 - 20
1888375	Zinc	0.606	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P323748

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887254	Arsenic	0.373	Spike	P	0 - 20
1887254	Cadmium	0.600	Spike	P	0 - 20
1887254	Chromium	0.363	Spike	P	0 - 20
1887254	Copper	0.185	Spike	P	0 - 20
1887254	Lead	0.141	Spike	P	0 - 20
1887254	Nickel	0.590	Spike	P	0 - 20
1887254	Silver	0.400	Spike	P	0 - 20
1887254	Zinc	1.73	Spike	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323274

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887709	Ammonia-N	1.23	Spike	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P323275

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887691	Ammonia-N	3.02	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323380

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887963	Kjeldahl Nitrogen	0.564	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P323382

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1888467	Kjeldahl Nitrogen	0.0871	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323400

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887941	NO2NO3-N	1.06	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P323570

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887851	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323425

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1888101	Total-P	2.05	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P323427

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887966	Total-P	3.32	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P323297

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887967	O-Phosphate-P	0.885	Spike	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P323535

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887371	Total Alkalinity	0.989	Sample	P	0 - 4.8

Reference Method: SM 2320 B-97
Batch ID: P323889

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1888726	Total Alkalinity	0.299	Sample	P	0 - 4.8

Quality Assurance Report
Precision

Reference Method: SM 4500 F-C-97
Batch ID: P323537

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887371	Fluoride	0.972	Spike	P	0 - 3.0

Reference Method: SM 4500 F-C-97
Batch ID: P324305

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887806	Fluoride	2.00	Spike	P	0 - 3.0

Reference Method: SM 5310 B-00
Batch ID: P323370

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1887173	Organic Carbon	0.174	Spike	P	0 - 20

Reference Method: SM 5310 B-00
Batch ID: P323470

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1888031	Organic Carbon	0.462	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: A75748
Included Lab Sample IDs: 1887959, 1887960, 1887961, 1887962

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

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A75750
Included Lab Sample IDs: 1887963, 1887964, 1887965, 1887966

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A75755
Included Lab Sample IDs: 1887967, 1887968, 1887969, 1887970

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	96.9	97.6	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A75755
Included Lab Sample IDs: 1887967, 1887968, 1887969, 1887970

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	97.6	97.5	P/P	90 - 110

Reference Method: SM 5310 B-00
Run ID: A75775
Included Lab Sample IDs: 1887963, 1887964, 1887966

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

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A75786
Included Lab Sample IDs: 1887965

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	94.0	92.5	P/P	90 - 110

Reference Method: SM 5310 B-00
Run ID: A75802
Included Lab Sample IDs: 1887965

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

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A75819
Included Lab Sample IDs: 1887963, 1887964, 1887965, 1887966

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	91.9	92.7	P/P	90 - 110
Kjeldahl Nitrogen	92.4	92.7	P/P	90 - 110
Kjeldahl Nitrogen	92.7	91.9	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A75826
Included Lab Sample IDs: 1887963, 1887964, 1887965, 1887966

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	99.0	99.0	P/P	90 - 110
Total-P	99.0	99.5	P/P	90 - 110

Reference Method: SM 2320 B-97
Run ID: A75833
Included Lab Sample IDs: 1887959, 1887960, 1887962

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

Quality Assurance Report
Calibration Verification

Reference Method: SM 4500 F-C-97
Run ID: A75833
Included Lab Sample IDs: 1887959, 1887960, 1887962

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	97.7	97.4	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A75838
Included Lab Sample IDs: 1887963, 1887964, 1887966

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	94.0	95.0	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A75916
Included Lab Sample IDs: 1887981

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	93.9	93.5	P/P	90 - 110
Chromium	100	99.2	P/P	90 - 110
Copper	93.0	92.6	P/P	90 - 110
Lead	95.7	95.1	P/P	90 - 110
Nickel	93.7	93.1	P/P	90 - 110
Silver	94.6	94.2	P/P	90 - 110
Zinc	97.2	96.3	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A75945
Included Lab Sample IDs: 1887981

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Cadmium	96.8	98.4	P/P	90 - 110

Reference Method: SM 2320 B-97
Run ID: A75952
Included Lab Sample IDs: 1887961

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	105	102	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A75972
Included Lab Sample IDs: 1887979, 1887980, 1887982

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	96.7	94.9	P/P	90 - 110
Cadmium	96.5	97.0	P/P	90 - 110
Chromium	98.1	97.6	P/P	90 - 110
Copper	96.4	92.0	P/P	90 - 110
Lead	97.2	95.8	P/P	90 - 110
Nickel	95.2	91.3	P/P	90 - 110
Silver	96.1	95.2	P/P	90 - 110
Zinc	97.9	93.9	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A75988
Included Lab Sample IDs: 1887980

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

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A75991
Included Lab Sample IDs: 1887979, 1887980, 1887982

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Iron	95.8	96.7	P/P	90 - 110
Iron	96.7	95.8	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A76011
Included Lab Sample IDs: 1887982

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Lead	95.2	93.8	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A76018
Included Lab Sample IDs: 1887981

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Iron	103	100	P/P	95 - 105

Reference Method: SM 4500 F-C-97
Run ID: A76090
Included Lab Sample IDs: 1887961

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	97.2	95.0	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						0.425	
EPA 200.7 Rev. 4.4	Iron	103	106	104	106			1.91
	Iron	100	94.1	93.5	102			0.612
EPA 200.8 Rev. 5.4	Arsenic	92.8	95.1	95.2	94.4			0.771
	Arsenic	98.0	110	108	107			0.373
	Cadmium	94.4	97.4	98.1	96.9			1.24
	Cadmium	96.0	99.9	101	101			0.600
	Chromium	99.8	104	101	101			0.513
	Chromium	96.7	94.6	91.4	91.1			0.363
	Copper	91.0	95.9	89.5	90.2			0.821

Quality Assurance Report
Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery			Precision		
						LCS	SMP	MS
EPA 200.8 Rev. 5.4	Copper	96.8	98.3	93.7	93.9			0.185
	Lead	96.1	98.4	96.8	96.8			0.0618
	Lead	94.9	103	103	103			0.141
	Nickel	91.9	93.8	92.0	92.4			0.464
	Nickel	97.5	102	99.8	99.2			0.590
	Silver	96.0	98.3	97.7	97.8			0.0724
	Silver	96.1	96.1	93.9	94.3			0.400
	Zinc	95.7	98.1	95.9	96.4			0.606
	Zinc	97.2	100	94.8	92.6			1.73
EPA 350.1 Rev. 2.0	Ammonia-N	100	105	103				1.23
	Ammonia-N	101	102	97.9				3.02
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	96.8	93.0	93.6				0.564
	Kjeldahl Nitrogen	96.2						0.0871
EPA 353.2 Rev. 2.0	NO2NO3-N	96.0	95.0	94.0				1.06
	NO2NO3-N	98.0	97.7	97.7				0.0
EPA 365.1 Rev. 2.0	Total-P	98.8	103	100				2.05
	Total-P	100	93.2	96.3				3.32
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	96.3	97.6	96.7				0.885
SM 2320 B-97	Total Alkalinity	103					0.989	
	Total Alkalinity	105					0.299	
SM 4500 F-C-97	Fluoride	95.0	93.7	95.3				0.972
	Fluoride	95.9	95.8	93.6				2.00
SM 5310 B-00	Organic Carbon	107	105	105				0.174
	Organic Carbon	105	104	104				0.462

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	1887959, 1887960, 1887961, 1887962
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	1887979, 1887980, 1887981, 1887982
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	1887979, 1887980, 1887981, 1887982
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	1887963, 1887964, 1887965, 1887966
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	1887963, 1887964, 1887965, 1887966
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	1887963, 1887964, 1887965, 1887966
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	1887963, 1887964, 1887965, 1887966
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	1887967, 1887968, 1887969, 1887970
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO3/L	1887959, 1887960, 1887961, 1887962
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices	1887959, 1887960, 1887961, 1887962
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	1887959, 1887960, 1887961, 1887962
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	1887963, 1887964, 1887965, 1887966

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	04/12/2017			04/12/2017 15:06	Sima Feizi	1887959, 1887960, 1887961, 1887962
EPA 200.7 Rev. 4.4	04/12/2017	04/18/2017	Elliott D. Healy	04/26/2017	Martin Acosta	1887981
	04/12/2017	04/20/2017	Elliott D. Healy	04/25/2017	Martin Acosta	1887979, 1887980, 1887982
EPA 200.8 Rev. 5.4	04/12/2017	04/18/2017	Elliott D. Healy	04/21/2017	Betina Topolski	1887981
	04/12/2017	04/20/2017	Elliott D. Healy	04/24/2017	Betina Topolski	1887979, 1887980, 1887982
	04/12/2017	04/20/2017	Elliott D. Healy	04/25/2017	Betina Topolski	1887980
	04/12/2017	04/20/2017	Elliott D. Healy	04/26/2017	Betina Topolski	1887982
EPA 350.1 Rev. 2.0	04/12/2017			04/12/2017	Julie Michelle Frank	1887963, 1887964, 1887965, 1887966
EPA 351.2 Rev. 2.0	04/12/2017	04/14/2017	Adrian Shelby	04/17/2017	Joseph Suarez	1887963, 1887964, 1887965, 1887966
EPA 353.2 Rev. 2.0	04/12/2017			04/14/2017	Beverly Y. Sanders	1887965
	04/12/2017			04/18/2017	Beverly Y. Sanders	1887963, 1887964, 1887966
EPA 365.1 Rev. 2.0	04/12/2017	04/14/2017	Vijayalakshmi Reddy	04/17/2017	Lipi Saha	1887963, 1887964, 1887965, 1887966
EPA 365.1 Rev. 2.0 dissolved	04/12/2017			04/12/2017 15:05	Anthony C. Onicha	1887967
	04/12/2017			04/12/2017 15:18	Anthony C. Onicha	1887968
	04/12/2017			04/12/2017 15:19	Anthony C. Onicha	1887969
	04/12/2017			04/12/2017 15:20	Anthony C. Onicha	1887970
SM 2320 B-97	04/12/2017			04/17/2017	Dale L. Simmons	1887959, 1887960, 1887962
	04/12/2017			04/22/2017	Dale L. Simmons	1887961
SM 2540 D-97	04/12/2017			04/14/2017	Yijie Li	1887959, 1887960, 1887961, 1887962
SM 4500 F-C-97	04/12/2017			04/16/2017	Dale L. Simmons	1887959, 1887960, 1887962
	04/12/2017			05/01/2017	Dale L. Simmons	1887961
SM 5310 B-00	04/12/2017			04/14/2017	Julie Michelle Frank	1887963, 1887964, 1887965, 1887966