Chemical Analysis Report

SO-DIST-2016-08-23-01

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-2016-08-22-09**
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

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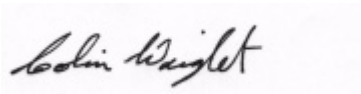
Certified by: Colin Wright, Environmental Administrator

Date Certified: 20-SEP-2016 15:46



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: 08/22/2016 13:20**

Field ID: G5SD0073 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1825648	EPA 180.1 Rev. 2.0	Turbidity	1.4		NTU	P310158	
	SM 2320 B-97	Total Alkalinity	116	A	mg CaCO3/L	P310364	
	SM 2540 D-97	TSS	4	I	mg/L	P310579	
	SM 4500 F-C-97	Fluoride	1.3		mg F/L	P310366	
1825652	EPA 350.1 Rev. 2.0	Ammonia-N	0.01		mg N/L	P310172	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.16	I	mg N/L	P310394	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.007	I	mg N/L	P310415	
	EPA 365.1 Rev. 2.0	Total-P	0.006	I	mg P/L	P310232	
	SM 5310 B-00	Organic Carbon	1.6	I	mg C/L	P310557	
1825656	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P310155	
1825666	EPA 200.7 Rev. 4.4	Iron	90	U	ug/L	P310573	
	EPA 200.8 Rev. 5.4	Arsenic	1.95		ug/L	P310911	
		Cadmium	0.060	U	ug/L	P310911	
		Chromium	0.15	U	ug/L	P310911	
		Copper	0.40	I	ug/L	P310911	
		Lead	0.25	U	ug/L	P310911	
		Nickel	0.15	U	ug/L	P310911	
		Silver	0.015	U	ug/L	P310911	
		Zinc	3.0	U	ug/L	P310911	

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 CREEK **Collection Date/Time: 08/22/2016 14:30**

Field ID: FLKEYS0022FTM Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1825649	EPA 180.1 Rev. 2.0	Turbidity	1.2		NTU	P310158	
	SM 2320 B-97	Total Alkalinity	129		mg CaCO3/L	P310364	
	SM 2540 D-97	TSS	4	I	mg/L	P310579	
	SM 4500 F-C-97	Fluoride	1.3		mg F/L	P310366	
1825653	EPA 350.1 Rev. 2.0	Ammonia-N	0.028		mg N/L	P310172	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.39	I	mg N/L	P310394	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.012		mg N/L	P310415	
	EPA 365.1 Rev. 2.0	Total-P	0.012		mg P/L	P310232	
	SM 5310 B-00	Organic Carbon	3.6		mg C/L	P310557	
1825657	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P310155	
1825667	EPA 200.7 Rev. 4.4	Iron	90	U	ug/L	P310573	
	EPA 200.8 Rev. 5.4	Arsenic	2.12		ug/L	P310911	
		Cadmium	0.060	U	ug/L	P310911	
		Chromium	0.15	U	ug/L	P310911	
		Copper	0.30	U	ug/L	P310911	
		Lead	0.25	U	ug/L	P310911	
		Nickel	0.15	U	ug/L	P310911	
		Silver	0.015	U	ug/L	P310911	

Field ID: FLKEYS0022FTM Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1825667	EPA 200.8 Rev. 5.4	Zinc	3.0	U	ug/L	P310911	

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: 6012C BY BRIDGE NO NAME KEY **Collection Date/Time: 08/22/2016 16:00**

Field ID: G5SD0071 Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1825650	EPA 180.1 Rev. 2.0	Turbidity	0.60		NTU	P310158	
	SM 2320 B-97	Total Alkalinity	112		mg CaCO3/L	P310364	
	SM 2540 D-97	TSS	3	U	mg/L	P310579	
	SM 4500 F-C-97	Fluoride	1.3		mg F/L	P310366	
1825654	EPA 350.1 Rev. 2.0	Ammonia-N	0.008		mg N/L	P310172	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.30	I	mg N/L	P310394	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.005	I	mg N/L	P310415	
	EPA 365.1 Rev. 2.0	Total-P	0.007	I	mg P/L	P310232	
	SM 5310 B-00	Organic Carbon	2.5		mg C/L	P310557	
1825658	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P310155	
1825668	EPA 200.7 Rev. 4.4	Iron	90	U	ug/L	P310573	
	EPA 200.8 Rev. 5.4	Arsenic	1.81		ug/L	P310911	
		Cadmium	0.060	U	ug/L	P310911	
		Chromium	0.15	U	ug/L	P310911	
		Copper	0.30	U	ug/L	P310911	
		Lead	0.25	U	ug/L	P310911	
		Nickel	0.16	I	ug/L	P310911	
		Silver	0.015	U	ug/L	P310911	
		Zinc	3.0	U	ug/L	P310911	

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: 08/22/2016 17:10**

Field ID: G5SD-Blank1 Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1825651	EPA 180.1 Rev. 2.0	Turbidity	0.10	U	NTU	P310158	
	SM 2320 B-97	Total Alkalinity	0.65	U	mg CaCO3/L	P310296	
	SM 2540 D-97	TSS	2	U	mg/L	P310578	
	SM 4500 F-C-97	Fluoride	0.035	U	mg F/L	P310299	
1825655	EPA 350.1 Rev. 2.0	Ammonia-N	0.002	U	mg N/L	P310172	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.080	U	mg N/L	P310511	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P310479	
	EPA 365.1 Rev. 2.0	Total-P	0.002	U	mg P/L	P310225	
	SM 5310 B-00	Organic Carbon	0.50	U	mg C/L	P310349	
1825659	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P310155	
1825669	EPA 200.7 Rev. 4.4	Iron	30	U	ug/L	P310344	
	EPA 200.8 Rev. 5.4	Arsenic	0.050	U	ug/L	P310344	

Field ID: G5SD-Blank1 Matrix: W-FIELD-BK

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1825669	EPA 200.8 Rev. 5.4	Cadmium	0.020	U	ug/L	P310344	
		Chromium	0.050	U	ug/L	P310344	
		Copper	0.50	U	ug/L	P310841	
		Lead	0.050	U	ug/L	P310344	
		Nickel	0.25	U	ug/L	P310841	
		Silver	0.0050	U	ug/L	P310344	
		Zinc	1.0	U	ug/L	P310841	

Ref. Method and Comment:
SM 2540 D-97: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 365.1 Rev. 2.0: Total-P: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P310158

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310344

Component	Result	Code	Units
Iron	30	U	ug/L

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310573

Component	Result	Code	Units
Iron	30	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310344

Component	Result	Code	Units
Arsenic	0.050	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.050	U	ug/L
Lead	0.050	U	ug/L
Silver	0.0050	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310841

Component	Result	Code	Units
Copper	0.50	U	ug/L
Nickel	0.25	U	ug/L
Zinc	1.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310911

Component	Result	Code	Units

Quality Assurance Report
Method Blank Results

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310911

Component	Result	Code	Units
Arsenic	0.050	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.050	U	ug/L
Copper	0.10	U	ug/L
Lead	0.050	U	ug/L
Nickel	0.050	U	ug/L
Silver	0.0050	U	ug/L
Zinc	1.0	U	ug/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P310172

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310394

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310511

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310415

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310479

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P310225

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P310232

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: P310155

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

Reference Method: SM 2320 B-97
Batch ID: P310296

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

Reference Method: SM 2320 B-97
Batch ID: P310364

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

Reference Method: SM 2540 D-97
Batch ID: P310578

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P310579

Component	Result	Code	Units
TSS	3	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P310299

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 4500 F-C-97
Batch ID: P310366

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P310349

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

Reference Method: SM 5310 B-00
Batch ID: P310557

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: P310344

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Iron	108		P	85 - 115

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310573

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Iron	102		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310344

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	101		P	85 - 115
Cadmium	97.4		P	85 - 115
Chromium	95.5		P	85 - 115
Lead	97.1		P	85 - 115
Silver	98.5		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310841

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Copper	92.9		P	85 - 115
Nickel	90.2		P	85 - 115
Zinc	102		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310911

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	102		P	85 - 115
Cadmium	101		P	85 - 115
Chromium	100		P	85 - 115
Copper	98.4		P	85 - 115
Lead	101		P	85 - 115
Nickel	98.2		P	85 - 115
Silver	99.8		P	85 - 115
Zinc	99.6		P	85 - 115

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P310172

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310394

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 351.2 Rev. 2.0
Batch ID: P310511

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310415

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310479

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: P310225

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P310232

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P310155

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

Reference Method: SM 2320 B-97
Batch ID: P310296

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	104		P	95 - 108

Reference Method: SM 2320 B-97
Batch ID: P310364

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

Reference Method: SM 4500 F-C-97
Batch ID: P310299

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	98.5		P	92 - 103

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: SM 4500 F-C-97
Batch ID: P310366

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	96.6		P	92 - 103

Reference Method: SM 5310 B-00
Batch ID: P310349

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

Reference Method: SM 5310 B-00
Batch ID: P310557

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	102		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310344

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1826814	Iron	108	108	P/P	80 - 120

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310573

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825800	Iron	96.4		P	70 - 130
1826290	Iron	91.8	92.3	P/P	70 - 130

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310344

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1826814	Arsenic	103	102	P/P	80 - 120
1826814	Cadmium	101	101	P/P	80 - 120
1826814	Chromium	100	98.9	P/P	80 - 120
1826814	Lead	99.3	98.9	P/P	80 - 120
1826814	Silver	101	100	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310841

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1828827	Copper	99.5	96.0	P/P	80 - 120
1828827	Nickel	96.4	83.7	P/P	80 - 120
1828827	Zinc	94.8	108	P/P	80 - 120
1829134	Copper	86.1		P	80 - 120
1829134	Nickel	81.8		P	80 - 120
1829134	Zinc	97.0		P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310911

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1829142	Arsenic	105	104	P/P	70 - 130
1829142	Cadmium	96.2	95.9	P/P	70 - 130
1829142	Chromium	86.5	84.7	P/P	70 - 130
1829142	Copper	94.2	91.9	P/P	70 - 130
1829142	Lead	104	102	P/P	70 - 130
1829142	Nickel	89.9	91.5	P/P	70 - 130
1829142	Silver	92.7	92.5	P/P	70 - 130
1829142	Zinc	94.0	93.8	P/P	70 - 130
1829183	Arsenic	104		P	70 - 130
1829183	Cadmium	90.7		P	70 - 130
1829183	Chromium	81.8		P	70 - 130
1829183	Copper	92.6		P	70 - 130
1829183	Lead	105		P	70 - 130
1829183	Nickel	93.2		P	70 - 130
1829183	Silver	92.4		P	70 - 130
1829183	Zinc	91.0		P	70 - 130

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P310172

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825652	Ammonia-N	106	108	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310394

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825652	Kjeldahl Nitrogen	96.9	94.1	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310511

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825707	Kjeldahl Nitrogen	106	106	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310415

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825123	NO2NO3-N	104	104	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310479

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825599	NO2NO3-N	102	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P310232

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825652	Total-P	95.3	95.0	P/P	90 - 110

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P310155

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825656	O-Phosphate-P	98.0	99.8	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P310299

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825591	Fluoride	98.7	98.7	P/P	91 - 105

Reference Method: SM 4500 F-C-97
Batch ID: P310366

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825648	Fluoride	93.9	93.9	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P310349

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1825059	Organic Carbon	99.8	98.2	P/P	85 - 115

Reference Method: SM 5310 B-00
Batch ID: P310557

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1824750	Organic Carbon	93.5	95.8	P/P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P310158

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825588	Turbidity	0.587	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310344

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1826814	Iron	0.231	Spike	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P310573

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1826290	Iron	0.470	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310344

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1826814	Arsenic	1.15	Spike	P	0 - 20
1826814	Cadmium	0.528	Spike	P	0 - 20
1826814	Chromium	1.33	Spike	P	0 - 20
1826814	Lead	0.421	Spike	P	0 - 20
1826814	Silver	0.708	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310841

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1828827	Copper	3.56	Spike	P	0 - 20
1828827	Nickel	14.1	Spike	P	0 - 20
1828827	Zinc	12.2	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P310911

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1829142	Arsenic	1.05	Spike	P	0 - 20
1829142	Cadmium	0.325	Spike	P	0 - 20
1829142	Chromium	1.99	Spike	P	0 - 20
1829142	Copper	2.34	Spike	P	0 - 20
1829142	Lead	1.17	Spike	P	0 - 20
1829142	Nickel	1.65	Spike	P	0 - 20
1829142	Silver	0.220	Spike	P	0 - 20
1829142	Zinc	0.299	Spike	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P310172

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825652	Ammonia-N	1.62	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310394

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825652	Kjeldahl Nitrogen	2.76	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P310511

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825707	Kjeldahl Nitrogen	0.253	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310415

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825123	NO2NO3-N	0.482	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P310479

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825599	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P310225

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825680	Total-P	2.13	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P310232

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825652	Total-P	0.315	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P310155

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825656	O-Phosphate-P	1.82	Spike	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P310296

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825591	Total Alkalinity	0.171	Sample	P	0 - 4.8

Reference Method: SM 2320 B-97
Batch ID: P310364

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825648	Total Alkalinity	0.629	Sample	P	0 - 4.8

Reference Method: SM 4500 F-C-97
Batch ID: P310299

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825591	Fluoride	0.0	Spike	P	0 - 3.0

Quality Assurance Report
Precision

Reference Method: SM 4500 F-C-97
Batch ID: P310366

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825648	Fluoride	0.0	Spike	P	0 - 3.0

Reference Method: SM 5310 B-00
Batch ID: P310349

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1825059	Organic Carbon	0.842	Spike	P	0 - 20

Reference Method: SM 5310 B-00
Batch ID: P310557

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1824750	Organic Carbon	2.22	Spike	P	0 - 20

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

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A71271
Included Lab Sample IDs: 1825656, 1825657, 1825658, 1825659

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	100	100	P/P	90 - 110
O-Phosphate-P	99.1	99.5	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A71272
Included Lab Sample IDs: 1825648, 1825649, 1825650, 1825651

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	99.0	99.0	P/P	95 - 105

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A71275
Included Lab Sample IDs: 1825652, 1825653, 1825654, 1825655

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	105	106	P/P	90 - 110

Reference Method: SM 2320 B-97
Run ID: A71312
Included Lab Sample IDs: 1825651

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

Quality Assurance Report
Calibration Verification

Reference Method: SM 4500 F-C-97
Run ID: A71312
Included Lab Sample IDs: 1825651

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

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A71321
Included Lab Sample IDs: 1825652, 1825653, 1825654, 1825655

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	96.5	97.0	P/P	90 - 110
Total-P	96.8	96.2	P/P	90 - 110
Total-P	97.2	96.5	P/P	90 - 110

Reference Method: SM 5310 B-00
Run ID: A71324
Included Lab Sample IDs: 1825655

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

Reference Method: SM 2320 B-97
Run ID: A71330
Included Lab Sample IDs: 1825648, 1825649, 1825650

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	100	103	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Run ID: A71330
Included Lab Sample IDs: 1825648, 1825649, 1825650

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	97.6	98.1	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A71345
Included Lab Sample IDs: 1825652, 1825653, 1825654

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

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A71370
Included Lab Sample IDs: 1825652, 1825653, 1825654

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	104	102	P/P	90 - 110
Kjeldahl Nitrogen	104	99.7	P/P	90 - 110
Kjeldahl Nitrogen	99.7	104	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A71378
Included Lab Sample IDs: 1825655

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

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A71387
Included Lab Sample IDs: 1825669

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A71393
Included Lab Sample IDs: 1825669

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	102	101	P/P	90 - 110
Cadmium	97.1	97.1	P/P	90 - 110
Chromium	94.0	96.8	P/P	90 - 110
Lead	96.8	95.1	P/P	90 - 110
Silver	98.2	97.7	P/P	90 - 110

Reference Method: SM 5310 B-00
Run ID: A71405
Included Lab Sample IDs: 1825652, 1825653, 1825654

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	100	90.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A71419
Included Lab Sample IDs: 1825655

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

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A71474
Included Lab Sample IDs: 1825666, 1825667, 1825668

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Iron	100	97.2	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A71536
Included Lab Sample IDs: 1825669

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Zinc	96.3	96.5	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A71542
Included Lab Sample IDs: 1825666, 1825667, 1825668

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	101	101	P/P	90 - 110
Cadmium	99.2	98.8	P/P	90 - 110
Chromium	98.5	95.6	P/P	90 - 110
Copper	101	100	P/P	90 - 110
Silver	99.5	98.9	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A71562
Included Lab Sample IDs: 1825666, 1825667, 1825668

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Lead	95.5	96.4	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A71635
Included Lab Sample IDs: 1825669

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Copper	99.6	98.3	P/P	90 - 110
Nickel	99.9	97.6	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A71665
Included Lab Sample IDs: 1825666, 1825667, 1825668

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Nickel	99.0	96.1	P/P	90 - 110
Zinc	99.9	98.2	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						0.587	
EPA 200.7 Rev. 4.4	Iron	108	108	108				0.231
	Iron	102	96.4	91.8	92.3			0.470
EPA 200.8 Rev. 5.4	Arsenic	101	103	102				1.15
	Arsenic	102	105	104	104			1.05
	Cadmium	97.4	101	101				0.528
	Cadmium	101	96.2	95.9	90.7			0.325
	Chromium	95.5	100	98.9				1.33
	Chromium	100	86.5	84.7	81.8			1.99
	Copper	92.9	99.5	96.0	86.1			3.56
	Copper	98.4	94.2	91.9	92.6			2.34
	Lead	97.1	99.3	98.9				0.421

Quality Assurance Report
Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery			Precision		
						LCS	SMP	MS
EPA 200.8 Rev. 5.4	Lead	101	104	102	105			1.17
	Nickel	90.2	96.4	83.7	81.8			14.1
	Nickel	98.2	89.9	91.5	93.2			1.65
	Silver	98.5	101	100				0.708
	Silver	99.8	92.7	92.5	92.4			0.220
	Zinc	102	94.8	108	97.0			12.2
	Zinc	99.6	94.0	93.8	91.0			0.299
EPA 350.1 Rev. 2.0	Ammonia-N	107	106	108				1.62
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	102	96.9	94.1				2.76
	Kjeldahl Nitrogen	98.5	106	106				0.253
EPA 353.2 Rev. 2.0	NO2NO3-N	102	104	104				0.482
	NO2NO3-N	102	102	102				0.0
EPA 365.1 Rev. 2.0	Total-P	95.2						2.13
	Total-P	103	95.3	95.0				0.315
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.9	98.0	99.8				1.82
SM 2320 B-97	Total Alkalinity	104					0.171	
	Total Alkalinity	103					0.629	
SM 4500 F-C-97	Fluoride	98.5	98.7	98.7				0.0
	Fluoride	96.6	93.9	93.9				0.0
SM 5310 B-00	Organic Carbon	100	99.8	98.2				0.842
	Organic Carbon	102	93.5	95.8				2.22

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	1825648, 1825649, 1825650, 1825651
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	1825666, 1825667, 1825668, 1825669
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	1825666, 1825667, 1825668, 1825669
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	1825652, 1825653, 1825654, 1825655
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	1825652, 1825653, 1825654, 1825655
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	1825652, 1825653, 1825654, 1825655
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	1825652, 1825653, 1825654, 1825655
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	1825656, 1825657, 1825658, 1825659
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO3/L	1825648, 1825649, 1825650, 1825651
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices	1825648, 1825649, 1825650, 1825651
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	1825648, 1825649, 1825650, 1825651
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	1825652, 1825653, 1825654, 1825655

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	08/23/2016			08/23/2016 14:34	Sima Feizi	1825648, 1825649, 1825650, 1825651
EPA 200.7 Rev. 4.4	08/23/2016	08/25/2016	Elliott D. Healy	08/26/2016	Joshua Ayres	1825669
	08/23/2016	08/30/2016	Elliott D. Healy	09/07/2016	Joshua Ayres	1825666, 1825667, 1825668
EPA 200.8 Rev. 5.4	08/23/2016	08/25/2016	Elliott D. Healy	08/29/2016	Charles J. Peterson	1825669
	08/23/2016	09/08/2016	Elliott D. Healy	09/09/2016	Charles J. Peterson	1825669
	08/23/2016	09/08/2016	Elliott D. Healy	09/14/2016	Robert K Palmer	1825669
	08/23/2016	09/09/2016	Elliott D. Healy	09/11/2016	Charles J. Peterson	1825666, 1825667, 1825668
	08/23/2016	09/09/2016	Elliott D. Healy	09/12/2016	Charles J. Peterson	1825666, 1825667, 1825668
	08/23/2016	09/09/2016	Elliott D. Healy	09/15/2016	Charles J. Peterson	1825666, 1825667, 1825668
EPA 350.1 Rev. 2.0	08/23/2016			08/23/2016	Julie Michelle Frank	1825652, 1825653, 1825654, 1825655
EPA 351.2 Rev. 2.0	08/23/2016	08/26/2016	Adrian Shelby	08/29/2016	Virginia P. Brown	1825652, 1825653, 1825654
	08/23/2016	08/30/2016	Adrian Shelby	08/31/2016	Christopher Armour	1825655
EPA 353.2 Rev. 2.0	08/23/2016			08/26/2016	Beverly Y. Sanders	1825652, 1825653, 1825654
	08/23/2016			08/29/2016	Beverly Y. Sanders	1825655
EPA 365.1 Rev. 2.0	08/23/2016	08/24/2016	Vijayalakshmi Reddy	08/25/2016	Lipi Saha	1825652, 1825653, 1825654, 1825655
EPA 365.1 Rev. 2.0 dissolved	08/23/2016			08/23/2016 14:47	Julia Storbeck	1825656
	08/23/2016			08/23/2016 14:52	Julia Storbeck	1825659
	08/23/2016			08/23/2016 15:36	Julia Storbeck	1825657
	08/23/2016			08/23/2016 15:37	Julia Storbeck	1825658
SM 2320 B-97	08/23/2016			08/24/2016	Dale L. Simmons	1825651
	08/23/2016			08/25/2016	Dale L. Simmons	1825648, 1825649, 1825650
SM 2540 D-97	08/23/2016			08/26/2016	Yijie Li	1825648, 1825649, 1825650, 1825651
SM 4500 F-C-97	08/23/2016			08/24/2016	Dale L. Simmons	1825651
	08/23/2016			08/25/2016	Dale L. Simmons	1825648, 1825649, 1825650
SM 5310 B-00	08/23/2016			08/25/2016	Sofia Elnemr	1825655
	08/23/2016			08/30/2016	Sofia Elnemr	1825652, 1825653, 1825654