Chemical Analysis Report

CEN-DIST-2018-01-12-01

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

Event Description: **Dead River X5**
Request ID: **RQ-2018-01-08-30**
Customer: **CEN-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
FL Dept. of Environmental Protection
3319 Maguire Blvd., Suite 232
Orlando, FL 32803-3767
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Certified by: Thekkekalathil Chandrasekhar, Chemist Administrator Date Certified: 02-FEB-2018 11:20

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: DEAD RIVER @ 150M FROM LAKE EUSTIS (2817C) **Collection Date/Time: 01/11/2018 10:45**

Field ID: G1CE0101 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1959148	EPA 180.1 Rev. 2.0	Turbidity	5.4	A	NTU	P338188	
	EPA 300.0 Rev. 2.1	Chloride	30		mg Cl/L	P338416	
		Sulfate	18		mg SO4/L	P338418	
	SM 2120 B	Color (true)	24		PCU	P338185	
	SM 2320 B-97	Total Alkalinity	99		mg CaCO3/L	P338673	
	SM 2540 C-97	TDS	205		mg/L	P338502	
	SM 2540 D-97	TSS	6	I	mg/L	P338622	
	SM 4500 F-C-97	Fluoride	0.16		mg F/L	P338677	
1959152	EPA 350.1 Rev. 2.0	Ammonia-N	0.15		mg N/L	P338539	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.2		mg N/L	P338332	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.018		mg N/L	P338335	
	EPA 365.1 Rev. 2.0	Total-P	0.019		mg P/L	P338268	
	SM 5310 B-00	Organic Carbon	14		mg C/L	P338324	
1959156	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P338183	
1959172	EPA 200.7 Rev. 4.4	Calcium	35.5		mg/L	P338275	
		Iron	30	U	ug/L	P338275	
		Magnesium	10.2		mg/L	P338275	
		Potassium	6.5		mg/L	P338275	
		Sodium	15.6		mg/L	P338275	
		Zinc	5.0	U	ug/L	P338275	
	EPA 200.8 Rev. 5.4	Arsenic	1.72		ug/L	P338275	
		Cadmium	0.020	U	ug/L	P338275	
		Chromium	0.40	U	ug/L	P338275	
		Copper	0.20	I	ug/L	P338275	
		Lead	0.15	I	ug/L	P338275	
		Nickel	0.20	U	ug/L	P338275	
		Silver	0.010	U	ug/L	P338653	

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: DEAD RIVER @ 50M S OF US 441 (2817C) **Collection Date/Time: 01/11/2018 10:55**

Field ID: G1CE0100 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1959149	EPA 180.1 Rev. 2.0	Turbidity	5.6		NTU	P338188	
	EPA 300.0 Rev. 2.1	Chloride	30		mg Cl/L	P338417	
		Sulfate	18		mg SO4/L	P338419	
	SM 2120 B	Color (true)	25		PCU	P338185	
	SM 2320 B-97	Total Alkalinity	98		mg CaCO3/L	P338673	
	SM 2540 C-97	TDS	210		mg/L	P338502	
	SM 2540 D-97	TSS	7	I	mg/L	P338622	
	SM 4500 F-C-97	Fluoride	0.15		mg F/L	P338677	
1959153	EPA 350.1 Rev. 2.0	Ammonia-N	0.13		mg N/L	P338539	

Field ID: G1CE0100 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1959153	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.6		mg N/L	P338332	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.031		mg N/L	P338335	
	EPA 365.1 Rev. 2.0	Total-P	0.032		mg P/L	P338269	
	SM 5310 B-00	Organic Carbon	15		mg C/L	P338324	
1959157	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P338183	
1959173	EPA 200.7 Rev. 4.4	Calcium	35.2		mg/L	P338275	
		Iron	30	U	ug/L	P338275	
		Magnesium	9.97		mg/L	P338275	
		Potassium	6.4		mg/L	P338275	
		Sodium	15.6		mg/L	P338275	
		Zinc	5.0	U	ug/L	P338275	
	EPA 200.8 Rev. 5.4	Arsenic	1.80		ug/L	P338275	
		Cadmium	0.020	U	ug/L	P338275	
		Chromium	0.40	U	ug/L	P338275	
		Copper	0.33	I	ug/L	P338275	
		Lead	0.16	I	ug/L	P338275	
		Nickel	0.20	U	ug/L	P338275	
		Silver	0.010	U	ug/L	P338653	

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: DEAD RIVER @ POWER LINES (2817C) **Collection Date/Time: 01/11/2018 11:05**

Field ID: G1CE0056 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1959150	EPA 180.1 Rev. 2.0	Turbidity	4.4		NTU	P338188	
	EPA 300.0 Rev. 2.1	Chloride	28		mg Cl/L	P338417	
		Sulfate	16		mg SO4/L	P338419	
	SM 2120 B	Color (true)	29		PCU	P338185	
	SM 2320 B-97	Total Alkalinity	96		mg CaCO3/L	P338673	
	SM 2540 C-97	TDS	198		mg/L	P338502	
	SM 2540 D-97	TSS	6	I	mg/L	P338622	
	SM 4500 F-C-97	Fluoride	0.14		mg F/L	P338677	
1959154	EPA 350.1 Rev. 2.0	Ammonia-N	0.16		mg N/L	P338539	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.5		mg N/L	P338332	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.029		mg N/L	P338335	
	EPA 365.1 Rev. 2.0	Total-P	0.023		mg P/L	P338268	
	SM 5310 B-00	Organic Carbon	15		mg C/L	P338324	
1959158	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P338183	
1959174	EPA 200.7 Rev. 4.4	Calcium	34.7		mg/L	P338275	
		Iron	30	U	ug/L	P338275	
		Magnesium	9.34		mg/L	P338275	
		Potassium	5.7		mg/L	P338275	
		Sodium	14.9		mg/L	P338275	

Field ID: G1CE0056 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1959174	EPA 200.7 Rev. 4.4	Zinc	5.0	U	ug/L	P338275	
	EPA 200.8 Rev. 5.4	Arsenic	1.65		ug/L	P338275	
		Cadmium	0.020	U	ug/L	P338275	
		Chromium	0.40	U	ug/L	P338275	
		Copper	0.22	I	ug/L	P338275	
		Lead	0.13	I	ug/L	P338275	
		Nickel	0.20	U	ug/L	P338275	
		Silver	0.010	U	ug/L	P338653	

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: DEAD RIVER @ 100M FROM LAKE HARRIS (2817C) **Collection Date/Time: 01/11/2018 11:15**

Field ID: G1CE0099 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
1959151	EPA 180.1 Rev. 2.0	Turbidity	2.2		NTU	P338188	
	EPA 300.0 Rev. 2.1	Chloride	24		mg Cl/L	P338417	
		Sulfate	9.2		mg SO4/L	P338419	
	SM 2120 B	Color (true)	30		PCU	P338185	
	SM 2320 B-97	Total Alkalinity	90		mg CaCO3/L	P338673	
	SM 2540 C-97	TDS	181		mg/L	P338502	
	SM 2540 D-97	TSS	5	I	mg/L	P338622	
	SM 4500 F-C-97	Fluoride	0.12		mg F/L	P338677	
1959155	EPA 350.1 Rev. 2.0	Ammonia-N	0.14		mg N/L	P338539	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.7		mg N/L	P338332	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.020		mg N/L	P338335	
	EPA 365.1 Rev. 2.0	Total-P	0.028		mg P/L	P338268	
	SM 5310 B-00	Organic Carbon	15		mg C/L	P338324	
1959159	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P338183	
1959175	EPA 200.7 Rev. 4.4	Calcium	32.5		mg/L	P338275	
		Iron	30	U	ug/L	P338275	
		Magnesium	7.29		mg/L	P338275	
		Potassium	3.7		mg/L	P338275	
		Sodium	12.2		mg/L	P338275	
		Zinc	5.0	U	ug/L	P338275	
	EPA 200.8 Rev. 5.4	Arsenic	1.26		ug/L	P338275	
		Cadmium	0.020	U	ug/L	P338275	
		Chromium	0.40	U	ug/L	P338275	
		Copper	0.22	I	ug/L	P338275	
		Lead	0.089	I	ug/L	P338275	
		Nickel	0.20	U	ug/L	P338275	
		Silver	0.010	U	ug/L	P338653	

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.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P338188

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P338275

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: P338275

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: P338653

Component	Result	Code	Units
Silver	0.010	U	ug/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338416

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338417

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338418

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338419

Component	Result	Code	Units

Quality Assurance Report
Method Blank Results

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338419

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P338539

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P338332

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P338335

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338268

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338269

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P338183

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

Reference Method: SM 2120 B
Batch ID: P338185

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-97
Batch ID: P338673

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

Quality Assurance Report
Method Blank Results

Reference Method: SM 2540 C-97
Batch ID: P338502

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-97
Batch ID: P338622

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-97
Batch ID: P338677

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-00
Batch ID: P338324

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: P338275

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	104		P	85 - 115
Iron	108		P	85 - 115
Magnesium	104		P	85 - 115
Potassium	101		P	85 - 115
Sodium	102		P	85 - 115
Zinc	105		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P338275

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Arsenic	96.8		P	85 - 115
Cadmium	95.9		P	85 - 115
Chromium	103		P	85 - 115
Copper	94.3		P	85 - 115
Lead	90.2		P	85 - 115
Nickel	102		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P338653

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Silver	98.8		P	85 - 115

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338416

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338417

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Chloride	99.4		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338418

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	94.0		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338419

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	96.6		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P338539

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	99.9		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P338332

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	109		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P338335

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338268

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	98.7		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338269

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

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P338183

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	96.5		P	90 - 110

Reference Method: SM 2320 B-97
Batch ID: P338673

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	98.8		P	95 - 108

Reference Method: SM 4500 F-C-97
Batch ID: P338677

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	94.6		P	92 - 103

Reference Method: SM 5310 B-00
Batch ID: P338324

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	94.9		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P338275

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959172	Calcium	105		P	80 - 120
1959172	Iron	108	107	P/P	80 - 120
1959172	Magnesium	105		P	80 - 120
1959172	Potassium	104		P	80 - 120
1959172	Sodium	103		P	80 - 120
1959172	Zinc	106	104	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P338275

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959172	Arsenic	94.7	98.3	P/P	80 - 120
1959172	Cadmium	94.6	97.2	P/P	80 - 120
1959172	Chromium	90.7	95.1	P/P	80 - 120
1959172	Copper	92.4	93.9	P/P	80 - 120
1959172	Lead	89.5	93.2	P/P	80 - 120
1959172	Nickel	92.0	95.0	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P338653

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1958690	Silver	97.0		P	80 - 120
1959175	Silver	92.9	99.2	P/P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338416

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1958884	Chloride	92.4		P	90 - 110
1959125	Chloride	95.0		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338417

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959249	Chloride	94.1		P	90 - 110
1959258	Chloride	92.9		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338418

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1958884	Sulfate	91.4		P	90 - 110
1959125	Sulfate	92.7		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338419

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959249	Sulfate	96.3		P	90 - 110
1959258	Sulfate	91.2		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P338539

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959164	Ammonia-N	101	103	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P338335

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959128	NO2NO3-N	104	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338268

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959131	Total-P	94.0	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338269

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959153	Total-P	98.1	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P338183

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P338183

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959133	O-Phosphate-P	97.2	96.3	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Batch ID: P338677

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1959526	Fluoride	95.7	95.7	P/P	91 - 105

Reference Method: SM 5310 B-00
Batch ID: P338324

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
1958648	Organic Carbon	94.2	94.1	P/P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P338188

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959148	Turbidity	6.09	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P338275

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959172	Calcium	3.13	Spike	P	0 - 20
1959172	Iron	0.598	Spike	P	0 - 20
1959172	Magnesium	1.69	Spike	P	0 - 20
1959172	Potassium	3.63	Spike	P	0 - 20
1959172	Sodium	1.50	Spike	P	0 - 20
1959172	Zinc	1.58	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P338275

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959172	Arsenic	3.58	Spike	P	0 - 20
1959172	Cadmium	2.71	Spike	P	0 - 20
1959172	Chromium	4.81	Spike	P	0 - 20
1959172	Copper	1.51	Spike	P	0 - 20
1959172	Lead	4.09	Spike	P	0 - 20
1959172	Nickel	3.22	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P338653

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959175	Silver	6.60	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338416

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959125	Chloride	0.847	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338417

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959258	Chloride	2.09	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338418

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959125	Sulfate	1.41	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P338419

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959258	Sulfate	2.57	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P338539

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959164	Ammonia-N	0.646	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P338332

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959152	Kjeldahl Nitrogen	2.17	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P338335

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959128	NO2NO3-N	0.412	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338268

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959131	Total-P	8.21	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P338269

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959153	Total-P	2.90	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P338183

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959133	O-Phosphate-P	0.930	Spike	P	0 - 20

Reference Method: SM 2120 B
Batch ID: P338185

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959123	Color (true)	5.47	Sample	P	0 - 20

Reference Method: SM 2320 B-97
Batch ID: P338673

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959526	Total Alkalinity	0.728	Sample	P	0 - 4.8

Reference Method: SM 2540 C-97
Batch ID: P338502

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959123	TDS	9.17	Sample	P	0 - 10

Reference Method: SM 4500 F-C-97
Batch ID: P338677

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1959526	Fluoride	0.0	Spike	P	0 - 3.0

Reference Method: SM 5310 B-00
Batch ID: P338324

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
1958648	Organic Carbon	0.101	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 365.1 Rev. 2.0 dissolved
Run ID: A81442
Included Lab Sample IDs: 1959156, 1959157, 1959158, 1959159

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

Reference Method: SM 2120 B
Run ID: A81443
Included Lab Sample IDs: 1959148, 1959149, 1959150, 1959151

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	99.5	102	P/P	85 - 115

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A81444
Included Lab Sample IDs: 1959148, 1959149, 1959150, 1959151

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	98.5	99.5	P/P	95 - 105

Reference Method: SM 5310 B-00
Run ID: A81480
Included Lab Sample IDs: 1959152, 1959153, 1959154, 1959155

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	94.6	94.4	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A81486
Included Lab Sample IDs: 1959152, 1959153, 1959154, 1959155

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

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A81502
Included Lab Sample IDs: 1959172, 1959173, 1959174, 1959175

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	101	98.8	P/P	90 - 110
Calcium	98.8	97.6	P/P	90 - 110
Iron	97.2	98.7	P/P	90 - 110
Iron	98.7	96.4	P/P	90 - 110
Magnesium	97.3	98.0	P/P	90 - 110
Magnesium	98.0	96.5	P/P	90 - 110
Potassium	95.8	95.5	P/P	90 - 110
Potassium	96.1	95.8	P/P	90 - 110
Sodium	98.2	98.9	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A81502
Included Lab Sample IDs: 1959172, 1959173, 1959174, 1959175

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Sodium	98.9	96.8	P/P	90 - 110
Zinc	96.9	97.0	P/P	90 - 110
Zinc	98.8	96.9	P/P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Run ID: A81524
Included Lab Sample IDs: 1959148, 1959149, 1959150, 1959151

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	100	105	P/P	90 - 110
Chloride	105	100	P/P	90 - 110
Sulfate	105	97.0	P/P	90 - 110
Sulfate	97.0	105	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A81539
Included Lab Sample IDs: 1959172, 1959173, 1959174, 1959175

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Arsenic	95.4	94.8	P/P	90 - 110
Arsenic	96.3	95.4	P/P	90 - 110
Cadmium	93.9	94.9	P/P	90 - 110
Cadmium	94.9	93.3	P/P	90 - 110
Chromium	94.6	94.8	P/P	90 - 110
Chromium	94.8	94.4	P/P	90 - 110
Copper	96.0	96.9	P/P	90 - 110
Copper	96.1	96.0	P/P	90 - 110
Lead	92.4	93.3	P/P	90 - 110
Lead	93.3	93.0	P/P	90 - 110
Nickel	96.4	96.6	P/P	90 - 110
Nickel	96.6	96.4	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A81547
Included Lab Sample IDs: 1959152, 1959153, 1959154, 1959155

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

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A81550
Included Lab Sample IDs: 1959152, 1959153, 1959154, 1959155

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	104	105	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A81570
Included Lab Sample IDs: 1959152, 1959153, 1959154, 1959155

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

Reference Method: SM 2320 B-97
Run ID: A81614
Included Lab Sample IDs: 1959148, 1959149, 1959150, 1959151

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	98.9	97.1	P/P	90 - 110

Reference Method: SM 4500 F-C-97
Run ID: A81614
Included Lab Sample IDs: 1959148, 1959149, 1959150, 1959151

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A81681
Included Lab Sample IDs: 1959172, 1959173, 1959174, 1959175

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Silver	98.7	99.6	P/P	90 - 110
Silver	99.6	97.9	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					6.09	
EPA 200.7 Rev. 4.4	Calcium	104	105				3.13
	Iron	108	108	107			0.598
	Magnesium	104	105				1.69
	Potassium	101	104				3.63
	Sodium	102	103				1.50
	Zinc	105	106	104			1.58
EPA 200.8 Rev. 5.4	Arsenic	96.8	94.7	98.3			3.58
	Cadmium	95.9	94.6	97.2			2.71
	Chromium	103	90.7	95.1			4.81
	Copper	94.3	92.4	93.9			1.51
	Lead	90.2	89.5	93.2			4.09
	Nickel	102	92.0	95.0			3.22
	Silver	98.8	97.0	92.9	99.2		6.60
EPA 300.0 Rev. 2.1	Chloride	96.7	95.0	92.4		0.847	
	Chloride	99.4	92.9	94.1		2.09	

Quality Assurance Report
Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery		Precision		
					LCS	SMP	MS
EPA 300.0 Rev. 2.1	Sulfate	94.0	92.7	91.4		1.41	
	Sulfate	96.6	91.2	96.3		2.57	
EPA 350.1 Rev. 2.0	Ammonia-N	99.9	101	103			0.646
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	109					2.17
EPA 353.2 Rev. 2.0	NO2NO3-N	104	104	104			0.412
EPA 365.1 Rev. 2.0	Total-P	98.7	94.0	102			8.21
	Total-P	103	98.1	101			2.90
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	96.5	97.2	96.3			0.930
SM 2120 B	Color (true)					5.47	
SM 2320 B-97	Total Alkalinity	98.8				0.728	
SM 2540 C-97	TDS					9.17	
SM 4500 F-C-97	Fluoride	94.6	95.7	95.7			0.0
SM 5310 B-00	Organic Carbon	94.9	94.2	94.1			0.101

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 180.1 Rev. 2.0 / E31780	Turbidity in aqueous matrices	1959148, 1959149, 1959150, 1959151
EPA 200.7 Rev. 4.4 / E31780	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	1959172, 1959173, 1959174, 1959175
EPA 200.8 Rev. 5.4 / E31780	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	1959172, 1959173, 1959174, 1959175
EPA 300.0 Rev. 2.1 / E31780	Chloride in aqueous matrices	1959148, 1959149, 1959150, 1959151
EPA 300.0 Rev. 2.1 / E31780	Sulfate in aqueous matrices	1959148, 1959149, 1959150, 1959151
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	1959152, 1959153, 1959154, 1959155
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	1959152, 1959153, 1959154, 1959155
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	1959152, 1959153, 1959154, 1959155
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	1959152, 1959153, 1959154, 1959155
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	1959156, 1959157, 1959158, 1959159
SM 2120 B / E31780	True Color measured at 450 nm	1959148, 1959149, 1959150, 1959151
SM 2320 B-97 / E31780	Alkalinity in aqueous matrices as mg CaCO3/L	1959148, 1959149, 1959150, 1959151
SM 2540 C-97 / E31780	Total Dissolved Solids in aqueous matrices	1959148, 1959149, 1959150, 1959151
SM 2540 D-97 / E31780	Total Suspended Solids in aqueous matrices	1959148, 1959149, 1959150, 1959151
SM 4500 F-C-97 / E31780	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	1959148, 1959149, 1959150, 1959151
SM 5310 B-00 / E31780	Nonpurgeable Organic Carbon in aqueous matrices	1959152, 1959153, 1959154, 1959155

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	01/12/2018			01/12/2018 16:49	Tanya Welborn	1959148, 1959149, 1959150, 1959151
EPA 200.7 Rev. 4.4	01/12/2018	01/16/2018	Elliott D. Healy	01/17/2018	Betina Topolski	1959172, 1959173, 1959174, 1959175
EPA 200.8 Rev. 5.4	01/12/2018	01/16/2018	Elliott D. Healy	01/18/2018	Robert K Palmer	1959172, 1959173, 1959174, 1959175
	01/12/2018	01/23/2018	Elliott D. Healy	01/25/2018	Robert K Palmer	1959172, 1959173, 1959174, 1959175
EPA 300.0 Rev. 2.1	01/12/2018			01/17/2018	Julia Storbeck	1959148, 1959149, 1959150, 1959151
EPA 350.1 Rev. 2.0	01/12/2018			01/19/2018	Sofia Elnemr	1959152, 1959153, 1959154, 1959155
EPA 351.2 Rev. 2.0	01/12/2018	01/17/2018	Adrian Shelby	01/19/2018	Joseph Suarez	1959152, 1959153, 1959154, 1959155
EPA 353.2 Rev. 2.0	01/12/2018			01/17/2018	Beverly Y. Sanders	1959152, 1959153, 1959154, 1959155
EPA 365.1 Rev. 2.0	01/12/2018	01/16/2018	Sima Feizi	01/18/2018	Lipi Saha	1959152, 1959153, 1959154, 1959155
EPA 365.1 Rev. 2.0 dissolved	01/12/2018			01/12/2018 14:51	Megan Treadwell	1959156
	01/12/2018			01/12/2018 14:52	Megan Treadwell	1959157
	01/12/2018			01/12/2018 14:53	Megan Treadwell	1959158, 1959159
SM 2120 B	01/12/2018			01/12/2018 15:40	Tanya Welborn	1959148, 1959149
	01/12/2018			01/12/2018 15:41	Tanya Welborn	1959150
	01/12/2018			01/12/2018 15:42	Tanya Welborn	1959151
SM 2320 B-97	01/12/2018			01/23/2018	Dale L. Simmons	1959148, 1959149, 1959150, 1959151
SM 2540 C-97	01/12/2018			01/17/2018	Yijie Li	1959148, 1959149, 1959150, 1959151
SM 2540 D-97	01/12/2018			01/17/2018	Yijie Li	1959148, 1959149, 1959150, 1959151
SM 4500 F-C-97	01/12/2018			01/23/2018	Dale L. Simmons	1959148, 1959149, 1959150, 1959151
SM 5310 B-00	01/12/2018			01/17/2018	Megan Treadwell	1959152, 1959153, 1959154, 1959155