Chemical Analysis Report

NW-DIST-2022-03-16-01

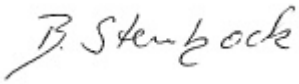
Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Escambia River Run**
Request ID: **RQ-2022-02-07-34**
Customer: **NW-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
160 Government Center
Suite 208
Pensacola, FL 32502-5794
Attn: Myranda Butler

For additional information please contact
Colin Wright, Ph.D.
Liang-Tsair Lin, Ph.D.
Kerry Tate, Ph.D.
Dr. rer. nat. Bettina Steinbock
Thekkekalathil Chandrasekhar, Ph.D, QA Officer
Phone (850) 245-8085

Certified by: Dr. rer. nat. Bettina Steinbock, Environmental Administrator Date Certified: 06-APR-2022 14:49



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 by the Florida Department of Health Environmental Laboratory Certification Program 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: Escambia River upstream of Mitchell Creek **Collection Date/Time: 03/14/2022 12:00**

Field ID: G4NW0404 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2312478	DEP SOP: NU-094-1	Color (true)**	21	A	PCU	P411172	
	EPA 180.1 Rev. 2.0	Turbidity	20		NTU	P411207	
	EPA 300.0 Rev. 2.1	Chloride	4.8		mg Cl/L	P411425	
		Sulfate	5.8		mg SO4/L	P411428	
	SM 2320 B-2011	Total Alkalinity	24		mg CaCO3/L	P411339	
	SM 2540 C-2011	TDS	53		mg/L	P411581	
	SM 2540 D-2011	TSS	18		mg/L	P411535	
	SM 4500 F-C-2011	Fluoride	0.035	U	mg F/L	P411344	
2312480	EPA 350.1 Rev. 2.0	Ammonia-N	0.053		mg N/L	P411186	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.50		mg N/L	P411275	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.22		mg N/L	P411227	
	EPA 365.1 Rev. 2.0	Total-P	0.050		mg P/L	P411408	
	SM 5310 B-2011	Organic Carbon	4.8		mg C/L	P411294	
2312482	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.014		mg P/L	P411169	
2312488	EPA 200.7 Rev. 4.4	Calcium	9.62		mg/L	P411211	
		Iron	940		ug/L	P411211	
		Magnesium	1.17		mg/L	P411211	
		Potassium	0.93	I	mg/L	P411211	
		Sodium	5.6		mg/L	P411211	
		Strontium	34.9		ug/L	P411211	
		Tin	3.0	U	ug/L	P411211	
		Titanium	1.6	I	ug/L	P411211	
		Vanadium	2.0	U	ug/L	P411211	
		Zinc	5.0	U	ug/L	P411211	
	EPA 200.8 Rev. 5.4	Aluminum	177		ug/L	P411384	
		Antimony	0.050	U	ug/L	P411211	
		Arsenic	0.52		ug/L	P411211	
		Barium	22.8		ug/L	P411211	
		Beryllium	0.062		ug/L	P411211	
		Boron**	10.1		ug/L	P411211	
		Cadmium	0.020	U	ug/L	P411211	
		Chromium	0.48	I	ug/L	P411211	
		Cobalt	0.426		ug/L	P411211	
		Copper	0.46	I	ug/L	P411211	
		Lead	0.42		ug/L	P411211	
		Manganese	42.2		ug/L	P411211	
		Molybdenum	0.15	U	ug/L	P411211	
		Nickel	0.65	I	ug/L	P411211	
		Selenium	0.20	U	ug/L	P411211	
		Silver	0.010	U	ug/L	P411211	
		Thallium	0.10	U	ug/L	P411211	
	SM 2340B	Hardness	28.8		mg/L	P411211	

Ref. Method and Comment:
SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

Sample Location: Escambia River downstream of Cotton Lake **Collection Date/Time: 03/14/2022 11:00**

Field ID: G4NW0403 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2312479	DEP SOP: NU-094-1	Color (true)**	43	Q	PCU	P411172	
	EPA 180.1 Rev. 2.0	Turbidity	20	Q	NTU	P411207	
	EPA 300.0 Rev. 2.1	Chloride	4.8		mg Cl/L	P411425	
		Sulfate	5.8		mg SO4/L	P411428	
	SM 2320 B-2011	Total Alkalinity	23		mg CaCO3/L	P411339	
	SM 2540 C-2011	TDS	57		mg/L	P411581	
	SM 2540 D-2011	TSS	17		mg/L	P411535	
	SM 4500 F-C-2011	Fluoride	0.035	U	mg F/L	P411344	
2312481	EPA 350.1 Rev. 2.0	Ammonia-N	0.044		mg N/L	P411186	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.52		mg N/L	P411275	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.21		mg N/L	P411227	
	EPA 365.1 Rev. 2.0	Total-P	0.049		mg P/L	P411408	
	SM 5310 B-2011	Organic Carbon	4.9		mg C/L	P411351	
2312483	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.011	Q	mg P/L	P411169	
2312489	EPA 200.7 Rev. 4.4	Calcium	9.03		mg/L	P411211	
		Iron	890		ug/L	P411211	
		Magnesium	1.13		mg/L	P411211	
		Potassium	0.91	I	mg/L	P411211	
		Sodium	5.4		mg/L	P411211	
		Strontium	33.6		ug/L	P411211	
		Tin	3.0	U	ug/L	P411211	
		Titanium	2.5	I	ug/L	P411211	
		Vanadium	2.0	U	ug/L	P411211	
		Zinc	5.0	U	ug/L	P411211	
	EPA 200.8 Rev. 5.4	Aluminum	378		ug/L	P411384	
		Antimony	0.050	U	ug/L	P411211	
		Arsenic	0.49		ug/L	P411211	
		Barium	21.7		ug/L	P411211	
		Beryllium	0.063		ug/L	P411211	
		Boron**	10.2		ug/L	P411211	
		Cadmium	0.020	U	ug/L	P411211	
		Chromium	0.48	I	ug/L	P411211	
		Cobalt	0.368		ug/L	P411211	
		Copper	0.46	I	ug/L	P411211	
		Lead	0.40		ug/L	P411211	
		Manganese	39.1		ug/L	P411211	
		Molybdenum	0.15	U	ug/L	P411211	
		Nickel	0.64	I	ug/L	P411211	
		Selenium	0.20	U	ug/L	P411211	
		Silver	0.010	U	ug/L	P411211	
		Thallium	0.10	U	ug/L	P411211	
	SM 2340B	Hardness	27.2		mg/L	P411211	

Field ID: G4NW0403 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes

Ref. Method and Comment:
DEP SOP: NU-094-1: The sample expired upon receipt.
EPA 180.1 Rev. 2.0: The sample expired upon receipt.
SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 365.1 Rev. 2.0 dissolved: O-Phosphate-P: The sample expired upon receipt.

Quality Assurance Report
Method Blank Results

Reference Method: DEP SOP: NU-094-1
Batch ID: P411172

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P411207

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P411211

Component	Result	Code	Units
Calcium	0.11	I	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
Strontium	2.0	U	ug/L
Tin	3.0	U	ug/L
Titanium	0.75	U	ug/L
Vanadium	2.0	U	ug/L
Zinc	5.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411211

Component	Result	Code	Units
Antimony	0.050	U	ug/L
Arsenic	0.050	U	ug/L
Barium	0.20	U	ug/L
Beryllium	0.010	U	ug/L
Boron	2.0	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.40	U	ug/L
Cobalt	0.020	U	ug/L
Copper	0.40	U	ug/L
Lead	0.20	U	ug/L
Manganese	0.10	U	ug/L
Molybdenum	0.15	U	ug/L
Nickel	0.50	U	ug/L
Selenium	0.20	U	ug/L
Silver	0.010	U	ug/L
Thallium	0.10	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411384

Component	Result	Code	Units
Aluminum	5.0	U	ug/L

Quality Assurance Report
Method Blank Results

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411425

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411428

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P411186

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P411275

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P411227

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P411408

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P411169

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

Reference Method: SM 2320 B-2011
Batch ID: P411339

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

Reference Method: SM 2540 C-2011
Batch ID: P411581

Component	Result	Code	Units
TDS	15	U	mg/L

Quality Assurance Report
Method Blank Results

Reference Method: SM 2540 D-2011
Batch ID: P411535

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-2011
Batch ID: P411344

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-2011
Batch ID: P411294

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

Reference Method: SM 5310 B-2011
Batch ID: P411351

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

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: DEP SOP: NU-094-1
Batch ID: P411172

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	97.0		P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P411207

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

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P411211

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	104		P	85 - 115
Iron	109		P	85 - 115
Magnesium	111		P	85 - 115
Potassium	107		P	85 - 115
Sodium	102		P	85 - 115
Strontium	109		P	85 - 115
Tin	106		P	85 - 115
Titanium	104		P	85 - 115
Vanadium	98.2		P	85 - 115
Zinc	106		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411211

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Antimony	99.9		P	85 - 115
Arsenic	99.4		P	85 - 115
Barium	102		P	85 - 115
Beryllium	97.3		P	85 - 115
Boron	104		P	85 - 115
Cadmium	99.8		P	85 - 115
Chromium	97.6		P	85 - 115
Cobalt	98.5		P	85 - 115
Copper	97.2		P	85 - 115
Lead	97.1		P	85 - 115
Manganese	98.6		P	85 - 115
Molybdenum	98.1		P	85 - 115
Nickel	98.8		P	85 - 115
Selenium	99.8		P	85 - 115
Silver	98.4		P	85 - 115
Thallium	99.1		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411384

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	101		P	85 - 115

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411425

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

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411428

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

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P411186

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P411275

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P411227

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P411408

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P411169

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	99.2		P	90 - 110

Reference Method: SM 2320 B-2011
Batch ID: P411339

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	99.1		P	94 - 106

Reference Method: SM 4500 F-C-2011
Batch ID: P411344

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	99.1		P	93 - 104

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: SM 5310 B-2011
Batch ID: P411294

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	96.5		P	85 - 115

Reference Method: SM 5310 B-2011
Batch ID: P411351

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	93.1		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P411211

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312488	Calcium	104		P	80 - 120
2312488	Iron	106		P	80 - 120
2312488	Magnesium	106		P	80 - 120
2312488	Potassium	102		P	80 - 120
2312488	Sodium	102		P	80 - 120
2312488	Strontium	108		P	80 - 120
2312488	Tin	106		P	80 - 120
2312488	Titanium	103		P	80 - 120
2312488	Vanadium	100		P	80 - 120
2312488	Zinc	108		P	80 - 120
2312489	Calcium	103		P	80 - 120
2312489	Iron	99.2	102	P/P	80 - 120
2312489	Magnesium	102	105	P/P	80 - 120
2312489	Potassium	98.1	99.7	P/P	80 - 120
2312489	Sodium	101		P	80 - 120
2312489	Strontium	103	105	P/P	80 - 120
2312489	Tin	102	103	P/P	80 - 120
2312489	Titanium	95.8	97.9	P/P	80 - 120
2312489	Vanadium	95.5	97.6	P/P	80 - 120
2312489	Zinc	103	105	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411211

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312488	Antimony	102		P	80 - 120
2312488	Arsenic	103		P	80 - 120
2312488	Barium	105		P	80 - 120
2312488	Beryllium	101		P	80 - 120
2312488	Boron	104		P	80 - 120
2312488	Cadmium	101		P	80 - 120
2312488	Chromium	102		P	80 - 120
2312488	Cobalt	102		P	80 - 120
2312488	Copper	102		P	80 - 120
2312488	Lead	99.0		P	80 - 120
2312488	Manganese	105		P	80 - 120
2312488	Molybdenum	101		P	80 - 120
2312488	Nickel	103		P	80 - 120
2312488	Selenium	103		P	80 - 120
2312488	Silver	99.1		P	80 - 120
2312488	Thallium	101		P	80 - 120
2312489	Antimony	98.6	98.1	P/P	80 - 120
2312489	Arsenic	98.9	99.0	P/P	80 - 120
2312489	Barium	102	103	P/P	80 - 120
2312489	Beryllium	97.2	98.6	P/P	80 - 120
2312489	Boron	107	105	P/P	80 - 120
2312489	Cadmium	99.6	102	P/P	80 - 120
2312489	Chromium	98.7	102	P/P	80 - 120
2312489	Cobalt	99.8	100	P/P	80 - 120
2312489	Copper	97.9	99.3	P/P	80 - 120
2312489	Lead	97.0	98.1	P/P	80 - 120
2312489	Manganese	100	105	P/P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411211

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312489	Molybdenum	98.3	99.2	P/P	80 - 120
2312489	Nickel	99.6	101	P/P	80 - 120
2312489	Selenium	97.2	98.5	P/P	80 - 120
2312489	Silver	96.4	98.3	P/P	80 - 120
2312489	Thallium	99.8	102	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411384

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2313385	Aluminum	99.5	101	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411425

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312520	Chloride	104		P	90 - 110
2312561	Chloride	104		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411428

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312520	Sulfate	103		P	90 - 110
2312561	Sulfate	103		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P411186

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312345	Ammonia-N	98.0	92.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P411275

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312165	Kjeldahl Nitrogen	92.3	103	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P411227

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312480	NO2NO3-N	94.8		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P411408

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312507	Total-P	105	105	P/P	90 - 110

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P411169

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312482	O-Phosphate-P	98.0	100	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Batch ID: P411344

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2313019	Fluoride	99.5	99.0	P/P	92 - 107

Reference Method: SM 5310 B-2011
Batch ID: P411294

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312295	Organic Carbon	105	90.8	P/P	85 - 115

Reference Method: SM 5310 B-2011
Batch ID: P411351

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2312914	Organic Carbon	95.3	98.6	P/P	85 - 115

Quality Assurance Report
Precision

Reference Method: DEP SOP: NU-094-1
Batch ID: P411172

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312478	Color (true)	5.74	Sample	P	0 - 20

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P411207

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312430	Turbidity	4.40	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P411211

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312489	Calcium	1.01	Spike	P	0 - 20
2312489	Iron	1.99	Spike	P	0 - 20
2312489	Magnesium	2.21	Spike	P	0 - 20
2312489	Potassium	1.33	Spike	P	0 - 20
2312489	Sodium	1.67	Spike	P	0 - 20
2312489	Strontium	1.85	Spike	P	0 - 20
2312489	Tin	0.843	Spike	P	0 - 20
2312489	Titanium	2.05	Spike	P	0 - 20
2312489	Vanadium	2.12	Spike	P	0 - 20
2312489	Zinc	2.11	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411211

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312489	Antimony	0.482	Spike	P	0 - 20
2312489	Arsenic	0.0390	Spike	P	0 - 20
2312489	Barium	0.541	Spike	P	0 - 20
2312489	Beryllium	1.19	Spike	P	0 - 20
2312489	Boron	1.48	Spike	P	0 - 20
2312489	Cadmium	2.02	Spike	P	0 - 20
2312489	Chromium	3.64	Spike	P	0 - 20
2312489	Cobalt	0.585	Spike	P	0 - 20
2312489	Copper	1.42	Spike	P	0 - 20
2312489	Lead	1.08	Spike	P	0 - 20
2312489	Manganese	2.23	Spike	P	0 - 20
2312489	Molybdenum	0.924	Spike	P	0 - 20
2312489	Nickel	1.25	Spike	P	0 - 20
2312489	Selenium	1.32	Spike	P	0 - 20
2312489	Silver	1.94	Spike	P	0 - 20
2312489	Thallium	2.27	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P411384

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2313385	Aluminum	1.05	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411425

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312520	Chloride	0.0684	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P411428

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312520	Sulfate	0.0741	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P411186

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312345	Ammonia-N	4.97	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P411275

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312165	Kjeldahl Nitrogen	6.93	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P411227

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312480	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P411408

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312507	Total-P	0.222	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P411169

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312482	O-Phosphate-P	1.86	Spike	P	0 - 20

Quality Assurance Report
Precision

Reference Method: SM 2320 B-2011
Batch ID: P411339

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2313019	Total Alkalinity	0.853	Sample	P	0 - 5.2

Reference Method: SM 2540 C-2011
Batch ID: P411581

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312339	TDS	0.805	Sample	P	0 - 10

Reference Method: SM 4500 F-C-2011
Batch ID: P411344

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2313019	Fluoride	0.495	Spike	P	0 - 2.1

Reference Method: SM 5310 B-2011
Batch ID: P411294

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312295	Organic Carbon	7.85	Spike	P	0 - 20

Reference Method: SM 5310 B-2011
Batch ID: P411351

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2312914	Organic Carbon	2.09	Spike	P	0 - 20

* Sample, spike and/or laboratory control sample precision (LCS) is reported.

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A110963
Included Lab Sample IDs: 2312482, 2312483

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

Reference Method: DEP SOP: NU-094-1
Run ID: A110965
Included Lab Sample IDs: 2312478, 2312479

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	98.5	99.5	P/P	85 - 115

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A110971
Included Lab Sample IDs: 2312480, 2312481

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	98.5	98.2	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A110981
Included Lab Sample IDs: 2312478, 2312479

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

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A110993
Included Lab Sample IDs: 2312480, 2312481

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	99.0	99.0	P/P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Run ID: A110994
Included Lab Sample IDs: 2312478, 2312479

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

Reference Method: SM 5310 B-2011
Run ID: A111024
Included Lab Sample IDs: 2312480

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

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A111050
Included Lab Sample IDs: 2312488, 2312489

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Antimony	95.7	96.7	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A111050
Included Lab Sample IDs: 2312488, 2312489

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Antimony	97.4	95.7	P/P	90 - 110
Arsenic	101	98.3	P/P	90 - 110
Arsenic	98.3	98.6	P/P	90 - 110
Barium	98.2	98.7	P/P	90 - 110
Barium	99.5	98.2	P/P	90 - 110
Beryllium	97.5	99.0	P/P	90 - 110
Beryllium	99.0	97.5	P/P	90 - 110
Boron	101	97.5	P/P	90 - 110
Boron	97.5	101	P/P	90 - 110
Cadmium	98.5	98.8	P/P	90 - 110
Cadmium	99.2	98.5	P/P	90 - 110
Chromium	98.1	97.8	P/P	90 - 110
Chromium	98.5	98.1	P/P	90 - 110
Cobalt	98.5	98.6	P/P	90 - 110
Cobalt	98.6	100	P/P	90 - 110
Copper	98.7	100	P/P	90 - 110
Copper	99.5	98.7	P/P	90 - 110
Lead	95.1	94.9	P/P	90 - 110
Lead	95.8	95.1	P/P	90 - 110
Manganese	98.7	99.3	P/P	90 - 110
Manganese	99.3	99.9	P/P	90 - 110
Molybdenum	98.0	97.9	P/P	90 - 110
Molybdenum	99.3	98.0	P/P	90 - 110
Nickel	99.5	101	P/P	90 - 110
Nickel	99.7	99.5	P/P	90 - 110
Selenium	98.3	99.1	P/P	90 - 110
Selenium	98.4	98.3	P/P	90 - 110
Silver	95.1	94.6	P/P	90 - 110
Silver	95.5	95.1	P/P	90 - 110
Thallium	99.0	99.2	P/P	90 - 110
Thallium	99.2	98.4	P/P	90 - 110

Reference Method: SM 2320 B-2011
Run ID: A111051
Included Lab Sample IDs: 2312478, 2312479

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	98.9	96.5	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Run ID: A111051
Included Lab Sample IDs: 2312478, 2312479

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

Reference Method: SM 5310 B-2011
Run ID: A111056
Included Lab Sample IDs: 2312481

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

Quality Assurance Report
Calibration Verification

Reference Method: SM 5310 B-2011
Run ID: A111056
Included Lab Sample IDs: 2312481

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	97.2	104	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A111092
Included Lab Sample IDs: 2312488, 2312489

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	98.0	97.2	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A111094
Included Lab Sample IDs: 2312488, 2312489

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	101	101	P/P	90 - 110
Calcium	99.7	101	P/P	90 - 110
Iron	102	99.6	P/P	90 - 110
Iron	99.6	101	P/P	90 - 110
Magnesium	101	103	P/P	90 - 110
Magnesium	103	101	P/P	90 - 110
Potassium	102	104	P/P	90 - 110
Potassium	104	102	P/P	90 - 110
Sodium	99.0	99.2	P/P	90 - 110
Sodium	99.2	100	P/P	90 - 110
Strontium	101	100	P/P	90 - 110
Strontium	99.1	101	P/P	90 - 110
Tin	96.1	97.5	P/P	90 - 110
Tin	97.5	97.3	P/P	90 - 110
Titanium	94.6	95.7	P/P	90 - 110
Titanium	95.7	95.8	P/P	90 - 110
Vanadium	95.5	97.1	P/P	90 - 110
Vanadium	97.1	97.4	P/P	90 - 110
Zinc	101	100	P/P	90 - 110
Zinc	99.7	101	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A111130
Included Lab Sample IDs: 2312480, 2312481

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	102	92.7	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A111137
Included Lab Sample IDs: 2312480, 2312481

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	98.8	99.0	P/P	90 - 110

Quality Assurance Report
Calibration Verification

* 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
DEP SOP: NU-094-1	Color (true)	97.0					5.74	
EPA 180.1 Rev. 2.0	Turbidity	96.9					4.40	
EPA 200.7 Rev. 4.4	Calcium	104	103	104				1.01
	Iron	109	106	99.2	102			1.99
	Magnesium	111	106	102	105			2.21
	Potassium	107	102	98.1	99.7			1.33
	Sodium	102	102	101				1.67
	Strontium	109	108	103	105			1.85
	Tin	106	106	102	103			0.843
	Titanium	104	103	95.8	97.9			2.05
	Vanadium	98.2	100	95.5	97.6			2.12
	Zinc	106	108	103	105			2.11
EPA 200.8 Rev. 5.4	Aluminum	101	99.5	101				1.05
	Antimony	99.9	98.6	98.1	102			0.482
	Arsenic	99.4	98.9	99.0	103			0.0390
	Barium	102	102	103	105			0.541
	Beryllium	97.3	97.2	98.6	101			1.19
	Boron	104	107	105	104			1.48
	Cadmium	99.8	99.6	102	101			2.02
	Chromium	97.6	98.7	102	102			3.64
	Cobalt	98.5	99.8	100	102			0.585
	Copper	97.2	97.9	99.3	102			1.42
	Lead	97.1	97.0	98.1	99.0			1.08
	Manganese	98.6	100	105	105			2.23
	Molybdenum	98.1	98.3	99.2	101			0.924
	Nickel	98.8	99.6	101	103			1.25
	Selenium	99.8	97.2	98.5	103			1.32
	Silver	98.4	96.4	98.3	99.1			1.94
	Thallium	99.1	99.8	102	101			2.27
EPA 300.0 Rev. 2.1	Chloride	104	104	104			0.0684	
	Sulfate	103	103	103			0.0741	
EPA 350.1 Rev. 2.0	Ammonia-N	98.8	98.0	92.8				4.97
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	101	92.3	103				6.93
EPA 353.2 Rev. 2.0	NO2NO3-N	99.5	94.8					0.0
EPA 365.1 Rev. 2.0	Total-P	101	105	105				0.222
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	99.2	98.0	100				1.86
SM 2320 B-2011	Total Alkalinity	99.1					0.853	
SM 2540 C-2011	TDS						0.805	
SM 4500 F-C-2011	Fluoride	99.1	99.5	99.0				0.495
SM 5310 B-2011	Organic Carbon	96.5	105	90.8				7.85
	Organic Carbon	93.1	95.3	98.6				2.09

Reference Method Descriptions

Method	Description	Associated Samples
DEP SOP: NU-094-1	True Color measured at 450 nm (not valid for NPDES monitoring)	2312478, 2312479
EPA 180.1 Rev. 2.0	Turbidity in aqueous matrices	2312478, 2312479
EPA 200.7 Rev. 4.4	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2312488, 2312489
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2312488, 2312489
EPA 300.0 Rev. 2.1	Chloride in aqueous matrices	2312478, 2312479
EPA 300.0 Rev. 2.1	Sulfate in aqueous matrices	2312478, 2312479

Reference Method Descriptions

Method	Description	Associated Samples
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2312480, 2312481
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2312480, 2312481
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2312480, 2312481
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2312480, 2312481
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2312482, 2312483
SM 2320 B-2011	Alkalinity in aqueous matrices as mg CaCO3/L	2312478, 2312479
SM 2340B	Hardness by calculation, in aqueous matrices, reported as mg/L CaCO3	2312488, 2312489
SM 2540 C-2011	Total Dissolved Solids in aqueous matrices	2312478, 2312479
SM 2540 D-2011	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2312478, 2312479
SM 4500 F-C-2011	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2312478, 2312479
SM 5310 B-2011	Nonpurgeable Organic Carbon in aqueous matrices	2312480, 2312481

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
DEP SOP: NU-094-1	03/16/2022			03/16/2022 11:47	Samantha L Bates	2312479
	03/16/2022			03/16/2022 11:48	Samantha L Bates	2312478
EPA 180.1 Rev. 2.0	03/16/2022			03/16/2022 11:30	Anna M. Plaviak	2312478
	03/16/2022			03/16/2022 11:31	Anna M. Plaviak	2312479
EPA 200.7 Rev. 4.4	03/16/2022	03/17/2022 10:40	Megan Whitefoot	03/22/2022 16:32	Josef B Mick	2312488
	03/16/2022	03/17/2022 10:40	Megan Whitefoot	03/22/2022 17:26	Josef B Mick	2312489
EPA 200.8 Rev. 5.4	03/16/2022	03/17/2022 10:40	Megan Whitefoot	03/18/2022 15:25	Alexander Thompson	2312489
	03/16/2022	03/17/2022 10:40	Megan Whitefoot	03/18/2022 17:07	Alexander Thompson	2312488
	03/16/2022	03/22/2022 10:52	Megan Whitefoot	03/22/2022 20:47	Emily M Philpot	2312488
	03/16/2022	03/22/2022 10:52	Megan Whitefoot	03/22/2022 20:56	Emily M Philpot	2312489
EPA 300.0 Rev. 2.1	03/16/2022			03/19/2022 06:00	Anna M. Plaviak	2312478
	03/16/2022			03/19/2022 06:12	Anna M. Plaviak	2312479
EPA 350.1 Rev. 2.0	03/16/2022			03/16/2022 12:43	Ping Hua	2312481
	03/16/2022			03/16/2022 12:48	Ping Hua	2312480
EPA 351.2 Rev. 2.0	03/16/2022	03/22/2022 11:30	Samantha L Bates	03/24/2022 11:51	Alexandra J Mattheus	2312480
	03/16/2022	03/22/2022 11:30	Samantha L Bates	03/24/2022 11:52	Alexandra J Mattheus	2312481
EPA 353.2 Rev. 2.0	03/16/2022			03/17/2022 10:57	Beverly Y. Sanders	2312480
	03/16/2022			03/17/2022 11:03	Beverly Y. Sanders	2312481
EPA 365.1 Rev. 2.0	03/16/2022	03/22/2022 15:55	Simonne.V. Calhoun	03/24/2022 14:27	James L Waggerby	2312480
	03/16/2022	03/22/2022 15:55	Simonne.V. Calhoun	03/24/2022 14:28	James L Waggerby	2312481
EPA 365.1 Rev. 2.0 dissolved	03/16/2022			03/16/2022 11:36	James L Waggerby	2312482
	03/16/2022			03/16/2022 11:39	James L Waggerby	2312483
SM 2320 B-2011	03/16/2022			03/18/2022 00:58	Dale L. Simmons	2312478
	03/16/2022			03/18/2022 01:10	Dale L. Simmons	2312479
SM 2340B	03/16/2022			03/22/2022 16:32	Josef B Mick	2312488
	03/16/2022			03/22/2022 17:26	Josef B Mick	2312489
SM 2540 C-2011	03/16/2022			03/18/2022 15:46	Yijie Li	2312478, 2312479
SM 2540 D-2011	03/16/2022			03/18/2022 15:46	Yijie Li	2312478, 2312479
SM 4500 F-C-2011	03/16/2022			03/18/2022 00:58	Dale L. Simmons	2312478
	03/16/2022			03/18/2022 01:10	Dale L. Simmons	2312479
SM 5310 B-2011	03/16/2022			03/17/2022 21:28	Khloe J Berg	2312480
	03/16/2022			03/18/2022 21:35	Khloe J Berg	2312481