

Chemical Analysis Report

WQAP-2020-06-25-01

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

Event Description: **Algal Bloom Response - SE ROC**
Request ID: **RQ-2020-03-23-45**
Customer: **WQAP**
Project ID: **BLOOM-RESP**

Send Reports to:
FL Dept. of Environmental Protection
2199 South Rock Road
Fort Pierce, FL 34945
Attn: Jordan Skaggs

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: Thekkekalathil Chandrasekhar, Chemist Administrator

Date Certified: 17-JUL-2020 10:50



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: Nutrients and Pesticides.

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: North Fork St. Lucie River_CM

Collection Date/Time: 06/24/2020 10:45

Field ID: North Fork St. Lucie River_CM

Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2178518	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P383674	
		Cylindrospermopsin**	0.25	U	ug/L	P383674	
		Desmethyl microcystin LR**	0.25	U	ug/L	P383674	
		Microcystin LA**	0.25	U	ug/L	P383674	
		Microcystin LF**	0.25	U	ug/L	P383674	
		Microcystin LR**	0.25	U	ug/L	P383674	
		Microcystin LW**	0.25	U	ug/L	P383674	
		Microcystin LY**	0.25	U	ug/L	P383674	
		Microcystin RR**	0.25	U	ug/L	P383674	
		Microcystin WR**	0.50	U	ug/L	P383674	
		Microcystin YR**	0.25	U	ug/L	P383674	
2178519	EPA 350.1 Rev. 2.0	Ammonia-N	0.022		mg N/L	P383767	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.2		mg N/L	P383716	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.073		mg N/L	P383798	
	EPA 365.1 Rev. 2.0	Total-P	0.29		mg P/L	P383810	
2178520	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.20		mg P/L	P383747	

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383767

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383716

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383798

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383810

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383747

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

Reference Method: EPA 8321B
Batch ID: P383674

Component	Result	Code	Units
Anatoxin-a	0.25	U	ug/L
Cylindrospermopsin	0.25	U	ug/L
Desmethyl microcystin LR	0.25	U	ug/L
Microcystin LA	0.25	U	ug/L
Microcystin LF	0.25	U	ug/L
Microcystin LR	0.25	U	ug/L
Microcystin LW	0.25	U	ug/L
Microcystin LY	0.25	U	ug/L
Microcystin RR	0.25	U	ug/L
Microcystin WR	0.50	U	ug/L
Microcystin YR	0.25	U	ug/L

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383767

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383716

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383798

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383810

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	98.2		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383747

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

Reference Method: EPA 8321B
Batch ID: P383674

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	88.2		P	40 - 140
Cylindrospermopsin	115		P	40 - 140
Desmethyl microcystin LR	101		P	40 - 140
Microcystin LA	99.9		P	40 - 140
Microcystin LF	107		P	40 - 140
Microcystin LR	104		P	40 - 140
Microcystin LW	92.6		P	40 - 140
Microcystin LY	106		P	40 - 140
Microcystin RR	99.1		P	40 - 140
Microcystin WR	99.6		P	40 - 140
Microcystin YR	82.0		P	40 - 140

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383767

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2178519	Ammonia-N	99.9	99.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383716

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2178460	Kjeldahl Nitrogen	102	109	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383798

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2178507	NO2NO3-N	99.0	98.0	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383810

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2178526	Total-P	102	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383747

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2178520	O-Phosphate-P	93.4	93.9	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P383674

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2178496	Anatoxin-a	84.0	84.3	P/P	40 - 140
2178496	Cylindrospermopsin	99.0	101	P/P	40 - 140
2178496	Desmethyl microcystin LR	111	108	P/P	40 - 140
2178496	Microcystin LA	91.8	95.3	P/P	40 - 140
2178496	Microcystin LF	103	104	P/P	40 - 140
2178496	Microcystin LR	109	109	P/P	40 - 140
2178496	Microcystin LW	99.1	92.0	P/P	40 - 140
2178496	Microcystin LY	95.7	101	P/P	40 - 140
2178496	Microcystin RR	106	104	P/P	40 - 140
2178496	Microcystin WR	109	101	P/P	40 - 140
2178496	Microcystin YR	83.6	84.6	P/P	40 - 140

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383767

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2178519	Ammonia-N	0.0581	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383716

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2178460	Kjeldahl Nitrogen	4.84	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383798

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2178507	NO2NO3-N	1.02	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383810

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2178526	Total-P	1.24	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383747

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2178520	O-Phosphate-P	0.170	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P383674

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2178496	Anatoxin-a	0.415	Spike	P	0 - 30
2178496	Cylindrospermopsin	2.10	Spike	P	0 - 30
2178496	Desmethyl microcystin LR	2.97	Spike	P	0 - 30
2178496	Microcystin LA	3.71	Spike	P	0 - 30
2178496	Microcystin LF	1.52	Spike	P	0 - 30
2178496	Microcystin LR	0.438	Spike	P	0 - 30
2178496	Microcystin LW	7.43	Spike	P	0 - 30
2178496	Microcystin LY	5.65	Spike	P	0 - 30
2178496	Microcystin RR	1.36	Spike	P	0 - 30
2178496	Microcystin WR	7.68	Spike	P	0 - 30
2178496	Microcystin YR	1.20	Spike	P	0 - 30

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

Quality Assurance Report Surrogates

Lab Sample ID: 2178518

Field Sample ID: North Fork St. Lucie River_CM

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	109	P	30 - 160

Quality Assurance Report Calibration Verification

Reference Method: EPA 8321B
Run ID: A99498
Included Lab Sample IDs: 2178518

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	89.1	89.9	P/P	50 - 160
Cylindrospermopsin	118	116	P/P	60 - 160
Desmethyl microcystin LR	114	113	P/P	60 - 160
Microcystin LA	108	113	P/P	50 - 160
Microcystin LF	124	118	P/P	60 - 160
Microcystin LR	111	117	P/P	60 - 160
Microcystin LW	109	107	P/P	60 - 160
Microcystin LY	109	125	P/P	60 - 160
Microcystin RR	106	106	P/P	60 - 160
Microcystin WR	121	116	P/P	60 - 160
Microcystin YR	90.1	97.6	P/P	60 - 160

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A99548
Included Lab Sample IDs: 2178520

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	97.4	96.8	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A99556
Included Lab Sample IDs: 2178519

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	101	94.9	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A99570
Included Lab Sample IDs: 2178519

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	101	101	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A99571
Included Lab Sample IDs: 2178519

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	100	96.3	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A99590
Included Lab Sample IDs: 2178519

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	103	103	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		LCS	Precision SMP	MS
EPA 350.1 Rev. 2.0	Ammonia-N	99.2	99.9	99.8			0.0581
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	105	102	109			4.84
EPA 353.2 Rev. 2.0	NO2NO3-N	100	99.0	98.0			1.02
EPA 365.1 Rev. 2.0	Total-P	98.2	102	100			1.24
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	96.4	93.4	93.9			0.170
EPA 8321B	Anatoxin-a	88.2	84.0	84.3			0.415
	Cylindrospermopsin	115	99.0	101			2.10
	Desmethyl microcystin LR	101	111	108			2.97
	Microcystin LA	99.9	91.8	95.3			3.71
	Microcystin LF	107	103	104			1.52
	Microcystin LR	104	109	109			0.438
	Microcystin LW	92.6	99.1	92.0			7.43
	Microcystin LY	106	95.7	101			5.65
	Microcystin RR	99.1	106	104			1.36
	Microcystin WR	99.6	109	101			7.68
	Microcystin YR	82.0	83.6	84.6			1.20

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2178519
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2178519
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2178519
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2178519
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2178520
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2178518

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 350.1 Rev. 2.0	06/25/2020			06/27/2020 16:27	Ping Hua	2178519
EPA 351.2 Rev. 2.0	06/25/2020	06/26/2020 11:30	Elliott Rodriguez	06/29/2020 10:18	Jhamieka S. Greenwood	2178519
EPA 353.2 Rev. 2.0	06/25/2020			06/29/2020 09:11	Beverly Y. Sanders	2178519
EPA 365.1 Rev. 2.0	06/25/2020	06/29/2020 13:17	Yen Ta	06/30/2020 08:53	Benjamin T. Nordmann	2178519
EPA 365.1 Rev. 2.0 dissolved	06/25/2020			06/25/2020 16:08	Carlos Miranda	2178520
EPA 8321B	06/25/2020	06/25/2020 11:50	Juyoung Kim	06/25/2020 17:43	Juyoung Kim	2178518