

Chemical Analysis Report

WQAP-2020-01-28-01

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

Event Description: **Algal Bloom Response - SEROC**
Request ID: **RQ-2019-09-09-35**
Customer: **WQAP**
Project ID: **BLOOM-RESP**

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

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: Kerry Tate, Ph.D., Environmental Administrator

Date Certified: 14-FEB-2020 14:16

A handwritten signature in black ink that reads "Kerry Tate". The signature is written in a cursive, flowing style with a horizontal line above the first name.

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: St.Lucie Lock

Collection Date/Time: 01/27/2020 11:00

Field ID: St.Lucie Lock

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2151999	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P377873	
		Cylindrospermopsin**	0.25	U	ug/L	P377873	
		Desmethyl microcystin LR**	0.25	U	ug/L	P377873	
		Microcystin LA**	0.25	U	ug/L	P377873	
		Microcystin LF**	0.25	U	ug/L	P377873	
		Microcystin LR**	0.25	U	ug/L	P377873	
		Microcystin LW**	0.25	U	ug/L	P377873	
		Microcystin LY**	0.25	U	ug/L	P377873	
		Microcystin RR**	0.25	U	ug/L	P377873	
		Microcystin WR**	0.50	U	ug/L	P377873	
		Microcystin YR**	0.25	U	ug/L	P377873	
2152004	EPA 350.1 Rev. 2.0	Ammonia-N	0.014		mg N/L	P378396	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.68		mg N/L	P378202	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.36		mg N/L	P377938	
	EPA 365.1 Rev. 2.0	Total-P	0.13		mg P/L	P378072	
2152005	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.092		mg P/L	P377811	

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P378396

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P378202

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P377938

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P378072

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P377811

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

Reference Method: EPA 8321B
Batch ID: P377873

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: P378396

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

Reference Method: EPA 351.2 Rev. 2.0
 Batch ID: P378202

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

Reference Method: EPA 353.2 Rev. 2.0
 Batch ID: P377938

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	103		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
 Batch ID: P378072

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: P377811

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	98.6		P	90 - 110

Reference Method: EPA 8321B
 Batch ID: P377873

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	108		P	40 - 140
Cylindrospermopsin	116		P	40 - 140
Desmethyl microcystin LR	104		P	40 - 140
Microcystin LA	103		P	40 - 140
Microcystin LF	101		P	40 - 140
Microcystin LR	104		P	40 - 140
Microcystin LW	98.1		P	40 - 140
Microcystin LY	100		P	40 - 140
Microcystin RR	106		P	40 - 140
Microcystin WR	104		P	40 - 140
Microcystin YR	94.3		P	40 - 140

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P378396

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2152004	Ammonia-N	103	103	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P378202

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2152230	Kjeldahl Nitrogen	98.8	106	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P377938

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2151685	NO2NO3-N	103	103	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P378072

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2151947	Total-P	103	105	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P377811

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2151987	O-Phosphate-P	95.1	96.0	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P377873

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2151999	Anatoxin-a	100	107	P/P	40 - 140
2151999	Cylindrospermopsin	102	106	P/P	40 - 140
2151999	Desmethyl microcystin LR	102	102	P/P	40 - 140
2151999	Microcystin LA	85.4	90.3	P/P	40 - 140
2151999	Microcystin LF	80.9	97.1	P/P	40 - 140
2151999	Microcystin LR	101	102	P/P	40 - 140
2151999	Microcystin LW	89.3	91.7	P/P	40 - 140
2151999	Microcystin LY	99.0	83.1	P/P	40 - 140
2151999	Microcystin RR	99.9	104	P/P	40 - 140
2151999	Microcystin WR	98.6	102	P/P	40 - 140
2151999	Microcystin YR	85.6	91.9	P/P	40 - 140

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0
 Batch ID: P378396

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2152004	Ammonia-N	0.503	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
 Batch ID: P378202

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2152230	Kjeldahl Nitrogen	5.48	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
 Batch ID: P377938

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2151685	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
 Batch ID: P378072

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2151947	Total-P	1.40	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
 Batch ID: P377811

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2151987	O-Phosphate-P	0.548	Spike	P	0 - 20

Reference Method: EPA 8321B
 Batch ID: P377873

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2151999	Anatoxin-a	6.43	Spike	P	0 - 30
2151999	Cylindrospermopsin	4.54	Spike	P	0 - 30
2151999	Desmethyl microcystin LR	0.00157	Spike	P	0 - 30
2151999	Microcystin LA	5.55	Spike	P	0 - 30
2151999	Microcystin LF	18.2	Spike	P	0 - 30
2151999	Microcystin LR	1.59	Spike	P	0 - 30
2151999	Microcystin LW	2.62	Spike	P	0 - 30
2151999	Microcystin LY	17.5	Spike	P	0 - 30
2151999	Microcystin RR	4.17	Spike	P	0 - 30
2151999	Microcystin WR	2.89	Spike	P	0 - 30
2151999	Microcystin YR	7.06	Spike	P	0 - 30

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

Quality Assurance Report Surrogates

Lab Sample ID: 2151999
Field Sample ID: St.Lucie Lock

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Carbamazepine-d10	116	P	30 - 165

Quality Assurance Report Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A97147

Included Lab Sample IDs: 2152005

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	100	98.1	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A97186

Included Lab Sample IDs: 2152004

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	102	103	P/P	90 - 110

Reference Method: EPA 8321B

Run ID: A97199

Included Lab Sample IDs: 2151999

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	101	92.5	P/P	50 - 160
Cylindrospermopsin	106	107	P/P	60 - 160
Desmethyl microcystin LR	102	106	P/P	60 - 160
Microcystin LA	100	100	P/P	50 - 160
Microcystin LF	107	97.8	P/P	60 - 160
Microcystin LR	103	102	P/P	60 - 160
Microcystin LW	111	100	P/P	60 - 160
Microcystin LY	95.7	99.0	P/P	60 - 160
Microcystin RR	105	102	P/P	60 - 160
Microcystin WR	95.9	107	P/P	60 - 160
Microcystin YR	91.7	90.9	P/P	60 - 160

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A97292

Included Lab Sample IDs: 2152004

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

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A97331

Included Lab Sample IDs: 2152004

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	104	98.4	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A97349

Included Lab Sample IDs: 2152004

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	102	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	MS
						SMP	
EPA 350.1 Rev. 2.0	Ammonia-N	101	103	103			0.503
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	96.5	98.8	106			5.48
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	103	103	103			0.0
EPA 365.1 Rev. 2.0	Total-P	101	103	105			1.40
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.6	95.1	96.0			0.548
EPA 8321B	Anatoxin-a	108	100	107			6.43
	Cylindrospermopsin	116	102	106			4.54
	Desmethyl microcystin LR	104	102	102			0.0015
	Microcystin LA	103	85.4	90.3			5.55
	Microcystin LF	101	80.9	97.1			18.2
	Microcystin LR	104	101	102			1.59
	Microcystin LW	98.1	89.3	91.7			2.62
	Microcystin LY	100	99.0	83.1			17.5
	Microcystin RR	106	99.9	104			4.17
	Microcystin WR	104	98.6	102			2.89
	Microcystin YR	94.3	85.6	91.9			7.06

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2152004
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2152004
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2152004
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2152004
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2152005
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2151999

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	01/28/2020			02/04/2020 14:16	Ping Hua	2152004
EPA 351.2 Rev. 2.0	01/28/2020	02/04/2020 12:30	Jhamieka S. Greenwood	02/05/2020 12:00	Jhamieka S. Greenwood	2152004
EPA 353.2 Rev. 2.0	01/28/2020			01/29/2020 10:41	Beverly Y. Sanders	2152004
EPA 365.1 Rev. 2.0	01/28/2020	01/31/2020 14:34	Yen Ta	02/03/2020 15:43	Benjamin T. Nordmann	2152004
EPA 365.1 Rev. 2.0 dissolved	01/28/2020			01/28/2020 17:08	Carlos Miranda	2152005
EPA 8321B	01/28/2020	01/30/2020 09:00	Juyoung Kim	01/30/2020 10:42	Juyoung Kim	2151999