Chemical Analysis Report

WQAP-2021-05-21-01

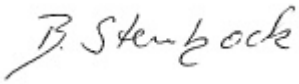
Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Algal Bloom Response -SOROC**
Request ID: **RQ-2021-05-17-68**
Customer: **WQAP**
Project ID: **BLOOM-RESP**

Send Reports to:
FL Dept. of Environmental Protection
2295 Victoria AVE
Suite 364
Fort Myers, FL 33901
Attn: Kirby Wolfe

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: 08-JUN-2021 17:14



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: Caloosa Canal - Sebastian Ct **Collection Date/Time: 05/20/2021 09:45**

Field ID: HAB-SD-052021-01 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2249123	EPA 8321B	Anatoxin-a	0.25	U	ug/L	P398658	
		Cylindrospermopsin	0.10	U	ug/L	P398658	
		Desmethyl microcystin LR	0.25	U	ug/L	P398658	
		Microcystin HilR**	0.25	U	ug/L	P398658	
		Microcystin HtyR**	0.25	U	ug/L	P398658	
		Microcystin LA	0.10	U	ug/L	P398658	
		Microcystin LF	0.10	U	ug/L	P398658	
		Microcystin LR	7.6		ug/L	P398658	
		Microcystin LW	0.25	U	ug/L	P398658	
		Microcystin LY	0.10	U	ug/L	P398658	
		Microcystin RR	0.10	U	ug/L	P398658	
		Microcystin WR	0.50	U	ug/L	P398658	
		Microcystin YR	0.25	U	ug/L	P398658	
		Nodularin-R**	0.10	U	ug/L	P398658	
2249124	EPA 350.1 Rev. 2.0	Ammonia-N	0.022		mg N/L	P399167	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.2		mg N/L	P398718	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P398655	
	EPA 365.1 Rev. 2.0	Total-P	0.16		mg P/L	P398797	
2249125	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.045		mg P/L	P398701	

Quality Assurance Report
Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P399167

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P398718

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P398655

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P398797

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P398701

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

Reference Method: EPA 8321B
Batch ID: P398658

Component	Result	Code	Units
Anatoxin-a	0.25	U	ug/L
Cylindrospermopsin	0.10	U	ug/L
Desmethyl microcystin LR	0.25	U	ug/L
Microcystin HilR	0.25	U	ug/L
Microcystin HtyR	0.25	U	ug/L
Microcystin LA	0.10	U	ug/L
Microcystin LF	0.10	U	ug/L
Microcystin LR	0.25	U	ug/L
Microcystin LW	0.25	U	ug/L
Microcystin LY	0.10	U	ug/L
Microcystin RR	0.10	U	ug/L
Microcystin WR	0.50	U	ug/L
Microcystin YR	0.25	U	ug/L
Nodularin-R	0.10	U	ug/L

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P399167

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P398718

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	94.6		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P398655

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P398797

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P398701

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

Reference Method: EPA 8321B
Batch ID: P398658

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	109		P	40 - 150
Cylindrospermopsin	109		P	40 - 150
Desmethyl microcystin LR	82.9		P	40 - 150
Microcystin HilR	85.9		P	40 - 150
Microcystin HtyR	77.6		P	40 - 150
Microcystin LA	99.9		P	40 - 150
Microcystin LF	98.0		P	40 - 150
Microcystin LR	78.4		P	40 - 150
Microcystin LW	93.0		P	40 - 150
Microcystin LY	84.1		P	40 - 150
Microcystin RR	98.9		P	40 - 150
Microcystin WR	83.5		P	40 - 150
Microcystin YR	75.5		P	40 - 150
Nodularin-R	96.9		P	40 - 150

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P399167

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2248924	Ammonia-N	91.4	95.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P398718

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2249136	Kjeldahl Nitrogen	101	99.3	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P398655

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2249124	NO2NO3-N	101	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P398797

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2248976	Total-P	107	106	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P398701

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2249141	O-Phosphate-P	96.1	97.1	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P398658

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2249123	Anatoxin-a	104	95.8	P/P	40 - 150
2249123	Cylindrospermopsin	103	96.4	P/P	40 - 150
2249123	Desmethyl microcystin LR	94.3	95.2	P/P	40 - 150
2249123	Microcystin HilR	92.5	87.6	P/P	40 - 150
2249123	Microcystin HtyR	79.7	81.1	P/P	40 - 150
2249123	Microcystin LA	95.8	90.8	P/P	40 - 150
2249123	Microcystin LF	96.7	96.6	P/P	40 - 150
2249123	Microcystin LR	105	91.7	P/P	40 - 150
2249123	Microcystin LW	91.0	89.4	P/P	40 - 150
2249123	Microcystin LY	85.3	82.1	P/P	40 - 150
2249123	Microcystin RR	101	95.0	P/P	40 - 150
2249123	Microcystin WR	87.7	87.1	P/P	40 - 150
2249123	Microcystin YR	76.9	74.2	P/P	40 - 150
2249123	Nodularin-R	110	105	P/P	40 - 150

Quality Assurance Report
Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P399167

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2248924	Ammonia-N	3.64	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P398718

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2249136	Kjeldahl Nitrogen	0.965	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P398655

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2249124	NO2NO3-N	0.496	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P398797

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2248976	Total-P	0.683	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P398701

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2249141	O-Phosphate-P	0.935	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P398658

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2249123	Anatoxin-a	7.89	Spike	P	0 - 30
2249123	Cylindrospermopsin	6.37	Spike	P	0 - 30
2249123	Desmethyl microcystin LR	1.01	Spike	P	0 - 30
2249123	Microcystin HilR	5.44	Spike	P	0 - 30
2249123	Microcystin HtyR	1.77	Spike	P	0 - 30
2249123	Microcystin LA	5.35	Spike	P	0 - 30
2249123	Microcystin LF	0.150	Spike	P	0 - 30
2249123	Microcystin LR	7.80	Spike	P	0 - 30
2249123	Microcystin LW	1.77	Spike	P	0 - 30
2249123	Microcystin LY	3.80	Spike	P	0 - 30
2249123	Microcystin RR	6.44	Spike	P	0 - 30
2249123	Microcystin WR	0.713	Spike	P	0 - 30
2249123	Microcystin YR	3.64	Spike	P	0 - 30
2249123	Nodularin-R	4.48	Spike	P	0 - 30

Quality Assurance Report
Precision

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

Quality Assurance Report
Surrogates

Lab Sample ID: 2249123
Field Sample ID: HAB-SD-052021-01

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	80.8	P	30 - 160
EPA 8321B	Microcystin LR ethyl-d5	83.1	P	30 - 160

Quality Assurance Report
Calibration Verification

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A105611
Included Lab Sample IDs: 2249124

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A105633
Included Lab Sample IDs: 2249125

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.4	99.5	P/P	90 - 110

Reference Method: EPA 8321B
Run ID: A105645
Included Lab Sample IDs: 2249123

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	93.4	90.0	P/P	50 - 160
Cylindrospermopsin	102	99.7	P/P	50 - 160
Desmethyl microcystin LR	92.7	84.9	P/P	50 - 160
Microcystin HilR	87.0	82.8	P/P	50 - 160
Microcystin HtyR	78.0	75.7	P/P	50 - 160
Microcystin LA	103	97.5	P/P	50 - 160
Microcystin LF	116	104	P/P	50 - 160
Microcystin LR	89.5	80.9	P/P	50 - 160
Microcystin LW	109	92.3	P/P	50 - 160
Microcystin LY	92.5	87.1	P/P	50 - 160
Microcystin RR	101	93.4	P/P	50 - 160
Microcystin WR	91.9	86.6	P/P	50 - 160
Microcystin YR	83.6	77.3	P/P	50 - 160
Nodularin-R	101	95.6	P/P	50 - 160

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A105734
Included Lab Sample IDs: 2249124

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

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A105791
Included Lab Sample IDs: 2249124

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	100	97.3	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A105849
Included Lab Sample IDs: 2249124

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	101	98.5	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
EPA 350.1 Rev. 2.0	Ammonia-N	100	91.4	95.8			3.64
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	94.6	101	99.3			0.965
EPA 353.2 Rev. 2.0	NO2NO3-N	102	101	100			0.496
EPA 365.1 Rev. 2.0	Total-P	107	107	106			0.683
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.8	96.1	97.1			0.935
EPA 8321B	Anatoxin-a	109	104	95.8			7.89
	Cylindrospermopsin	109	103	96.4			6.37
	Desmethyl microcystin LR	82.9	94.3	95.2			1.01
	Microcystin HilR	85.9	92.5	87.6			5.44
	Microcystin HtyR	77.6	79.7	81.1			1.77
	Microcystin LA	99.9	95.8	90.8			5.35
	Microcystin LF	98.0	96.7	96.6			0.150
	Microcystin LR	78.4	105	91.7			7.80
	Microcystin LW	93.0	91.0	89.4			1.77
	Microcystin LY	84.1	85.3	82.1			3.80
	Microcystin RR	98.9	101	95.0			6.44
	Microcystin WR	83.5	87.7	87.1			0.713
	Microcystin YR	75.5	76.9	74.2			3.64
	Nodularin-R	96.9	110	105			4.48

Reference Method Descriptions

Method	Description	Associated Samples
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2249124
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2249124
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2249124
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2249124
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2249125
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2249123

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	05/21/2021			06/03/2021 12:19	Roberta Tatti	2249124
EPA 351.2 Rev. 2.0	05/21/2021	05/25/2021 12:46	Benjamin T. Nordmann	05/27/2021 16:50	Virginia P. Brown	2249124
EPA 353.2 Rev. 2.0	05/21/2021			05/24/2021 11:01	Beverly Y. Sanders	2249124
EPA 365.1 Rev. 2.0	05/21/2021	05/26/2021 13:31	Yen Ta	05/27/2021 12:02	Shengyu Ding	2249124
EPA 365.1 Rev. 2.0 dissolved	05/21/2021			05/21/2021 14:54	Blanca Fach	2249125
EPA 8321B	05/21/2021	05/25/2021 07:00	Pramila Ghimire	05/25/2021 10:31	Pramila Ghimire	2249123