Chemical Analysis Report

WQAP-2021-12-07-03

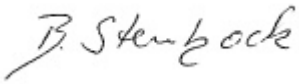
Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Algal Bloom Response -SOROC**
Request ID: **RQ-2021-07-12-40**
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: 28-DEC-2021 13:08



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: Lake Okeechobee - Clewiston Boat Ramp **Collection Date/Time: 12/06/2021 12:20**

Field ID: HAB-SD-12062021-1220 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2293819	EPA 8321B	Anatoxin-a	0.25	U	ug/L	P407033	
		Cylindrospermopsin	0.10	U	ug/L	P407033	
		Desmethyl microcystin LR	0.25	U	ug/L	P407033	
		Microcystin HilR**	0.25	U	ug/L	P407033	
		Microcystin HtyR**	0.25	U	ug/L	P407033	
		Microcystin LA	0.10	U	ug/L	P407033	
		Microcystin LF	0.10	U	ug/L	P407033	
		Microcystin LR	0.25	U	ug/L	P407033	
		Microcystin LW	0.25	U	ug/L	P407033	
		Microcystin LY	0.10	U	ug/L	P407033	
		Microcystin RR	0.10	U	ug/L	P407033	
		Microcystin WR	0.50	U	ug/L	P407033	
		Microcystin YR	0.25	U	ug/L	P407033	
		Nodularin-R**	0.10	U	ug/L	P407033	
2293820	EPA 350.1 Rev. 2.0	Ammonia-N	0.012		mg N/L	P407717	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.4		mg N/L	P407517	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P407296	
	EPA 365.1 Rev. 2.0	Total-P	0.058		mg P/L	P407175	
2293821	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.004	U	mg P/L	P407119	

Quality Assurance Report
Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P407717

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407517

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407296

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P407175

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407119

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

Reference Method: EPA 8321B
Batch ID: P407033

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: P407717

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	98.4		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407517

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407296

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: P407175

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407119

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

Reference Method: EPA 8321B
Batch ID: P407033

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	105		P	40 - 150
Cylindrospermopsin	84.2		P	40 - 150
Desmethyl microcystin LR	90.1		P	40 - 150
Microcystin HilR	82.0		P	40 - 150
Microcystin HtyR	82.0		P	40 - 150
Microcystin LA	107		P	40 - 150
Microcystin LF	129		P	40 - 150
Microcystin LR	78.1		P	40 - 150
Microcystin LW	103		P	40 - 150
Microcystin LY	106		P	40 - 150
Microcystin RR	96.0		P	40 - 150
Microcystin WR	83.9		P	40 - 150
Microcystin YR	74.8		P	40 - 150
Nodularin-R	94.4		P	40 - 150

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P407717

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293799	Ammonia-N	97.6	99.0	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407517

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293480	Kjeldahl Nitrogen	98.5	93.1	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407296

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293799	NO2NO3-N	101	99.0	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P407175

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293799	Total-P	103	104	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407119

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293464	O-Phosphate-P	99.3	98.3	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P407033

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2292904	Anatoxin-a	113	105	P/P	40 - 150
2292904	Cylindrospermopsin	86.9	79.5	P/P	40 - 150
2292904	Desmethyl microcystin LR	101	85.3	P/P	40 - 150
2292904	Microcystin HilR	86.9	81.0	P/P	40 - 150
2292904	Microcystin HtyR	87.9	77.8	P/P	40 - 150
2292904	Microcystin LA	102	98.8	P/P	40 - 150
2292904	Microcystin LF	127	114	P/P	40 - 150
2292904	Microcystin LR	76.3	71.2	P/P	40 - 150
2292904	Microcystin LW	100	86.1	P/P	40 - 150
2292904	Microcystin LY	103	89.3	P/P	40 - 150
2292904	Microcystin RR	98.1	88.0	P/P	40 - 150
2292904	Microcystin WR	79.9	74.4	P/P	40 - 150
2292904	Microcystin YR	80.8	72.4	P/P	40 - 150
2292904	Nodularin-R	98.0	89.4	P/P	40 - 150

Quality Assurance Report
Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P407717

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293799	Ammonia-N	1.15	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407517

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293480	Kjeldahl Nitrogen	3.44	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407296

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293799	NO2NO3-N	2.00	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P407175

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293799	Total-P	0.938	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407119

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293464	O-Phosphate-P	0.609	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P407033

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2292904	Anatoxin-a	7.03	Spike	P	0 - 30
2292904	Cylindrospermopsin	8.91	Spike	P	0 - 30
2292904	Desmethyl microcystin LR	17.1	Spike	P	0 - 30
2292904	Microcystin HilR	6.99	Spike	P	0 - 30
2292904	Microcystin HtyR	12.2	Spike	P	0 - 30
2292904	Microcystin LA	3.49	Spike	P	0 - 30
2292904	Microcystin LF	11.3	Spike	P	0 - 30
2292904	Microcystin LR	6.56	Spike	P	0 - 30
2292904	Microcystin LW	15.4	Spike	P	0 - 30
2292904	Microcystin LY	14.3	Spike	P	0 - 30
2292904	Microcystin RR	10.6	Spike	P	0 - 30
2292904	Microcystin WR	7.15	Spike	P	0 - 30
2292904	Microcystin YR	11.0	Spike	P	0 - 30
2292904	Nodularin-R	9.17	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: 2293819
Field Sample ID: HAB-SD-12062021-1220

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	88.3	P	30 - 160
EPA 8321B	Microcystin LR ethyl-d5	84.5	P	30 - 160

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A109244
Included Lab Sample IDs: 2293821

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	101	99.2	P/P	90 - 110

Reference Method: EPA 8321B
Run ID: A109250
Included Lab Sample IDs: 2293819

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	111	114	P/P	50 - 160
Cylindrospermopsin	87.4	87.0	P/P	60 - 160
Desmethyl microcystin LR	92.3	95.1	P/P	60 - 160
Microcystin HilR	85.6	86.4	P/P	60 - 160
Microcystin HtyR	78.1	78.9	P/P	60 - 160
Microcystin LA	108	109	P/P	50 - 160
Microcystin LF	124	130	P/P	60 - 160
Microcystin LR	77.8	77.5	P/P	60 - 160
Microcystin LW	83.4	80.6	P/P	60 - 160
Microcystin LY	93.5	91.4	P/P	60 - 160
Microcystin RR	97.3	97.0	P/P	60 - 160
Microcystin WR	64.0	65.9	P/P	60 - 160
Microcystin YR	69.9	76.9	P/P	60 - 160
Nodularin-R	90.7	90.7	P/P	60 - 160

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A109315
Included Lab Sample IDs: 2293820

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	102	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A109353
Included Lab Sample IDs: 2293820

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	104	103	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A109486
Included Lab Sample IDs: 2293820

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	103	99.8	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A109493
Included Lab Sample IDs: 2293820

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.3	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
EPA 350.1 Rev. 2.0	Ammonia-N	98.4	97.6	99.0			1.15
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	106	98.5	93.1			3.44
EPA 353.2 Rev. 2.0	NO2NO3-N	100	101	99.0			2.00
EPA 365.1 Rev. 2.0	Total-P	104	103	104			0.938
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	99.5	99.3	98.3			0.609
EPA 8321B	Anatoxin-a	105	113	105			7.03
	Cylindrospermopsin	84.2	86.9	79.5			8.91
	Desmethyl microcystin LR	90.1	101	85.3			17.1
	Microcystin HilR	82.0	86.9	81.0			6.99
	Microcystin HtyR	82.0	87.9	77.8			12.2
	Microcystin LA	107	102	98.8			3.49
	Microcystin LF	129	127	114			11.3
	Microcystin LR	78.1	76.3	71.2			6.56
	Microcystin LW	103	100	86.1			15.4
	Microcystin LY	106	103	89.3			14.3
	Microcystin RR	96.0	98.1	88.0			10.6
	Microcystin WR	83.9	79.9	74.4			7.15
	Microcystin YR	74.8	80.8	72.4			11.0
	Nodularin-R	94.4	98.0	89.4			9.17

Reference Method Descriptions

Method	Description	Associated Samples
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2293820
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2293820
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2293820
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2293820
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2293821
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2293819

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	12/07/2021			12/20/2021 14:11	Ping Hua	2293820
EPA 351.2 Rev. 2.0	12/07/2021	12/16/2021 10:33	Alexandra J Mattheus	12/17/2021 14:45	Alexandra J Mattheus	2293820
EPA 353.2 Rev. 2.0	12/07/2021			12/10/2021 09:30	Beverly Y. Sanders	2293820
EPA 365.1 Rev. 2.0	12/07/2021	12/09/2021 14:45	Simonne.V. Calhoun	12/10/2021 12:40	Shengyu Ding	2293820
EPA 365.1 Rev. 2.0 dissolved	12/07/2021			12/07/2021 15:28	James L Waggerby	2293821
EPA 8321B	12/07/2021	12/07/2021 13:30	Manjita Shrestha	12/07/2021 17:38	Manjita Shrestha	2293819