

Chemical Analysis Report

WQAP-2021-07-21-04

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

Event Description: **Algal Bloom Response -Lee County**
Request ID: **RQ-2021-06-14-20**
Customer: **WQAP**
Project ID: **BLOOM-RESP**

Send Reports to:
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Certified by: Liang Lin, Environmental Administrator

Date Certified: 17-AUG-2021 14:51

A handwritten signature in black ink, appearing to read "Liang Lin", on a light-colored background.

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: Four Mile Cove / Midpoint Bridge

Collection Date/Time: 07/20/2021 11:40

Field ID: Four Mile Cove

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2263901	EPA 8321B	Anatoxin-a	0.25	U	ug/L	P401276	
		Cylindrospermopsin	0.10	U	ug/L	P401276	
		Desmethyl microcystin LR	0.25	U	ug/L	P401276	
		Microcystin HILR**	0.25	U	ug/L	P401276	
		Microcystin HtyR**	0.25	U	ug/L	P401276	
		Microcystin LA	0.10	U	ug/L	P401276	
		Microcystin LF	0.10	U	ug/L	P401276	
		Microcystin LR	0.25	U	ug/L	P401276	
		Microcystin LW	0.25	U	ug/L	P401276	
		Microcystin LY	0.10	U	ug/L	P401276	
		Microcystin RR	0.10	U	ug/L	P401276	
		Microcystin WR	0.50	U	ug/L	P401276	
		Microcystin YR	0.25	U	ug/L	P401276	
		Nodularin-R**	0.10	U	ug/L	P401276	
2263906	EPA 350.1 Rev. 2.0	Ammonia-N	0.028		mg N/L	P401767	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.0		mg N/L	P402410	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.050		mg N/L	P401382	
	EPA 365.1 Rev. 2.0	Total-P	0.14		mg P/L	P401590	
2263907	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.078		mg P/L	P401305	

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P401767

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P402410

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P401382

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P401590

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P401305

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

Reference Method: EPA 8321B
Batch ID: P401276

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 HIR	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: P401767

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P402410

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P401382

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: P401590

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: P401305

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

Reference Method: EPA 8321B
Batch ID: P401276

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	107		P	40 - 150
Cylindrospermopsin	107		P	40 - 150
Desmethyl microcystin LR	87.8		P	40 - 150
Microcystin HIR	95.2		P	40 - 150
Microcystin HtyR	91.0		P	40 - 150
Microcystin LA	90.5		P	40 - 150
Microcystin LF	78.4		P	40 - 150
Microcystin LR	95.3		P	40 - 150
Microcystin LW	82.6		P	40 - 150
Microcystin LY	78.7		P	40 - 150
Microcystin RR	96.9		P	40 - 150
Microcystin WR	89.8		P	40 - 150
Microcystin YR	94.2		P	40 - 150
Nodularin-R	95.4		P	40 - 150

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
 Batch ID: P401767

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2263906	Ammonia-N	96.2	97.2	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
 Batch ID: P402410

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2263906	Kjeldahl Nitrogen	109	106	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
 Batch ID: P401382

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2263894	NO2NO3-N	102	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
 Batch ID: P401590

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2263921	Total-P	106	105	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
 Batch ID: P401305

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2263635	O-Phosphate-P	99.4	99.3	P/P	90 - 110

Reference Method: EPA 8321B
 Batch ID: P401276

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2263799	Anatoxin-a	80.9	75.3	P/P	40 - 150
2263799	Cylindrospermopsin	69.7	66.8	P/P	40 - 150
2263799	Desmethyl microcystin LR	66.1	63.4	P/P	40 - 150
2263799	Microcystin HiLR	72.3	69.2	P/P	40 - 150
2263799	Microcystin HtyR	73.9	69.0	P/P	40 - 150
2263799	Microcystin LA	66.8	60.9	P/P	40 - 150
2263799	Microcystin LF	48.8	40.8	P/P	40 - 150
2263799	Microcystin LR	69.0	77.9	P/P	40 - 150
2263799	Microcystin LW	46.7	46.0	P/P	40 - 150
2263799	Microcystin LY	54.8	51.7	P/P	40 - 150
2263799	Microcystin RR	83.9	75.8	P/P	40 - 150
2263799	Microcystin WR	71.8	65.8	P/P	40 - 150
2263799	Microcystin YR	75.6	68.1	P/P	40 - 150
2263799	Nodularin-R	80.0	74.7	P/P	40 - 150

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0

Batch ID: P401767

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2263906	Ammonia-N	0.651	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0

Batch ID: P402410

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2263906	Kjeldahl Nitrogen	1.46	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0

Batch ID: P401382

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2263894	NO2NO3-N	1.40	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0

Batch ID: P401590

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2263921	Total-P	0.264	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Batch ID: P401305

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2263635	O-Phosphate-P	0.0684	Spike	P	0 - 20

Reference Method: EPA 8321B

Batch ID: P401276

Replicated

Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2263799	Anatoxin-a	7.27	Spike	P	0 - 30
2263799	Cylindrospermopsin	4.14	Spike	P	0 - 30
2263799	Desmethyl microcystin LR	4.16	Spike	P	0 - 30
2263799	Microcystin HtIR	4.36	Spike	P	0 - 30
2263799	Microcystin HtyR	6.94	Spike	P	0 - 30
2263799	Microcystin LA	9.17	Spike	P	0 - 30
2263799	Microcystin LF	17.7	Spike	P	0 - 30
2263799	Microcystin LR	12.1	Spike	P	0 - 30
2263799	Microcystin LW	1.40	Spike	P	0 - 30
2263799	Microcystin LY	5.71	Spike	P	0 - 30
2263799	Microcystin RR	10.2	Spike	P	0 - 30
2263799	Microcystin WR	8.70	Spike	P	0 - 30
2263799	Microcystin YR	10.5	Spike	P	0 - 30
2263799	Nodularin-R	6.86	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: 2263901

Field Sample ID: Four Mile Cove

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	74.4	P	30 - 160
EPA 8321B	Microcystin LR ethyl-d5	52.7	P	30 - 160

Quality Assurance Report Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A106743

Included Lab Sample IDs: 2263907

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.6	99.7	P/P	90 - 110

Reference Method: EPA 8321B

Run ID: A106757

Included Lab Sample IDs: 2263901

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	71.9	102	P/P	50 - 160
Cylindrospermopsin	76.0	95.2	P/P	50 - 160
Desmethyl microcystin LR	70.2	86.5	P/P	50 - 160
Microcystin HIR	66.5	92.9	P/P	50 - 160
Microcystin HtyR	73.3	92.9	P/P	50 - 160
Microcystin LA	68.8	93.3	P/P	50 - 160
Microcystin LF	62.4	74.8	P/P	50 - 160
Microcystin LR	78.6	99.6	P/P	50 - 160
Microcystin LW	61.6	71.7	P/P	50 - 160
Microcystin LY	62.7	83.3	P/P	50 - 160
Microcystin RR	77.7	94.3	P/P	50 - 160
Microcystin WR	79.8	103	P/P	50 - 160
Microcystin YR	76.8	97.7	P/P	50 - 160
Nodularin-R	77.0	98.7	P/P	50 - 160

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A106766

Included Lab Sample IDs: 2263906

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

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A106868

Included Lab Sample IDs: 2263906

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

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A106946

Included Lab Sample IDs: 2263906

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.7	98.7	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A107270

Included Lab Sample IDs: 2263906

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	103	102	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 SMP	MS
			LCS			
EPA 350.1 Rev. 2.0	Ammonia-N	97.6	96.2	97.2		0.651
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	107	109	106		1.46
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	102	102	100		1.40
EPA 365.1 Rev. 2.0	Total-P	107	106	105		0.264
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.1	99.4	99.3		0.0684
EPA 8321B	Anatoxin-a	107	80.9	75.3		7.27
	Cylindrospermopsin	107	69.7	66.8		4.14
	Desmethyl microcystin LR	87.8	66.1	63.4		4.16
	Microcystin HiLR	95.2	72.3	69.2		4.36
	Microcystin HtyR	91.0	73.9	69.0		6.94
	Microcystin LA	90.5	66.8	60.9		9.17
	Microcystin LF	78.4	48.8	40.8		17.7
	Microcystin LR	95.3	69.0	77.9		12.1
	Microcystin LW	82.6	46.7	46.0		1.40
	Microcystin LY	78.7	54.8	51.7		5.71
	Microcystin RR	96.9	83.9	75.8		10.2
	Microcystin WR	89.8	71.8	65.8		8.70
	Microcystin YR	94.2	75.6	68.1		10.5
	Nodularin-R	95.4	80.0	74.7		6.86

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2263906
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2263906
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2263906
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2263906
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2263907
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2263901

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	07/21/2021			07/30/2021 14:17	Roberta Tatti	2263906
EPA 351.2 Rev. 2.0	07/21/2021	08/13/2021 13:09	Madeline Gruver	08/16/2021 10:50	Virginia P. Brown	2263906
EPA 353.2 Rev. 2.0	07/21/2021			07/22/2021 11:11	Beverly Y. Sanders	2263906
EPA 365.1 Rev. 2.0	07/21/2021	07/27/2021 15:15	Simonne.V. Calhoun	07/28/2021 09:01	Shengyu Ding	2263906
EPA 365.1 Rev. 2.0 dissolved	07/21/2021			07/21/2021 13:22	Lipi Saha	2263907
EPA 8321B	07/21/2021	07/21/2021 12:00	Pramila Ghimire	07/22/2021 00:09	Pramila Ghimire	2263901