

Chemical Analysis Report

WQAP-2019-10-23-01

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-2019-09-16-44**
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: Liang Lin, Environmental Administrator

Date Certified: 04-NOV-2019 13:07

A handwritten signature in black ink, appearing to read "Liang Lin", is shown 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: West Lake Okeechobee

Collection Date/Time: 10/22/2019 10:30

Field ID: HAB-102219 Lake Okeechobee

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2130595	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P372975	
		Cylindrospermopsin**	0.25	U	ug/L	P372975	
		Microcystin LA**	0.25	U	ug/L	P372975	
		Microcystin LF**	0.25	U	ug/L	P372975	
		Microcystin LR**	0.25	U	ug/L	P372975	
		Microcystin LY**	0.25	U	ug/L	P372975	
		Microcystin RR**	0.25	U	ug/L	P372975	
		Microcystin YR**	0.25	U	ug/L	P372975	
2130612	EPA 350.1 Rev. 2.0	Ammonia-N	0.01		mg N/L	P373269	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.0		mg N/L	P373238	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.18		mg N/L	P373126	
	EPA 365.1 Rev. 2.0	Total-P	0.080		mg P/L	P373142	
2130614	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.038		mg P/L	P373031	

Sample Location: West Lake Okeechobee at Lakeport

Collection Date/Time: 10/22/2019 11:15

Field ID: HAB-102219 Lake O West

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2130596	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P372975	
		Cylindrospermopsin**	0.33	I	ug/L	P372975	
		Microcystin LA**	0.25	U	ug/L	P372975	
		Microcystin LF**	0.25	U	ug/L	P372975	
		Microcystin LR**	0.25	U	ug/L	P372975	
		Microcystin LY**	0.25	U	ug/L	P372975	
		Microcystin RR**	0.25	U	ug/L	P372975	
		Microcystin YR**	0.25	U	ug/L	P372975	
2130613	EPA 350.1 Rev. 2.0	Ammonia-N	0.008		mg N/L	P373269	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.93		mg N/L	P373238	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.29		mg N/L	P373126	
	EPA 365.1 Rev. 2.0	Total-P	0.091		mg P/L	P373142	
2130615	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.051		mg P/L	P373031	

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P373269

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P373238

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P373126

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P373142

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P373031

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

Reference Method: EPA 8321B
Batch ID: P372975

Component	Result	Code	Units
Anatoxin-a	0.25	U	ug/L
Cylindrospermopsin	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 LY	0.25	U	ug/L
Microcystin RR	0.25	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: P373269

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	98.9		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P373238

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P373126

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: P373142

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	97.8		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P373031

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	99.0		P	90 - 110

Reference Method: EPA 8321B
Batch ID: P372975

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	121		P	40 - 140
Cylindrospermopsin	107		P	40 - 140
Microcystin LA	100		P	40 - 140
Microcystin LF	114		P	40 - 140
Microcystin LR	91.5		P	40 - 140
Microcystin LY	109		P	40 - 140
Microcystin RR	107		P	40 - 140
Microcystin YR	98.6		P	40 - 140

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P373269

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2130649	Ammonia-N	100	102	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P373238

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2130608	Kjeldahl Nitrogen	102	105	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P373126

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2130598	NO2NO3-N	98.5		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P373142

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2130543	Total-P	99.8	98.5	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P373031

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2130611	O-Phosphate-P	97.1	97.8	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P372975

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2130558	Anatoxin-a	116	117	P/P	40 - 140
2130558	Cylindrospermopsin	97.7	96.9	P/P	40 - 140
2130558	Microcystin LA	105	100	P/P	40 - 140
2130558	Microcystin LF	112	97.3	P/P	40 - 140
2130558	Microcystin LR	101	97.4	P/P	40 - 140
2130558	Microcystin LY	114	114	P/P	40 - 140
2130558	Microcystin RR	108	109	P/P	40 - 140
2130558	Microcystin YR	102	99.4	P/P	40 - 140

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P373269

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2130649	Ammonia-N	1.50	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P373238

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2130608	Kjeldahl Nitrogen	2.34	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P373126

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2130598	NO2NO3-N	0.436	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P373142

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2130543	Total-P	1.08	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P373031

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2130611	O-Phosphate-P	0.570	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P372975

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2130558	Anatoxin-a	0.977	Spike	P	0 - 30
2130558	Cylindrospermopsin	0.881	Spike	P	0 - 30
2130558	Microcystin LA	4.18	Spike	P	0 - 30
2130558	Microcystin LF	13.8	Spike	P	0 - 30
2130558	Microcystin LR	3.18	Spike	P	0 - 30
2130558	Microcystin LY	0.0369	Spike	P	0 - 30
2130558	Microcystin RR	0.231	Spike	P	0 - 30
2130558	Microcystin YR	2.77	Spike	P	0 - 30

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

Quality Assurance Report Surrogates

Lab Sample ID: 2130595

Field Sample ID: HAB-102219 Lake Okeechobee

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Carbamazepine-d10	104	P	30 - 165

Lab Sample ID: 2130596

Field Sample ID: HAB-102219 Lake O West

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Carbamazepine-d10	102	P	30 - 165

Quality Assurance Report Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A95195

Included Lab Sample IDs: 2130614, 2130615

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	98.9	99.2	P/P	90 - 110

Reference Method: EPA 8321B

Run ID: A95210

Included Lab Sample IDs: 2130595, 2130596

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	119	115	P/P	50 - 160
Cylindrospermopsin	104	105	P/P	60 - 160
Microcystin LA	105	99.8	P/P	50 - 160
Microcystin LF	105	102	P/P	60 - 160
Microcystin LR	91.6	94.8	P/P	60 - 160
Microcystin LY	106	113	P/P	60 - 160
Microcystin RR	104	108	P/P	60 - 160
Microcystin YR	100	93.7	P/P	60 - 160

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A95239

Included Lab Sample IDs: 2130612, 2130613

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

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A95288

Included Lab Sample IDs: 2130612, 2130613

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

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A95305

Included Lab Sample IDs: 2130612, 2130613

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	101	105	P/P	90 - 110
Total-P	105	99.9	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A95324

Included Lab Sample IDs: 2130612, 2130613

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	102	100	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		Precision LCS	SMP	MS
EPA 350.1 Rev. 2.0	Ammonia-N	98.9	100	102			1.50
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	98.6	102	105			2.34
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	100	98.5				0.436
EPA 365.1 Rev. 2.0	Total-P	97.8	99.8	98.5			1.08
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	99.0	97.1	97.8			0.570
EPA 8321B	Anatoxin-a	121	116	117			0.977
	Cylindrospermopsin	107	97.7	96.9			0.881
	Microcystin LA	100	105	100			4.18
	Microcystin LF	114	112	97.3			13.8
	Microcystin LR	91.5	101	97.4			3.18
	Microcystin LY	109	114	114			0.0369
	Microcystin RR	107	108	109			0.231
	Microcystin YR	98.6	102	99.4			2.77

Reference Method Descriptions

Method / DoH Cert #	Description	Associated Samples
EPA 350.1 Rev. 2.0 / E31780	Ammonia in aqueous matrices as mg N/L	2130612, 2130613
EPA 351.2 Rev. 2.0 / E31780	Total Kjeldahl Nitrogen in aqueous matrices	2130612, 2130613
EPA 353.2 Rev. 2.0 / E31780	Nitrite/Nitrate in aqueous matrices as mg N/L	2130612, 2130613
EPA 365.1 Rev. 2.0 / E31780	Total Phosphorus in aqueous matrices as mg P/L	2130612, 2130613
EPA 365.1 Rev. 2.0 dissolved / E31780	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2130614, 2130615
EPA 8321B / E31780	Microcystins in water matrices by HPLC/MS/MS	2130595, 2130596

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	10/23/2019			10/28/2019 14:14	Ping Hua	2130612
	10/23/2019			10/28/2019 14:16	Ping Hua	2130613
EPA 351.2 Rev. 2.0	10/23/2019	10/28/2019 13:27	Sima Feizi	10/29/2019 18:17	Jhamieka S. Greenwood	2130612
	10/23/2019	10/28/2019 13:27	Sima Feizi	10/29/2019 18:18	Jhamieka S. Greenwood	2130613
EPA 353.2 Rev. 2.0	10/23/2019			10/25/2019 11:38	Beverly Y. Sanders	2130612
	10/23/2019			10/25/2019 11:40	Beverly Y. Sanders	2130613
EPA 365.1 Rev. 2.0	10/23/2019	10/25/2019 14:30	Lipi Saha	10/28/2019 12:18	Lipi Saha	2130612
	10/23/2019	10/25/2019 14:30	Lipi Saha	10/28/2019 12:20	Lipi Saha	2130613
EPA 365.1 Rev. 2.0 dissolved	10/23/2019			10/23/2019 15:22	Virginia P. Brown	2130614
	10/23/2019			10/23/2019 15:23	Virginia P. Brown	2130615
EPA 8321B	10/23/2019	10/24/2019 09:00	Juyoung Kim	10/24/2019 11:34	Juyoung Kim	2130595
	10/23/2019	10/24/2019 09:00	Juyoung Kim	10/24/2019 11:51	Juyoung Kim	2130596