

Chemical Analysis Report

WQAP-2020-09-15-01

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

Event Description: **Cape Coral Algal Bloom Response**

Request ID: **RQ-2020-03-02-71**

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: Kerry Tate, Ph.D., Environmental Administrator

Date Certified: 02-OCT-2020 10:03

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: Boris Canal

Collection Date/Time: 09/14/2020 10:42

Field ID: CC-091420-003

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2195986	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P387457	
		Cylindrospermopsin**	0.25	U	ug/L	P387457	
		Desmethyl microcystin LR**	0.25	U	ug/L	P387457	
		Microcystin LA**	0.25	U	ug/L	P387457	
		Microcystin LF**	0.25	U	ug/L	P387457	
		Microcystin LR**	0.25	U	ug/L	P387457	
		Microcystin LW**	0.25	U	ug/L	P387457	
		Microcystin LY**	0.25	U	ug/L	P387457	
		Microcystin RR**	0.25	U	ug/L	P387457	
		Microcystin WR**	0.50	U	ug/L	P387457	
		Microcystin YR**	0.25	U	ug/L	P387457	
2195988	EPA 350.1 Rev. 2.0	Ammonia-N	0.48		mg N/L	P387576	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	1.5		mg N/L	P387486	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.090		mg N/L	P387470	
	EPA 365.1 Rev. 2.0	Total-P	0.37		mg P/L	P387810	
2195990	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.11		mg P/L	P387399	

Ref. Method and Comment:

EPA 351.2 Rev. 2.0: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

Sample Location: Shaughnessey

Collection Date/Time: 09/14/2020 11:00

Field ID: CC-091420-004

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2195987	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P387457	
		Cylindrospermopsin**	0.25	U	ug/L	P387457	
		Desmethyl microcystin LR**	0.25	U	ug/L	P387457	
		Microcystin LA**	0.25	U	ug/L	P387457	
		Microcystin LF**	0.25	U	ug/L	P387457	
		Microcystin LR**	0.25	U	ug/L	P387457	
		Microcystin LW**	0.25	U	ug/L	P387457	
		Microcystin LY**	0.25	U	ug/L	P387457	
		Microcystin RR**	0.25	U	ug/L	P387457	
		Microcystin WR**	0.50	U	ug/L	P387457	
		Microcystin YR**	0.25	U	ug/L	P387457	
2195989	EPA 350.1 Rev. 2.0	Ammonia-N	0.17		mg N/L	P387576	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.94		mg N/L	P387486	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.050		mg N/L	P387470	
	EPA 365.1 Rev. 2.0	Total-P	0.089		mg P/L	P387810	
2195991	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.012		mg P/L	P387401	

Ref. Method and Comment:

EPA 351.2 Rev. 2.0: Batch matrix spike recoveries are unavailable because of high analyte concentration in the QC sample.

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P387576

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P387486

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P387470

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P387810

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387399

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387401

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

Reference Method: EPA 8321B
Batch ID: P387457

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: P387576

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: P387486

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	94.1		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P387470

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P387810

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387399

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	98.7		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387401

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

Reference Method: EPA 8321B
Batch ID: P387457

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	104		P	40 - 140
Cylindrospermopsin	103		P	40 - 140
Desmethyl microcystin LR	102		P	40 - 140
Microcystin LA	94.0		P	40 - 140
Microcystin LF	96.6		P	40 - 140
Microcystin LR	91.5		P	40 - 140
Microcystin LW	99.1		P	40 - 140
Microcystin LY	93.3		P	40 - 140
Microcystin RR	108		P	40 - 140
Microcystin WR	107		P	40 - 140
Microcystin YR	93.2		P	40 - 140

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P387576

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2195912	Ammonia-N	96.3	97.3	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P387470

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2195988	NO2NO3-N	101	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P387810

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2195988	Total-P	101	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387399

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2195917	O-Phosphate-P	101	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387401

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2195991	O-Phosphate-P	94.9	94.7	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P387457

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2196270	Anatoxin-a	112	102	P/P	40 - 140
2196270	Cylindrospermopsin	97.3	95.7	P/P	40 - 140
2196270	Desmethyl microcystin LR	107	101	P/P	40 - 140
2196270	Microcystin LA	104	102	P/P	40 - 140
2196270	Microcystin LF	75.8	91.7	P/P	40 - 140
2196270	Microcystin LR	111	101	P/P	40 - 140
2196270	Microcystin LW	87.8	103	P/P	40 - 140
2196270	Microcystin LY	100	91.8	P/P	40 - 140
2196270	Microcystin RR	116	117	P/P	40 - 140
2196270	Microcystin WR	109	102	P/P	40 - 140
2196270	Microcystin YR	105	104	P/P	40 - 140

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P387576

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2195912	Ammonia-N	0.904	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P387486

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2196005	Kjeldahl Nitrogen	6.15	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P387470

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2195988	NO2NO3-N	0.343	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P387810

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2195988	Total-P	0.0903	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387399

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2195917	O-Phosphate-P	0.697	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P387401

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2195991	O-Phosphate-P	0.187	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P387457

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2196270	Anatoxin-a	9.16	Spike	P	0 - 30
2196270	Cylindrospermopsin	1.72	Spike	P	0 - 30
2196270	Desmethyl microcystin LR	5.11	Spike	P	0 - 30
2196270	Microcystin LA	1.13	Spike	P	0 - 30
2196270	Microcystin LF	19.0	Spike	P	0 - 30
2196270	Microcystin LR	9.81	Spike	P	0 - 30
2196270	Microcystin LW	16.2	Spike	P	0 - 30
2196270	Microcystin LY	8.89	Spike	P	0 - 30
2196270	Microcystin RR	0.0981	Spike	P	0 - 30

Quality Assurance Report Precision

Reference Method: EPA 8321B
Batch ID: P387457

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2196270	Microcystin WR	6.74	Spike	P	0 - 30
2196270	Microcystin YR	0.511	Spike	P	0 - 30

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

Quality Assurance Report Surrogates

Lab Sample ID: 2195986

Field Sample ID: CC-091420-003

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	102	P	30 - 160
EPA 8321B	Microcystin LR ethyl-d5	81.8	P	30 - 160

Lab Sample ID: 2195987

Field Sample ID: CC-091420-004

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	107	P	30 - 160
EPA 8321B	Microcystin LR ethyl-d5	89.1	P	30 - 160

Quality Assurance Report Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A100989

Included Lab Sample IDs: 2195990, 2195991

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	97.5	98.2	P/P	90 - 110
O-Phosphate-P	98.2	97.6	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A101029

Included Lab Sample IDs: 2195988, 2195989

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

Reference Method: EPA 8321B

Run ID: A101056

Included Lab Sample IDs: 2195986, 2195987

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	107	104	P/P	50 - 160
Cylindrospermopsin	97.2	97.7	P/P	60 - 160
Desmethyl microcystin LR	85.6	97.2	P/P	60 - 160
Microcystin LA	96.7	97.7	P/P	50 - 160
Microcystin LF	95.9	88.8	P/P	50 - 160
Microcystin LR	86.3	102	P/P	60 - 160
Microcystin LW	97.6	77.2	P/P	60 - 160
Microcystin LY	88.2	95.6	P/P	60 - 160
Microcystin RR	100	98.3	P/P	60 - 160
Microcystin WR	91.1	95.6	P/P	60 - 160
Microcystin YR	86.1	81.7	P/P	60 - 160

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A101073

Included Lab Sample IDs: 2195988, 2195989

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	92.2	96.5	P/P	90 - 110
Kjeldahl Nitrogen	96.5	99.2	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A101085

Included Lab Sample IDs: 2195988, 2195989

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	91.1	94.4	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A101204

Included Lab Sample IDs: 2195988, 2195989

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	102	102	P/P	85 - 115

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		LCS	Precision SMP	MS
EPA 350.1 Rev. 2.0	Ammonia-N	101	96.3	97.3			0.904
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	94.1					6.15
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	101	101	100			0.343
EPA 365.1 Rev. 2.0	Total-P	105	101	101			0.0903
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.7	101	100			0.697
	O-Phosphate-P	98.3	94.9	94.7			0.187
EPA 8321B	Anatoxin-a	104	112	102			9.16
	Cylindrospermopsin	103	97.3	95.7			1.72
	Desmethyl microcystin LR	102	107	101			5.11
	Microcystin LA	94.0	104	102			1.13
	Microcystin LF	96.6	75.8	91.7			19.0
	Microcystin LR	91.5	111	101			9.81
	Microcystin LW	99.1	87.8	103			16.2
	Microcystin LY	93.3	100	91.8			8.89
	Microcystin RR	108	116	117			0.0981
	Microcystin WR	107	109	102			6.74
	Microcystin YR	93.2	105	104			0.511

Reference Method Descriptions

Method	Description	Associated Samples
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2195988, 2195989
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2195988, 2195989
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2195988, 2195989
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2195988, 2195989
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2195990, 2195991
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2195986, 2195987

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	09/15/2020			09/19/2020 14:50	Ping Hua	2195988
	09/15/2020			09/19/2020 14:52	Ping Hua	2195989
EPA 351.2 Rev. 2.0	09/15/2020	09/17/2020 10:50	Elliott Rodriguez	09/18/2020 10:08	Elliott Rodriguez	2195988
	09/15/2020	09/17/2020 10:50	Elliott Rodriguez	09/18/2020 10:13	Elliott Rodriguez	2195989
EPA 353.2 Rev. 2.0	09/15/2020			09/16/2020 11:55	Beverly Y. Sanders	2195988
	09/15/2020			09/16/2020 12:04	Beverly Y. Sanders	2195989
EPA 365.1 Rev. 2.0	09/15/2020	09/24/2020 11:57	Yen Ta	09/25/2020 14:46	Benjamin T. Nordmann	2195988
	09/15/2020	09/24/2020 11:57	Yen Ta	09/25/2020 14:49	Benjamin T. Nordmann	2195989
EPA 365.1 Rev. 2.0 dissolved	09/15/2020			09/15/2020 17:30	Virginia P. Brown	2195991
	09/15/2020			09/15/2020 17:45	Virginia P. Brown	2195990
EPA 8321B	09/15/2020	09/17/2020 09:30	Mohammad Ghaffari	09/17/2020 12:10	Mohammad Ghaffari	2195986
	09/15/2020	09/17/2020 09:30	Mohammad Ghaffari	09/17/2020 12:26	Mohammad Ghaffari	2195987