

Chemical Analysis Report

WQAP-2020-06-11-01

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

Event Description: **Algal Bloom Response - Collier County**
Request ID: **RQ-2019-06-10-38**
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: Thekkekalathil Chandrasekhar, Chemist Administrator

Date Certified: 22-JUN-2020 10:14



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: Upper Moorings Bay

Collection Date/Time: 06/10/2020 12:39

Field ID: Upper Moorings Bay

Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2175850	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P382852	
		Cylindrospermopsin**	0.25	U	ug/L	P382852	
		Desmethyl microcystin LR**	0.25	U	ug/L	P382852	
		Microcystin LA**	0.25	U	ug/L	P382852	
		Microcystin LF**	0.25	U	ug/L	P382852	
		Microcystin LR**	0.25	U	ug/L	P382852	
		Microcystin LW**	0.25	U	ug/L	P382852	
		Microcystin LY**	0.25	U	ug/L	P382852	
		Microcystin RR**	0.25	U	ug/L	P382852	
		Microcystin WR**	0.50	U	ug/L	P382852	
		Microcystin YR**	0.25	U	ug/L	P382852	
2175851	EPA 350.1 Rev. 2.0	Ammonia-N	0.007		mg N/L	P383175	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	2.0		mg N/L	P383264	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.004	U	mg N/L	P383253	
	EPA 365.1 Rev. 2.0	Total-P	0.23		mg P/L	P383227	
2175852	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.015		mg P/L	P383106	

Quality Assurance Report Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383175

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383264

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383253

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383227

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383106

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

Reference Method: EPA 8321B
Batch ID: P382852

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: P383175

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	99.8		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
 Batch ID: P383264

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

Reference Method: EPA 353.2 Rev. 2.0
 Batch ID: P383253

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

Reference Method: EPA 365.1 Rev. 2.0
 Batch ID: P383227

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
 Batch ID: P383106

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

Reference Method: EPA 8321B
 Batch ID: P382852

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	100		P	40 - 140
Cylindrospermopsin	97.3		P	40 - 140
Desmethyl microcystin LR	81.1		P	40 - 140
Microcystin LA	93.7		P	40 - 140
Microcystin LF	113		P	40 - 140
Microcystin LR	88.5		P	40 - 140
Microcystin LW	103		P	40 - 140
Microcystin LY	95.3		P	40 - 140
Microcystin RR	94.7		P	40 - 140
Microcystin WR	89.2		P	40 - 140
Microcystin YR	82.3		P	40 - 140

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383175

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2175517	Ammonia-N	102	101	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383264

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2176207	Kjeldahl Nitrogen	99.6	101	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383253

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2176208	NO2NO3-N	103	103	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383227

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2175452	Total-P	97.8	105	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383106

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2175852	O-Phosphate-P	95.5	97.1	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P382852

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2174931	Anatoxin-a	92.9	94.6	P/P	40 - 140
2174931	Cylindrospermopsin	98.5	95.7	P/P	40 - 140
2174931	Desmethyl microcystin LR	80.8	91.8	P/P	40 - 140
2174931	Microcystin LA	88.8	90.6	P/P	40 - 140
2174931	Microcystin LF	99.5	102	P/P	40 - 140
2174931	Microcystin LR	88.8	87.6	P/P	40 - 140
2174931	Microcystin LW	84.3	84.5	P/P	40 - 140
2174931	Microcystin LY	89.6	93.1	P/P	40 - 140
2174931	Microcystin RR	95.1	92.7	P/P	40 - 140
2174931	Microcystin WR	80.4	78.8	P/P	40 - 140
2174931	Microcystin YR	77.8	83.3	P/P	40 - 140

Quality Assurance Report Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P383175

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2175517	Ammonia-N	0.233	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P383264

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2176207	Kjeldahl Nitrogen	0.996	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P383253

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2176208	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P383227

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2175452	Total-P	4.13	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P383106

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2175852	O-Phosphate-P	1.44	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P382852

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2174931	Anatoxin-a	1.89	Spike	P	0 - 30
2174931	Cylindrospermopsin	2.44	Spike	P	0 - 30
2174931	Desmethyl microcystin LR	12.8	Spike	P	0 - 30
2174931	Microcystin LA	1.98	Spike	P	0 - 30
2174931	Microcystin LF	2.61	Spike	P	0 - 30
2174931	Microcystin LR	1.28	Spike	P	0 - 30
2174931	Microcystin LW	0.176	Spike	P	0 - 30
2174931	Microcystin LY	3.84	Spike	P	0 - 30
2174931	Microcystin RR	2.60	Spike	P	0 - 30
2174931	Microcystin WR	2.07	Spike	P	0 - 30
2174931	Microcystin YR	6.75	Spike	P	0 - 30

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

Quality Assurance Report Surrogates

Lab Sample ID: 2175850
Field Sample ID: Upper Moorings Bay

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	75.5	P	30 - 160

Quality Assurance Report Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A99275

Included Lab Sample IDs: 2175852

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.0	99.4	P/P	90 - 110

Reference Method: EPA 8321B

Run ID: A99276

Included Lab Sample IDs: 2175850

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	83.1	87.0	P/P	50 - 160
Cylindrospermopsin	112	115	P/P	60 - 160
Desmethyl microcystin LR	85.3	99.4	P/P	60 - 160
Microcystin LA	86.0	106	P/P	50 - 160
Microcystin LF	101	140	P/P	60 - 160
Microcystin LR	92.3	97.0	P/P	60 - 160
Microcystin LW	91.8	118	P/P	60 - 160
Microcystin LY	97.5	109	P/P	60 - 160
Microcystin RR	90.4	86.9	P/P	60 - 160
Microcystin WR	93.2	93.9	P/P	60 - 160
Microcystin YR	84.4	89.2	P/P	60 - 160

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A99309

Included Lab Sample IDs: 2175851

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.9	102	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A99337

Included Lab Sample IDs: 2175851

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

Run ID: A99359

Included Lab Sample IDs: 2175851

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

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A99379

Included Lab Sample IDs: 2175851

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	99.6	103	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		LCS	Precision	MS
						SMP	
EPA 350.1 Rev. 2.0	Ammonia-N	99.8	102	101			0.233
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	103	99.6	101			0.996
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	99.0	103	103			0.0
EPA 365.1 Rev. 2.0	Total-P	106	97.8	105			4.13
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	98.9	95.5	97.1			1.44
EPA 8321B	Anatoxin-a	100	92.9	94.6			1.89
	Cylindrospermopsin	97.3	98.5	95.7			2.44
	Desmethyl microcystin LR	81.1	80.8	91.8			12.8
	Microcystin LA	93.7	88.8	90.6			1.98
	Microcystin LF	113	99.5	102			2.61
	Microcystin LR	88.5	88.8	87.6			1.28
	Microcystin LW	103	84.3	84.5			0.176
	Microcystin LY	95.3	89.6	93.1			3.84
	Microcystin RR	94.7	95.1	92.7			2.60
	Microcystin WR	89.2	80.4	78.8			2.07
	Microcystin YR	82.3	77.8	83.3			6.75

Reference Method Descriptions

Method	Description	<u>Associated Samples</u>
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2175851
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2175851
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2175851
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2175851
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2175852
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2175850

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	06/11/2020			06/13/2020 16:40	Ping Hua	2175851
EPA 351.2 Rev. 2.0	06/11/2020	06/16/2020 11:50	Sima Feizi	06/17/2020 11:09	Jhamieka S. Greenwood	2175851
EPA 353.2 Rev. 2.0	06/11/2020			06/16/2020 08:41	Beverly Y. Sanders	2175851
EPA 365.1 Rev. 2.0	06/11/2020	06/15/2020 15:28	Yen Ta	06/16/2020 10:16	Lipi Saha	2175851
EPA 365.1 Rev. 2.0 dissolved	06/11/2020			06/11/2020 16:43	Julia Storbeck	2175852
EPA 8321B	06/11/2020	06/11/2020 12:00	Juyoung Kim	06/11/2020 14:11	Juyoung Kim	2175850