Chemical Analysis Report

WQAP-2021-01-05-01

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

Event Description: **Algal Bloom Response - SE ROC**
Request ID: **RQ-2020-12-28-33**
Customer: **WQAP**
Project ID: **BLOOM-RESP**

Send Reports to:
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Fort Pierce, FL 34945
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Certified by: Thekkekalathil Chandrasekhar, Chemist Administrator Date Certified: 22-JAN-2021 09:40

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: N. Fork St.Lucie Near Club Med **Collection Date/Time: 01/04/2021 12:00**

Field ID: N. Fork St.Lucie Near Club Med Matrix: W-SURF-SLT

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2216268	EPA 8321B	Anatoxin-a**	0.25	U	ug/L	P392003	
		Cylindrospermopsin**	0.25	U	ug/L	P392003	
		Desmethyl microcystin LR**	0.25	U	ug/L	P392003	
		Microcystin LA**	0.25	U	ug/L	P392003	
		Microcystin LF**	0.25	U	ug/L	P392003	
		Microcystin LR**	0.25	U	ug/L	P392003	
		Microcystin LW**	0.25	U	ug/L	P392003	
		Microcystin LY**	0.25	U	ug/L	P392003	
		Microcystin RR**	0.25	U	ug/L	P392003	
		Microcystin WR**	0.50	U	ug/L	P392003	
		Microcystin YR**	0.25	U	ug/L	P392003	
2216269	EPA 350.1 Rev. 2.0	Ammonia-N	0.033		mg N/L	P392033	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.91	J	mg N/L	P392044	MS
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.070		mg N/L	P391987	
	EPA 365.1 Rev. 2.0	Total-P	0.10		mg P/L	P392024	
2216270	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.069		mg P/L	P391974	

Ref. Method and Comment:
EPA 351.2 Rev. 2.0: Refer to the Lab Analysis Report for an explanation of QC Codes.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P392033

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

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P392044

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

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P391987

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

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P392024

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

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P391974

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

Reference Method: EPA 8321B
Batch ID: P392003

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: P392033

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	94.2		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P392044

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: P391987

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: P392024

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	99.3		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P391974

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

Reference Method: EPA 8321B
Batch ID: P392003

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Anatoxin-a	63.6		P	40 - 150
Cylindrospermopsin	93.5		P	40 - 150
Desmethyl microcystin LR	85.6		P	40 - 150
Microcystin LA	95.7		P	40 - 150
Microcystin LF	98.7		P	40 - 150
Microcystin LR	79.9		P	40 - 150
Microcystin LW	96.4		P	40 - 150
Microcystin LY	84.9		P	40 - 150
Microcystin RR	88.0		P	40 - 150
Microcystin WR	88.4		P	40 - 150
Microcystin YR	88.4		P	40 - 150

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P392033

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2216269	Ammonia-N	99.6	98.8	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P392044

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2216269	Kjeldahl Nitrogen	111	95.9	F/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P391987

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2216474	NO2NO3-N	98.8	97.8	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P392024

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2216269	Total-P	101	100	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P391974

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2216270	O-Phosphate-P	98.4	98.6	P/P	90 - 110

Reference Method: EPA 8321B
Batch ID: P392003

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2216582	Anatoxin-a	109	106	P/P	40 - 150
2216582	Cylindrospermopsin	83.2	83.0	P/P	40 - 150
2216582	Desmethyl microcystin LR	87.4	86.8	P/P	40 - 150
2216582	Microcystin LA	83.9	91.9	P/P	40 - 150
2216582	Microcystin LF	91.3	93.8	P/P	40 - 150
2216582	Microcystin LR	89.6	81.2	P/P	40 - 150
2216582	Microcystin LW	85.0	82.2	P/P	40 - 150
2216582	Microcystin LY	80.1	77.8	P/P	40 - 150
2216582	Microcystin RR	82.7	82.5	P/P	40 - 150
2216582	Microcystin WR	80.2	86.5	P/P	40 - 150
2216582	Microcystin YR	89.8	88.1	P/P	40 - 150

Quality Assurance Report
Precision

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P392033

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2216269	Ammonia-N	0.485	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P392044

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2216269	Kjeldahl Nitrogen	11.0	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P391987

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2216474	NO2NO3-N	0.941	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P392024

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2216269	Total-P	0.843	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P391974

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2216270	O-Phosphate-P	0.119	Spike	P	0 - 20

Reference Method: EPA 8321B
Batch ID: P392003

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2216582	Anatoxin-a	2.72	Spike	P	0 - 30
2216582	Cylindrospermopsin	0.172	Spike	P	0 - 30
2216582	Desmethyl microcystin LR	0.777	Spike	P	0 - 30
2216582	Microcystin LA	9.10	Spike	P	0 - 30
2216582	Microcystin LF	2.64	Spike	P	0 - 30
2216582	Microcystin LR	9.87	Spike	P	0 - 30
2216582	Microcystin LW	3.37	Spike	P	0 - 30
2216582	Microcystin LY	2.91	Spike	P	0 - 30
2216582	Microcystin RR	0.236	Spike	P	0 - 30
2216582	Microcystin WR	7.53	Spike	P	0 - 30
2216582	Microcystin YR	1.91	Spike	P	0 - 30

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

Quality Assurance Report
Surrogates

Lab Sample ID: 2216268
Field Sample ID: N. Fork St.Lucie Near Club Med

Reference Method	Surrogate	% Rec.	Pass/Fail	Control Limits
EPA 8321B	Microcystin LR-d7	69.5	P	30 - 160
EPA 8321B	Microcystin LR ethyl-d5	72.9	P	30 - 160

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A102888
Included Lab Sample IDs: 2216270

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.9	99.6	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A102900
Included Lab Sample IDs: 2216269

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	100	100	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A102915
Included Lab Sample IDs: 2216269

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	95.8	94.9	P/P	90 - 110

Reference Method: EPA 8321B
Run ID: A102931
Included Lab Sample IDs: 2216268

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Anatoxin-a	77.9	106	P/P	50 - 160
Cylindrospermopsin	90.0	99.6	P/P	60 - 160
Desmethyl microcystin LR	87.9	95.1	P/P	60 - 160
Microcystin LA	78.6	104	P/P	50 - 160
Microcystin LF	88.9	98.0	P/P	50 - 160
Microcystin LR	78.0	90.3	P/P	60 - 160
Microcystin LW	88.1	92.4	P/P	60 - 160
Microcystin LY	81.9	84.8	P/P	60 - 160
Microcystin RR	78.7	99.1	P/P	60 - 160
Microcystin WR	89.8	95.5	P/P	60 - 160
Microcystin YR	99.5	86.5	P/P	60 - 160

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A102934
Included Lab Sample IDs: 2216269

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	98.6	95.4	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A102990
Included Lab Sample IDs: 2216269

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	97.0	97.0	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	94.2	99.6	98.8			0.485
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	107	111	95.9			11.0
EPA 353.2 Rev. 2.0	NO2NO3-N	99.0	98.8	97.8			0.941
EPA 365.1 Rev. 2.0	Total-P	99.3	101	100			0.843
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	101	98.4	98.6			0.119
EPA 8321B	Anatoxin-a	63.6	109	106			2.72
	Cylindrospermopsin	93.5	83.2	83.0			0.172
	Desmethyl microcystin LR	85.6	87.4	86.8			0.777
	Microcystin LA	95.7	83.9	91.9			9.10
	Microcystin LF	98.7	91.3	93.8			2.64
	Microcystin LR	79.9	89.6	81.2			9.87
	Microcystin LW	96.4	85.0	82.2			3.37
	Microcystin LY	84.9	80.1	77.8			2.91
	Microcystin RR	88.0	82.7	82.5			0.236
	Microcystin WR	88.4	80.2	86.5			7.53
	Microcystin YR	88.4	89.8	88.1			1.91

Reference Method Descriptions

Method	Description	Associated Samples
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2216269
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2216269
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2216269
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2216269
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2216270
EPA 8321B	Microcystins in water matrices by HPLC/MS/MS	2216268

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	01/05/2021			01/06/2021 18:22	Ping Hua	2216269
EPA 351.2 Rev. 2.0	01/05/2021	01/06/2021 14:20	David Boose	01/07/2021 14:07	Virginia P. Brown	2216269
EPA 353.2 Rev. 2.0	01/05/2021			01/06/2021 09:18	Beverly Y. Sanders	2216269
EPA 365.1 Rev. 2.0	01/05/2021	01/06/2021 16:30	Yen Ta	01/11/2021 12:45	Shengyu Wang	2216269
EPA 365.1 Rev. 2.0 dissolved	01/05/2021			01/05/2021 16:43	Ping Hua	2216270
EPA 8321B	01/05/2021	01/07/2021 09:00	Pramila Ghimire	01/07/2021 12:27	Pramila Ghimire	2216268