



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8 LABORATORY**

16194 W 45th Drive  
GOLDEN, CO 80403-1790  
Phone 303-312-7700

Ref: 8TMS-L

MEMORANDUM

SUBJECT: Analytical Results--- **HAB Emergency Bloom 2016 / 1609004**

FROM: Jeff McPherson, Biologist  
Mark Murphy, Organic Chemist  
William H. Batschelet, PhD, Laboratory Quality Assurance Officer

THRU: Mark Burkhardt, PhD, Director  
Laboratory Services Program

TO: Tina Laidlaw, 8MO  
Clean Water Act

Attached are the analytical results for HAB Emergency Bloom 2016 1609004. The table below shows the number of containers received, the work order number(s) assigned, and the date received:

	1609004	Total
31-Aug-2016	6	6

These samples were prepared, analyzed, and verified by the Region 8 Laboratory according to the requirements of the Laboratory Services Request (LSR) and procedures found in the laboratory Quality Assurance Manual (QSP-001) dated June 16, 2016.

**Sample Receipt**

All samples were received in acceptable condition except as noted in the Analyst Comments or Appendix A. The number of samples received and analyses are listed in Appendix B.

**Sample Analysis**

All sample results are reported on an as-received basis except as noted in the Analyst Comments. All samples were analyzed within holding times except as noted in Appendix A. All analyses met QC acceptance criteria except as noted in the Analyst Comments or Appendix A.

**Field Measurements**

All field measurements met QC acceptance criteria except as noted in the Analyst Comments or Appendix A.

**QC Note**

Routine sample quality control results such as blanks, matrix spikes, and laboratory duplicates, etc. are reported on the quality control pages of this report. Certain of the reported QC criteria may not be applicable or otherwise affect the data usability. Appendix C summarizes the guidelines used by the Region 8 Laboratory to qualify data. This is a general table and may or may not be applicable to this project.

**Analyst Comments**



## Microcystins by LC/MS/MS

Station ID: 5930960

Date / Time Sampled: 08/29/16 12:30

Workorder 1609004

Comment: UT Lake

Matrix: Water

Lab Number: 1609004-01 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Anatoxin-A	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Cylindrospermopsin	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-LR</b>	<b>4.33</b>	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-RR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-YR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344

Station ID: 5931231

Date / Time Sampled: 08/29/16 12:50

Workorder 1609004

Comment: UT Lake

Matrix: Water

Lab Number: 1609004-02 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Anatoxin-A	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Cylindrospermopsin	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-LR</b>	<b>349</b>	ug/L	<b>J</b>	0.50	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-RR</b>	<b>1.22</b>	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-YR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344

Station ID: Scofield 01

Date / Time Sampled: 08/29/16 12:55

Workorder 1609004

Comment: UT Lake

Matrix: Water

Lab Number: 1609004-03 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Anatoxin-A	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Cylindrospermopsin	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-LR</b>	<b>6.99</b>	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-RR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-YR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344

Station ID: Scofield at Frandsen

Date / Time Sampled: 08/29/16 13:10

Workorder 1609004

Comment: UT Lake

Matrix: Water

Lab Number: 1609004-04 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Anatoxin-A	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Cylindrospermopsin	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-LR</b>	<b>1890</b>	ug/L	<b>J</b>	0.50	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-RR</b>	<b>17.5</b>	ug/L	<b>J</b>	0.50	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-YR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344

## Microcystins by LC/MS/MS

Station ID: 5931234

Date / Time Sampled: 08/29/16 13:30

Workorder 1609004

Comment: UT Lake

Matrix: Water

Lab Number: 1609004-05 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Anatoxin-A	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Cylindrospermopsin	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-LR</b>	<b>11.5</b>	ug/L		0.50	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-RR</b>	<b>0.13</b>	ug/L	<b>J</b>	0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-YR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344

Station ID: Madsen Bay Middle

Date / Time Sampled: 08/29/16 14:25

Workorder 1609004

Comment: UT Lake

Matrix: Water

Lab Number: 1609004-06 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Anatoxin-A	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Cylindrospermopsin	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-LR</b>	<b>43.3</b>	ug/L		0.50	1	09/02/2016	MAM	1600344
Reg. 8 Lab	<b>Microcystin-RR</b>	<b>0.29</b>	ug/L	<b>J</b>	0.05	1	09/02/2016	MAM	1600344
Reg. 8 Lab	Microcystin-YR	< 0.05	ug/L		0.05	1	09/02/2016	MAM	1600344

## Microcystins by ELISA

Station ID: 5930960 Date / Time Sampled: 08/29/16 12:30 Workorder 1609004  
 Comment: UT Lake Matrix: Water Lab Number: 1609004-01 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Total Microcystin	46.4	ug/L	J	1.50	10	09/01/2016	JWM	1600343

Station ID: 5931231 Date / Time Sampled: 08/29/16 12:50 Workorder 1609004  
 Comment: UT Lake Matrix: Water Lab Number: 1609004-02 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Total Microcystin	>50	ug/L	J	1.50	10	09/01/2016	JWM	1600343

Station ID: Scofield 01 Date / Time Sampled: 08/29/16 12:55 Workorder 1609004  
 Comment: UT Lake Matrix: Water Lab Number: 1609004-03 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Total Microcystin	22.2	ug/L		1.50	10	09/01/2016	JWM	1600343

Station ID: Scofield at Frandsen Date / Time Sampled: 08/29/16 13:10 Workorder 1609004  
 Comment: UT Lake Matrix: Water Lab Number: 1609004-04 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Total Microcystin	>50	ug/L	J	1.50	10	09/01/2016	JWM	1600343

Station ID: 5931234 Date / Time Sampled: 08/29/16 13:30 Workorder 1609004  
 Comment: UT Lake Matrix: Water Lab Number: 1609004-05 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Total Microcystin	>50	ug/L	J	1.50	10	09/01/2016	JWM	1600343

Station ID: Madsen Bay Middle Date / Time Sampled: 08/29/16 14:25 Workorder 1609004  
 Comment: UT Lake Matrix: Water Lab Number: 1609004-06 A

Method	Parameter	Results	Units	Qual- ifier	Report Limit	Dilution Factor	Analyzed	By	Batch
Reg. 8 Lab	Total Microcystin	>50	ug/L	J	1.50	10	09/01/2016	JWM	1600343

Note: "J" Qualifier indicates an estimated value.

## Microcystins by LC/MS/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch 1600344 - No Preparation****Matrix Spike (1600344-MS2)** Source: 1609004-03 Prepared: 09/01/16 Analyzed: 09/02/16

Anatoxin-A	1.16	0.05	ug/L	1.00	< 0.05	116	60-140		
Cylindrospermopsin	0.74	0.05	"	1.00	< 0.05	74.1	60-140		
Microcystin-LR	7.66	0.05	"	1.00	6.99	67.6	60-140		
Microcystin-RR	0.84	0.05	"	1.00	0.05	79.0	60-140		
Microcystin-YR	0.76	0.05	"	1.00	< 0.05	76.0	60-140		

**Matrix Spike (1600344-MS3)** Source: 1609004-03RE1 Prepared: 09/01/16 Analyzed: 09/02/16

Anatoxin-A	11.5	0.50	ug/L	10.0	< 0.50	115	60-140		
Cylindrospermopsin	7.52	0.50	"	10.0	< 0.50	75.2	60-140		
Microcystin-LR	14.1	0.50	"	10.0	7.46	66.2	60-140		
Microcystin-RR	8.05	0.50	"	10.0	< 0.50	80.5	60-140		
Microcystin-YR	7.55	0.50	"	10.0	< 0.50	75.5	60-140		

**Matrix Spike Dup (1600344-MSD2)** Source: 1609004-03 Prepared: 09/01/16 Analyzed: 09/02/16

Anatoxin-A	1.07	0.05	ug/L	1.00	< 0.05	107	60-140	8.65	30
Cylindrospermopsin	0.65	0.05	"	1.00	< 0.05	65.0	60-140	13.0	30
Microcystin-LR	7.51	0.05	"	1.00	6.99	52.2	60-140	2.03	30
Microcystin-RR	0.85	0.05	"	1.00	0.05	79.8	60-140	0.990	30
Microcystin-YR	0.67	0.05	"	1.00	< 0.05	67.3	60-140	12.1	30

**Matrix Spike Dup (1600344-MSD3)** Source: 1609004-03RE1 Prepared: 09/01/16 Analyzed: 09/02/16

Anatoxin-A	12.5	0.50	ug/L	10.0	< 0.50	125	60-140	7.97	30
Cylindrospermopsin	8.75	0.50	"	10.0	< 0.50	87.5	60-140	15.1	30
Microcystin-LR	15.7	0.50	"	10.0	7.46	82.6	60-140	11.0	30
Microcystin-RR	8.61	0.50	"	10.0	< 0.50	86.1	60-140	6.70	30
Microcystin-YR	8.26	0.50	"	10.0	< 0.50	82.6	60-140	8.98	30

**Project: HAB Emergency Bloom 2016 LSR No: 1609004**  
**Microcystins by ELISA - Quality Control**

**Certificate of Analysis**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch 1600343 - General Prep**

<b>Method Blank (1600343-BLK1)</b>				Prepared & Analyzed: 09/01/16					
Total Microcystin	< 0.15	0.15	ug/L						

<b>Duplicate (1600343-DUP1)</b>		<b>Source: 1609004-06</b>		Prepared & Analyzed: 09/01/16					
Total Microcystin	>50	1.50	ug/L	>50				0.00	40

<b>Reference (1600343-SRM1)</b>				Prepared & Analyzed: 09/01/16					
Total Microcystin	0.59	0.15	ug/L	0.750		78.9	70-130		

**NOTE:**  
 %REC is percent recovery, Result (less sample contribution) divided by the Spike Level  
 RPD is the Relative Percent Difference (difference between the Result and the Source Result) divided by their average



1007009

Agency: UTAH DIVISION OF WATER QUALITY		CYANOTOXIN CHAIN OF CUSTODY RECORD (EPA Region 8 Laboratory)				
Project: Utah Lake HAB		Sample Collector(s): D. CULLISA R. BIRD				
Please Send Results to: Bgn Holcomb		Preservation: Refrigeration				
Sample Number	Date Collected	Time Collected	STORET (if applicable)	Site Name/Description	Requested Test	Remarks
-01	8/29/16	12 30	593 060	Pack 2, Below Scofield Res	Microcystins by ELISA for all samples	* temp SSC on receipt
-02	"	12 50	593 1231	Scofield Res @ State Pl Mtn View		
-03	"	12 58	NA	Scofield 01		
-04	"	13 10	NA	Scofield AT HANSEN SCOT CAMP		
-05	"	13 30	593 1234	Scofield Res @ HANSEN ST RAMP		
-06	"	14 25	NA	HANSEN BAY MIDDLE		
Relinquished By: _____		Date: 8/30/16	Time: 13:15	Special Instructions: All samples ~5°C except 59309160. Ice used not in contact with all bottles. NR 8/31		
Received By: _____		Date: 8/31/16	Time: 0945			
Relinquished By: _____		Date: _____	Time: _____			
Received By: _____		Date: _____	Time: _____			

## Appendix A - Exceptions Report

<u>Lab Number</u>	<u>Sample Name</u>	<u>Analysis</u>	<u>Analyte Name</u>	<u>Explanation</u>
1609004-01	5930960	Microcystin by ELISA - Total	*ALL*	Temperature outside of criteria.
1609004-02	5931231	Microcystin by ELISA - Total	Total Microcystin	Outside quantitation range.
1609004-02RE1	5931231	Microcystins by LC/MS/MS_2016	Microcystin-LR	Outside quantitation range.
1609004-04	Scofield at Frandsen	Microcystin by ELISA - Total	Total Microcystin	Outside quantitation range.
1609004-04RE1	Scofield at Frandsen	Microcystins by LC/MS/MS_2016	Microcystin-LR	Outside quantitation range.
1609004-04RE1	Scofield at Frandsen	Microcystins by LC/MS/MS_2016	Microcystin-RR	Continuing calibration criteria not met - high
1609004-05	5931234	Microcystin by ELISA - Total	Total Microcystin	Outside quantitation range.
1609004-05	5931234	Microcystins by LC/MS/MS_2016	Microcystin-RR	Continuing calibration criteria not met - high
1609004-06	Madsen Bay Middle	Microcystin by ELISA - Total	Total Microcystin	Outside quantitation range.
1609004-06	Madsen Bay Middle	Microcystins by LC/MS/MS_2016	Microcystin-RR	Continuing calibration criteria not met - high

**Appendix B - Samples and Analysis**

<u>Work Order #</u>	<u># Samples</u>	<u>Analysis</u>	<u>Method Name</u>	<u>Lab SOP</u>
1609004	6	Microcystin by ELISA - Total	Reg. 8 Lab	BIOLM-004v10_Microcystin_Abraxis
1609004	6	Microcystins by LC/MS/MS_2016	Reg. 8 Lab	Draft SOP

## Appendix C - Data Assessment Guidelines

QC Check (Symbol)	Flagging Criteria
Initial Calibration (ICAL)	All failing analytes for all samples are qualified as estimated.
Initial Calibration Verification (ICV) or Standard Reference Material (SRM)	High failure: All detections for failing analytes for all samples are qualified as estimated. Low failure: All failing analytes for all samples are qualified as estimated.
Continuing Calibration Verification (CCV)	High failure: All detections for failing analytes for all associated samples are qualified as estimated. Low failure: All failing analytes for all associated samples are qualified as estimated.
Continuing Calibration Blank (CCB)	All detections for failing analytes for all associated samples where the concentration in the blank is greater than 1/10 the amount measured in the sample OR the blank contamination otherwise affects the sample results are qualified as estimated.
Blanks (BLK) Preparation Blank, Method, Trip, Storage, etc.	All detections for failing analytes for all samples where the concentration in the blank is greater than 1/10 the amount measured in the sample OR the blank contamination otherwise affects the sample results are qualified as estimated.
Lab Control Sample (LCS) or Standard Reference Material (SRM) or Blank Spike (BS)	High failure: All detections for failing analytes for all associated samples are qualified as estimated. Low failure: All failing analytes for all associated samples are qualified as estimated.
Matrix Spike (MS)	High failure: All detections for failing analytes in the parent sample are qualified as estimated. Low failure: All failing analytes in the parent sample are qualified as estimated. No qualification if the native concentration is greater than or equal to 4x the spike concentration.
Matrix Spike Duplicate (MSD)	%R Failure: Same as matrix spike. RPD Failure: All failing analytes in the parent sample are qualified as estimated.
Duplicate Sample (DUP)	All failing analytes in the parent sample are qualified as estimated. No qualification if the native concentration is less than the RL.
Serial Dilution (SD)	All failing analytes in the parent sample are qualified as estimated. No qualification if native concentration is less than or equal to 50x the RL.
Detection Limit Standard (CRA) or (CRL)	High failure: All detections for failing analytes less than or equal to 5x the concentration in the CRL for all associated samples are qualified as estimated. Low failure: All failing analytes less than or equal to 5x the RL for all associated samples are qualified as estimated.
Internal Standard (IS)	All analytes associated with the failing IS are qualified as estimated.
Surrogate Spike (SURR)	High failure: All detections for all analytes associated with the failing surrogate are qualified as estimated. Low failure: All analytes associated with the failing surrogate are qualified as estimated. If obvious chromatographic interference with the surrogate is present, qualification may not be necessary and will be based on the professional judgment of the analyst.

**Note:** The J Qualifier is used to indicate an estimated value.