



City of Toledo

Department of Public Utilities

Microcystin Event Preliminary Summary

Monday, August 4, 2014

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EXECUTIVE SUMMARY

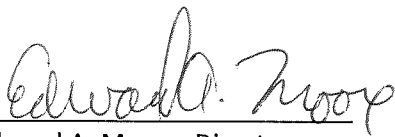
A number of factors contributed to the microcystin crisis the weekend of August 1-4, 2014. In the weeks ahead we will analyze data to prepare a comprehensive post-incident report of the activities which led to issuing and subsequent cancellation of the "Drinking Water Warning" impacting some 500,000 Toledo water customers.

Understanding there are many questions surrounding these events, the Department provides this brief summary of the water quality piece of the situation.

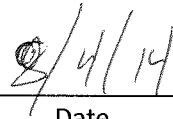
In the early evening of Friday, August 1, chemists at the Collins Park Water Treatment Plant found a lysed sample reading of 0.6 for microcystin. The readings triggered notification to the Ohio EPA personnel, who remained in contact with the City of Toledo throughout the entire four-day episode. From the onset of the unusual readings, Collins Park chemists found inconsistencies in the data. In an attempt to verify the results, we began a three day effort to enlist independent analysis, first with our sister water treatment plant in Oregon; then with samples to Lake Superior State University, and multiple samples to the Ohio EPA in Columbus and the US EPA in Cincinnati.

This document includes the raw data reported from all of the above agencies in addition to testing performed at the plant. Inconsistencies exist because of conflicting parameters for sampling and analyzing microcystin levels caused by Harmful Algal Blooms.

The microcystin crisis was a learning experience for all of the agencies involved. The positive result was the design of an established protocol for procuring consistent sampling that will be used as a model statewide.



Edward A. Moore, Director
Department of Public Utilities



Date



Test Report (by Request)

Test Information

Request: 8/1/2014 4:36:20 PM
Date: 8/1/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.082 Abs	< 0.000 ng/mL		
Std1	Microcystins ADDA QL	1.052 Abs	0.011 ng/mL		
Std2	Microcystins ADDA QL	0.834 Abs	0.175 ng/mL		
Std2	Microcystins ADDA QL	0.840 Abs	0.169 ng/mL		
Std3	Microcystins ADDA QL	0.625 Abs	0.432 ng/mL		
Std3	Microcystins ADDA QL	0.630 Abs	0.423 ng/mL		
Std4	Microcystins ADDA QL	0.379 Abs	1.258 ng/mL		
Std4	Microcystins ADDA QL	0.416 Abs	1.041 ng/mL		
Std5	Microcystins ADDA QL	0.280 Abs	2.436 ng/mL		
Std5	Microcystins ADDA QL	0.296 Abs	2.137 ng/mL		
Std6	Microcystins ADDA QL	0.214 Abs	5.389 ng/mL		
Std6	Microcystins ADDA QL	0.218 Abs	5.028 ng/mL		
Normal Control	Microcystins ADDA QL	0.489 Abs	0.748 ng/mL		
Normal Control	Microcystins ADDA QL	0.470 Abs	0.812 ng/mL		
TAP 7-24	Microcystins ADDA QL	1.009 Abs	0.041 ng/mL	Low	0.167 - 5.550
TAP 7-24	Microcystins ADDA QL	0.970 Abs [0.9895]	0.067 ng/mL [0.054]	Low [Low]	0.167 - 5.550
RAW LS 7-25	Microcystins ADDA QL	0.477 Abs	0.788 ng/mL		0.167 - 5.550
RAW LS 7-25	Microcystins ADDA QL	0.485 Abs [0.4810]	0.761 ng/mL [0.774]		0.167 - 5.550
RAW LS 10X 7-25	Microcystins ADDA QL	0.935 Abs	0.093 ng/mL	Low	0.167 - 5.550
RAW LS 10X 7-25	Microcystins ADDA QL	0.975 Abs [0.9550]	0.064 ng/mL [0.078]	Low [Low]	0.167 - 5.550
TAP 7-25	Microcystins ADDA QL	1.030 Abs	0.026 ng/mL	Low	0.167 - 5.550
TAP 7-25	Microcystins ADDA QL	1.028 Abs [1.0290]	0.028 ng/mL [0.027]	Low [Low]	0.167 - 5.550
RAW LA 7-26	Microcystins ADDA QL	0.561 Abs	0.556 ng/mL		0.167 - 5.550
RAW LA 7-26	Microcystins ADDA QL	0.461 Abs [0.5110]	0.845 ng/mL [0.682]		0.167 - 5.550
RAW LS 10X 7-26	Microcystins ADDA QL	0.948 Abs	0.083 ng/mL	Low	0.167 - 5.550
RAW LS 10X 7-26	Microcystins ADDA QL	1.011 Abs [0.9795]	0.039 ng/mL [0.061]	Low [Low]	0.167 - 5.550
TAP 7-26	Microcystins ADDA QL	1.064 Abs	0.002 ng/mL	Low	0.167 - 5.550
TAP 7-26	Microcystins ADDA QL	1.066 Abs [1.0650]	< 0.000 ng/mL [0.001]	Out(LR) [Low]	0.167 - 5.550
RAW LS 7-27	Microcystins ADDA QL	0.726 Abs	0.287 ng/mL		0.167 - 5.550
RAW LS 7-27	Microcystins ADDA QL	0.670 Abs [0.6980]	0.361 ng/mL [0.323]		0.167 - 5.550
RAW LS 10X 7-27	Microcystins ADDA QL	1.033 Abs	0.024 ng/mL	Low	0.167 - 5.550
RAW LS 10X 7-27	Microcystins ADDA QL	0.936 Abs [0.9845]	0.092 ng/mL [0.057]	Low [Low]	0.167 - 5.550
TAP 7-27	Microcystins ADDA QL	1.050 Abs	0.012 ng/mL	Low	0.167 - 5.550
TAP 7-27	Microcystins ADDA QL	1.094 Abs [1.0720]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
RAW LS 7-28	Microcystins ADDA QL	0.883 Abs	0.133 ng/mL	Low	0.167 - 5.550
RAW LS 7-28	Microcystins ADDA QL	0.933 Abs [0.9080]	0.094 ng/mL [0.113]	Low [Low]	0.167 - 5.550
RAW LS 10X 7-28	Microcystins ADDA QL	1.090 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
RAW LS 10X 7-28	Microcystins ADDA QL	1.052 Abs [1.0710]	0.011 ng/mL [< 0.000]	Low [Out(LR)]	0.167 - 5.550
TAP 7-28	Microcystins ADDA QL	1.044 Abs	0.017 ng/mL	Low	0.167 - 5.550
TAP 7-28	Microcystins ADDA QL	0.914 Abs [0.9790]	0.108 ng/mL [0.061]	Low [Low]	0.167 - 5.550
RAW LS 7-29	Microcystins ADDA QL	0.502 Abs	0.708 ng/mL		0.167 - 5.550
RAW LS 7-29	Microcystins ADDA QL	0.539 Abs [0.5205]	0.608 ng/mL [0.655]		0.167 - 5.550
RAW LS 10X 7-29	Microcystins ADDA QL	0.928 Abs	0.098 ng/mL	Low	0.167 - 5.550
RAW LS 10X 7-29	Microcystins ADDA QL	0.983 Abs [0.9555]	0.058 ng/mL [0.078]	Low [Low]	0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests
* Generated by Plate Reader version (6.3.1.163/01620/AE:17 /) 8/1/2014 4:39:00 PM



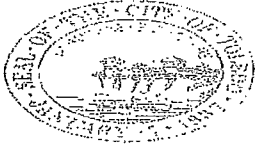
Test Report (by Request)

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
TAP 7-29	Microcystins ADDA QL	1.093 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
TAP 7-29	Microcystins ADDA QL	1.021 Abs [1.0570]	0.032 ng/mL [0.007]	Low [Low]	0.167 - 5.550
RAW LS 7-30	Microcystins ADDA QL	0.283 Abs	2.375 ng/mL		0.167 - 5.550
RAW LS 7-30	Microcystins ADDA QL	0.261 Abs [0.2720]	2.908 ng/mL [2.614]		0.167 - 5.550
RAW LS 10X 7-30	Microcystins ADDA QL	0.815 Abs	0.192 ng/mL		0.167 - 5.550
RAW LS 10X 7-30	Microcystins ADDA QL	0.824 Abs [0.8195]	0.184 ng/mL [0.188]		0.167 - 5.550
RAW SW 7-30	Microcystins ADDA QL	0.107 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
RAW SW 7-30	Microcystins ADDA QL	0.097 Abs [0.1020]	> 5.550 ng/mL [> 5.55]	Out(LR) [Out(LR)]	0.167 - 5.550
RAW SW 10X 7-30	Microcystins ADDA QL	0.389 Abs	1.193 ng/mL		0.167 - 5.550
RAW SW 10X 7-30	Microcystins ADDA QL	0.380 Abs [0.3845]	1.252 ng/mL [1.221]		0.167 - 5.550
RAW PLT 7-30	Microcystins ADDA QL	0.185 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
RAW PLT 7-30	Microcystins ADDA QL	0.214 Abs [0.1995]	5.389 ng/mL [> 5.550]	[Out(LR)]	0.167 - 5.550
RAW PLT 10X 7-30	Microcystins ADDA QL	0.693 Abs	0.329 ng/mL		0.167 - 5.550
RAW PLT 10X 7-30	Microcystins ADDA QL	0.645 Abs [0.6690]	0.399 ng/mL [0.363]		0.167 - 5.550
80 FILT 7-30	Microcystins ADDA QL	0.403 Abs	1.110 ng/mL		0.167 - 5.550
80 FILT 7-30	Microcystins ADDA QL	0.375 Abs [0.3890]	1.286 ng/mL [1.193]		0.167 - 5.550
CLEARWELL 7-30	Microcystins ADDA QL	1.027 Abs	0.028 ng/mL	Low	0.167 - 5.550
CLEARWELL 7-30	Microcystins ADDA QL	1.031 Abs [1.0290]	0.026 ng/mL [0.027]	Low [Low]	0.167 - 5.550
TAP 7-30	Microcystins ADDA QL	1.014 Abs	0.037 ng/mL	Low	0.167 - 5.550
TAP 7-30	Microcystins ADDA QL	1.045 Abs [1.0295]	0.016 ng/mL [0.027]	Low [Low]	0.167 - 5.550
TAP UNLYSED 7-31	Microcystins ADDA QL	1.002 Abs	0.045 ng/mL	Low	0.167 - 5.550
TAP UNLYSED 7-31	Microcystins ADDA QL	1.013 Abs [1.0075]	0.038 ng/mL [0.042]	Low [Low]	0.167 - 5.550
TAP UNLYSED 8-1	Microcystins ADDA QL	0.271 Abs	2.641 ng/mL		0.167 - 5.550
TAP UNLYSED 8-1	Microcystins ADDA QL	0.286 Abs [0.2785]	2.314 ng/mL [2.469]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests

* Generated by Plate Reader version (6.3.1.16301520/AE:17 J) 8/1/2014 4:39:00 PM

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Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

Assay Calibration

Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/1/2014 4:36:20 PM				
Std1	1.082 Abs	< 0.000 ng/mL		A01
Std1	1.052 Abs	0.011 ng/mL		B01
Std2	0.834 Abs	0.175 ng/mL		C01
Std2	0.840 Abs	0.169 ng/mL		D01
Std3	0.625 Abs	0.432 ng/mL		E01
Std3	0.630 Abs	0.423 ng/mL		F01
Std4	0.379 Abs	1.258 ng/mL		G01
Std4	0.416 Abs	1.041 ng/mL		H01
Std5	0.280 Abs	2.436 ng/mL		A02
Std5	0.296 Abs	2.137 ng/mL		B02
Std6	0.214 Abs	5.389 ng/mL		C02
Std6	0.218 Abs	5.028 ng/mL		D02
+++++				
8/1/2014 4:36:20 PM				
Normal Control	0.489 Abs	0.748 ng/mL		E02
Normal Control	0.470 Abs	0.812 ng/mL		F02

Statistic				
Std1 [MEAN]	1.067			
Std1 [SD]	0.021			
Std1 [%CV]	1.99			
Std2 [MEAN]	0.837	0.172		
Std2 [SD]	0.004	0.004		
Std2 [%CV]	0.51	2.47		
Std2 [%DIFF]		2.99		
Std3 [MEAN]	0.627	0.428		
Std3 [SD]	0.004	0.006		
Std3 [%CV]	0.56	1.49		
Std3 [%DIFF]		-3.60		
Std4 [MEAN]	0.398	1.150		
Std4 [SD]	0.026	0.153		

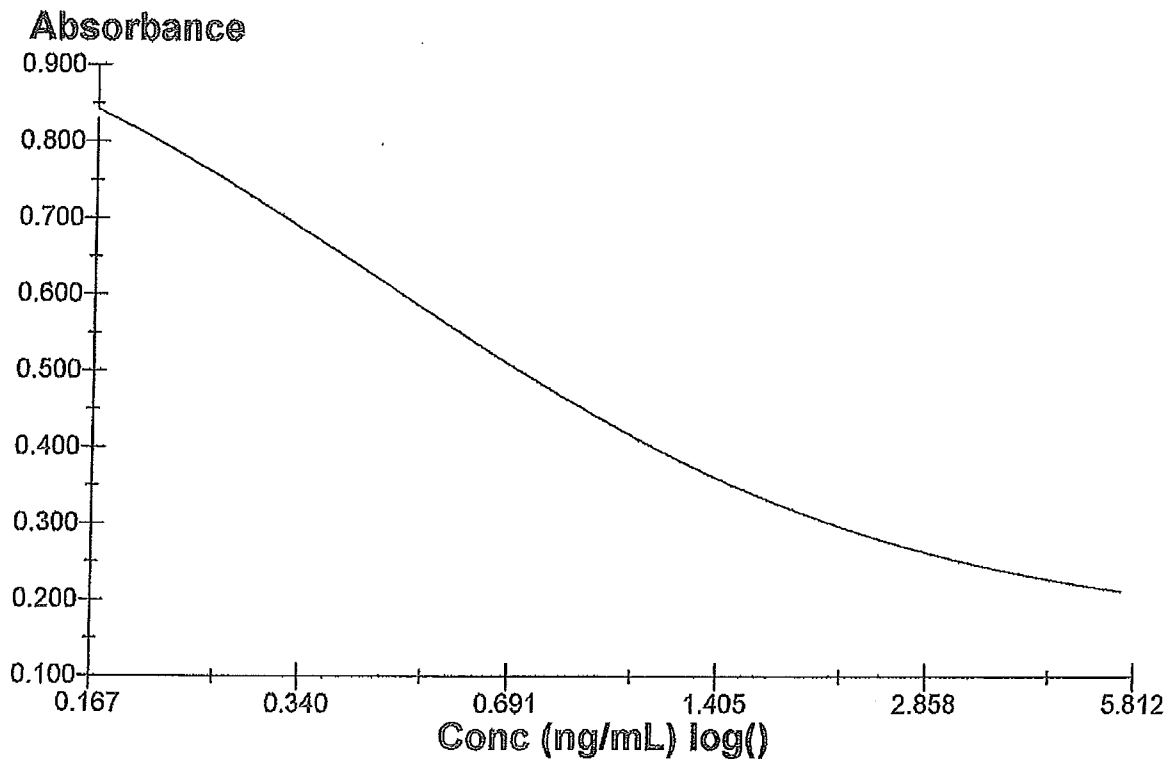


Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	6.58	13.35		
Std4 [%DIFF]		3.60		
Std5 [MEAN]	0.288	2.286		
Std5 [SD]	0.011	0.211		
Std5 [%CV]	3.93	9.25		
Std5 [%DIFF]		2.97		
Std6 [MEAN]	0.216	5.208		
Std6 [SD]	0.003	0.255		
Std6 [%CV]	1.31	4.90		
Std6 [%DIFF]		-6.16		
Normal Control [MEAN]	0.479	0.780		
Normal Control [SD]	0.013	0.045		
Normal Control [%CV]	2.80	5.80		

Assay Curve

$y = (A-D)/(1+(x/C)^B) + D$
 A = 0.16140
 B = -1.1226
 C = 0.45193
 D = 1.0656
 R2 coef = 0.99971





City of Toledo
Water Department

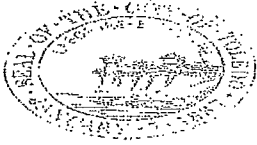
Test Report (by Request)

Test Information

Request: 8/1/2014 9:16:58 PM
Date: 8/1/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.265 Abs	< 0.000 ng/mL		
Std1	Microcystins ADDA QL	1.153 Abs	0.025 ng/mL		
Std2	Microcystins ADDA QL	0.940 Abs	0.129 ng/mL		
Std2	Microcystins ADDA QL	0.856 Abs	0.186 ng/mL		
Std3	Microcystins ADDA QL	0.591 Abs	0.554 ng/mL		
Std3	Microcystins ADDA QL	0.643 Abs	0.441 ng/mL		
Std4	Microcystins ADDA QL	0.454 Abs	1.178 ng/mL		
Std4	Microcystins ADDA QL	0.442 Abs	1.286 ng/mL		
Std5	Microcystins ADDA QL	0.454 Abs	1.178 ng/mL		
Std5	Microcystins ADDA QL	0.447 Abs	1.238 ng/mL		
Std6	Microcystins ADDA QL	0.291 Abs	> 5.550 ng/mL		
Std6	Microcystins ADDA QL	0.290 Abs	> 5.550 ng/mL		
Normal Control	Microcystins ADDA QL	0.614 Abs	0.500 ng/mL		
Normal Control	Microcystins ADDA QL	0.682 Abs	0.375 ng/mL		
T 7/30	Microcystins ADDA QL	1.141 Abs	0.030 ng/mL	Low	0.167 - 5.550
T 7/30	Microcystins ADDA QL	1.120 Abs [1.1305]	0.039 ng/mL [0.034]	Low [Low]	0.167 - 5.550
R 7/31	Microcystins ADDA QL	0.480 Abs	0.992 ng/mL		0.167 - 5.550
R 7/31	Microcystins ADDA QL	0.476 Abs [0.4780]	1.017 ng/mL [1.005]		0.167 - 5.550
R 7/31 10X	Microcystins ADDA QL	0.964 Abs	0.114 ng/mL	Low	0.167 - 5.550
R 7/31 10X	Microcystins ADDA QL	0.943 Abs [0.9535]	0.127 ng/mL [0.121]	Low [Low]	0.167 - 5.550
T 7/31	Microcystins ADDA QL	1.086 Abs	0.053 ng/mL	Low	0.167 - 5.550
T 7/31	Microcystins ADDA QL	1.125 Abs [1.1055]	0.036 ng/mL [0.045]	Low [Low]	0.167 - 5.550
R 8/1	Microcystins ADDA QL	0.134 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
R 8/1	Microcystins ADDA QL	0.117 Abs [0.1255]	> 5.550 ng/mL [> 5.55]	Out(LR) [Out(LR)]	0.167 - 5.550
R 8/1 10X	Microcystins ADDA QL	0.608 Abs	0.513 ng/mL		0.167 - 5.550
R 8/1 10X	Microcystins ADDA QL	0.630 Abs [0.6190]	0.466 ng/mL [0.489]		0.167 - 5.550
CW 8/1	Microcystins ADDA QL	1.035 Abs	0.077 ng/mL	Low	0.167 - 5.550
CW 8/1	Microcystins ADDA QL	1.148 Abs [1.0915]	0.027 ng/mL [0.051]	Low [Low]	0.167 - 5.550
CW 8/1 UNLYSED	Microcystins ADDA QL	0.350 Abs	3.613 ng/mL		0.167 - 5.550
CW 8/1 UNLYSED	Microcystins ADDA QL	0.275 Abs [0.3125]	> 5.550 ng/mL [> 5.55]	Out(LR) [Out(LR)]	0.167 - 5.550
J T 8/1	Microcystins ADDA QL	1.173 Abs	0.017 ng/mL	Low	0.167 - 5.550
J T 8/1	Microcystins ADDA QL	0.950 Abs [1.0615]	0.123 ng/mL [0.064]	Low [Low]	0.167 - 5.550
J T 8/1 UNLYSED	Microcystins ADDA QL	0.583 Abs	0.575 ng/mL		0.167 - 5.550
J T 8/1 UNLYSED	Microcystins ADDA QL	0.392 Abs [0.4875]	2.009 ng/mL [0.947]		0.167 - 5.550
B T 8/1	Microcystins ADDA QL	1.011 Abs	0.089 ng/mL	Low	0.167 - 5.550
B T 8/1	Microcystins ADDA QL	1.105 Abs [1.0580]	0.045 ng/mL [0.066]	Low [Low]	0.167 - 5.550
B T 8/1 UNLYSED	Microcystins ADDA QL	0.502 Abs	0.870 ng/mL		0.167 - 5.550
B T 8/1 UNLYSED	Microcystins ADDA QL	0.349 Abs [0.4255]	3.680 ng/mL [1.465]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests
* Generated by Plate Reader version (0.3.1.163/01520/AE:17 /) 8/1/2014 9:21:44 PM



Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

Assay Calibration

Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/1/2014 9:16:58 PM				
Std1	1.265 Abs	< 0.000 ng/mL		A01
Std1	1.153 Abs	0.025 ng/mL		B01
Std2	0.940 Abs	0.129 ng/mL		C01
Std2	0.856 Abs	0.186 ng/mL		D01
Std3	0.591 Abs	0.554 ng/mL		E01
Std3	0.643 Abs	0.441 ng/mL		F01
Std4	0.454 Abs	1.178 ng/mL		G01
Std4	0.442 Abs	1.286 ng/mL		H01
Std5	0.454 Abs	1.178 ng/mL		A02
Std5	0.447 Abs	1.238 ng/mL		B02
Std6	0.291 Abs	> 5.550 ng/mL		C02
Std6	0.290 Abs	> 5.550 ng/mL		D02
+++++				
8/1/2014 9:16:58 PM				
Normal Control	0.614 Abs	0.500 ng/mL		E02
Normal Control	0.682 Abs	0.375 ng/mL		F02

Statistic				
Std1 [MEAN]	1.209			
Std1 [SD]	0.079			
Std1 [%CV]	6.55			
Std2 [MEAN]	0.898	0.157		
Std2 [SD]	0.059	0.040		
Std2 [%CV]	6.61	25.59		
Std2 [%DIFF]		-5.99		
Std3 [MEAN]	0.617	0.498		
Std3 [SD]	0.037	0.080		
Std3 [%CV]	5.96	16.06		
Std3 [%DIFF]		12.16		
Std4 [MEAN]	0.448	1.232		
Std4 [SD]	0.008	0.076		



Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	1.89	6.20		
Std4 [%DIFF]		10.99		
Std5 [MEAN]	0.451	1.208		
Std5 [SD]	0.005	0.042		
Std5 [%CV]	1.10	3.51		
Std5 [%DIFF]		-45.59		
Std6 [MEAN]	0.290			
Std6 [SD]	0.001			
Std6 [%CV]	0.24			
Std6 [%DIFF]		-100.00		
Normal Control [MEAN]	0.648	0.438		
Normal Control [SD]	0.048	0.088		
Normal Control [%CV]	7.42	20.20		

Assay Curve

$$y = (A-D)/(1+(x/C)^B) + D$$

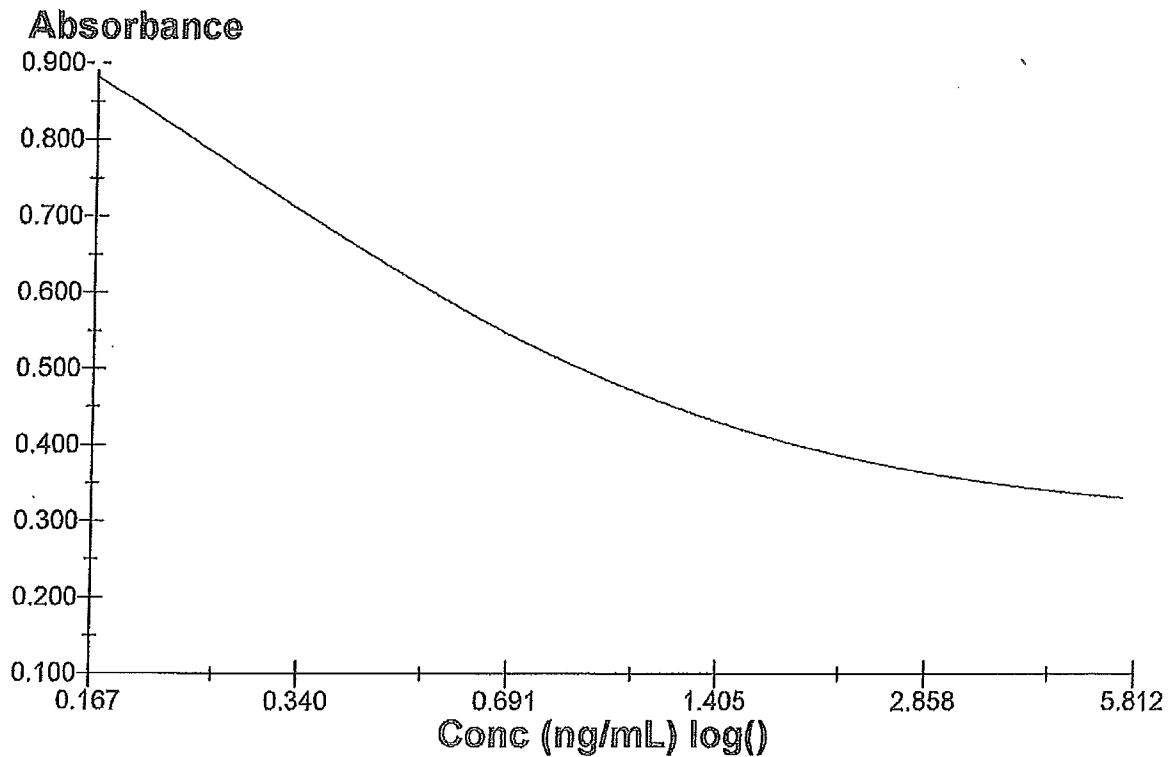
A = 0.29887

B = -1.1038

C = 0.27984

D = 1.2121

R2 coef = 0.98735





Test Report (by Request)

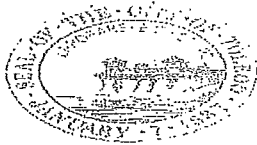
Test Information

Request: 8/1/2014 9:13:20 PM
Date: 8/1/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.051 Abs	0.044 ng/mL		
Std1	Microcystins ADDA QL	1.143 Abs	< 0.000 ng/mL		
Std2	Microcystins ADDA QL	0.879 Abs	0.187 ng/mL		
Std2	Microcystins ADDA QL	0.936 Abs	0.137 ng/mL		
Std3	Microcystins ADDA QL	0.657 Abs	0.465 ng/mL		
Std3	Microcystins ADDA QL	0.662 Abs	0.456 ng/mL		
Std4	Microcystins ADDA QL	0.464 Abs	1.004 ng/mL		
Std4	Microcystins ADDA QL	0.429 Abs	1.189 ng/mL		
Std5	Microcystins ADDA QL	0.320 Abs	2.420 ng/mL		
Std5	Microcystins ADDA QL	0.350 Abs	1.904 ng/mL		
Std6	Microcystins ADDA QL	0.241 Abs	> 5.550 ng/mL		
Std6	Microcystins ADDA QL	0.283 Abs	4.895 ng/mL		
Normal Control	Microcystins ADDA QL	0.548 Abs	0.703 ng/mL		
Normal Control	Microcystins ADDA QL	0.511 Abs	0.818 ng/mL		
T 7/30	Microcystins ADDA QL	1.113 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
T 7/30	Microcystins ADDA QL	1.043 Abs [1.0780]	0.051 ng/mL [0.022]	Low [Low]	0.167 - 5.550
R 7/31	Microcystins ADDA QL	0.363 Abs	1.740 ng/mL		0.167 - 5.550
R 7/31	Microcystins ADDA QL	0.401 Abs [0.3820]	1.380 ng/mL [1.542]		0.167 - 5.550
R 7/31 10X	Microcystins ADDA QL	0.972 Abs	0.107 ng/mL	Low	0.167 - 5.550
R 7/31 10X	Microcystins ADDA QL	0.990 Abs [0.9810]	0.093 ng/mL [0.100]	Low [Low]	0.167 - 5.550
T 7/31	Microcystins ADDA QL	1.098 Abs	0.002 ng/mL	Low	0.167 - 5.550
T 7/31	Microcystins ADDA QL	1.136 Abs [1.1170]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
R 8/1	Microcystins ADDA QL	0.126 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
R 8/1	Microcystins ADDA QL	0.109 Abs [0.1175]	> 5.550 ng/mL [> 5.55]	Out(LR) [Out(LR)]	0.167 - 5.550
R 8/1 10X	Microcystins ADDA QL	0.481 Abs	0.930 ng/mL		0.167 - 5.550
R 8/1 10X	Microcystins ADDA QL	0.475 Abs [0.4780]	0.955 ng/mL [0.942]		0.167 - 5.550
CW 8/1	Microcystins ADDA QL	1.115 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
CW 8/1	Microcystins ADDA QL	1.015 Abs [1.0850]	0.073 ng/mL [0.033]	Low [Low]	0.167 - 5.550
CW 8/1 UNLYSED	Microcystins ADDA QL	0.251 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
CW 8/1 UNLYSED	Microcystins ADDA QL	0.269 Abs [0.2600]	4.418 ng/mL [5.184]		0.167 - 5.550
J T 8/1	Microcystins ADDA QL	1.084 Abs	0.016 ng/mL	Low	0.167 - 5.550
J T 8/1	Microcystins ADDA QL	1.038 Abs [1.0610]	0.055 ng/mL [0.036]	Low [Low]	0.167 - 5.550
J T 8/1 UNLYSED	Microcystins ADDA QL	0.370 Abs	1.662 ng/mL		0.167 - 5.550
J T 8/1 UNLYSED	Microcystins ADDA QL	0.380 Abs [0.3750]	1.560 ng/mL [1.610]		0.167 - 5.550
B T 8/1	Microcystins ADDA QL	0.990 Abs	0.093 ng/mL	Low	0.167 - 5.550
B T 8/1	Microcystins ADDA QL	1.020 Abs [1.0050]	0.069 ng/mL [0.081]	Low [Low]	0.167 - 5.550
B T 8/1 UNLYSED	Microcystins ADDA QL	0.334 Abs	2.151 ng/mL		0.167 - 5.550
B T 8/1 UNLYSED	Microcystins ADDA QL	0.363 Abs [0.3485]	1.740 ng/mL [1.926]		0.167 - 5.550

* LR - Linear Range; [..] - Mean result of duplicate tests

* Generated by Plate Reader version (6.3.1.163/01520/AE:17 /) 8/1/2014 9:15:20 PM



Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

Assay Calibration

Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/1/2014 9:13:20 PM				
Std1	1.051 Abs	0.044 ng/mL		A01
Std1	1.143 Abs	< 0.000 ng/mL		B01
Std2	0.879 Abs	0.187 ng/mL		C01
Std2	0.936 Abs	0.137 ng/mL		D01
Std3	0.657 Abs	0.465 ng/mL		E01
Std3	0.662 Abs	0.456 ng/mL		F01
Std4	0.464 Abs	1.004 ng/mL		G01
Std4	0.429 Abs	1.189 ng/mL		H01
Std5	0.320 Abs	2.420 ng/mL		A02
Std5	0.350 Abs	1.904 ng/mL		B02
Std6	0.241 Abs	> 5.550 ng/mL		C02
Std6	0.263 Abs	4.895 ng/mL		D02
+++++				
8/1/2014 9:13:20 PM				
Normal Control	0.548 Abs	0.703 ng/mL		E02
Normal Control	0.511 Abs	0.818 ng/mL		F02

Statistic				
Std1 [MEAN]	1.097			
Std1 [SD]	0.065			
Std1 [%CV]	5.93			
Std2 [MEAN]	0.908	0.162		
Std2 [SD]	0.040	0.035		
Std2 [%CV]	4.44	21.82		
Std2 [%DIFF]		-2.99		
Std3 [MEAN]	0.660	0.461		
Std3 [SD]	0.004	0.006		
Std3 [%CV]	0.54	1.38		
Std3 [%DIFF]		3.83		
Std4 [MEAN]	0.447	1.096		
Std4 [SD]	0.025	0.131		



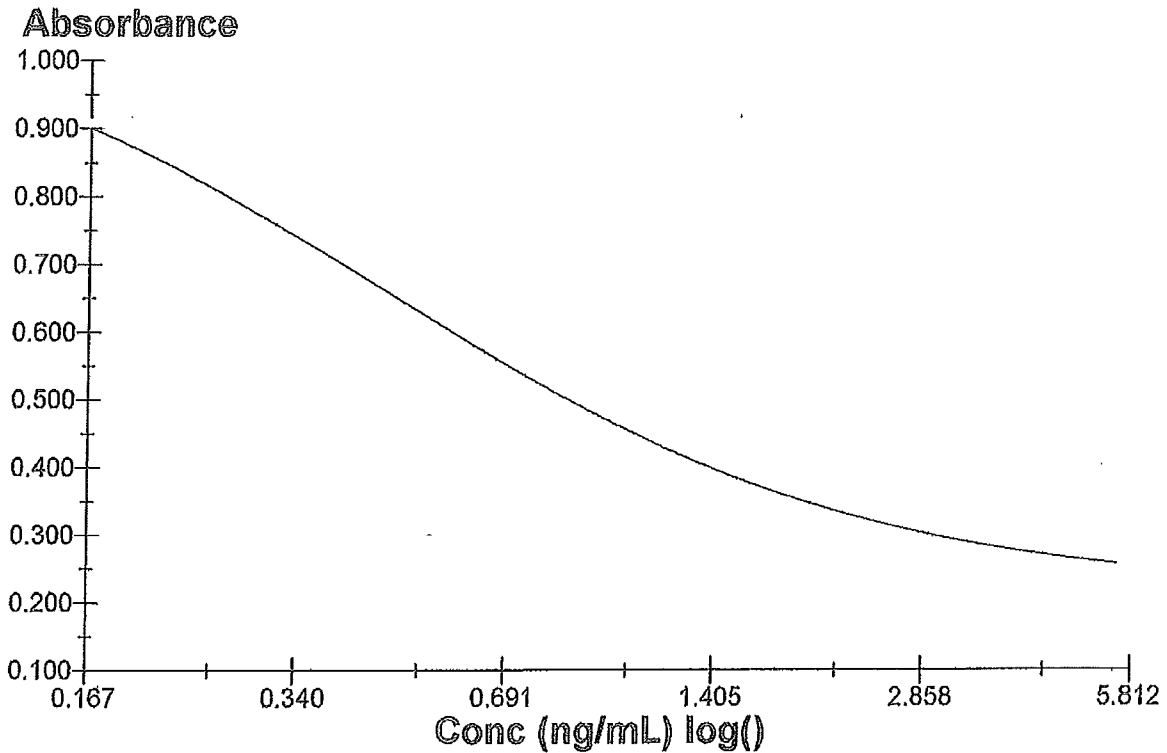


Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	5.54	11.93		
Std4 [%DIFF]		-1.26		
Std5 [MEAN]	0.335	2.162		
Std5 [SD]	0.021	0.365		
Std5 [%CV]	6.33	16.88		
Std5 [%DIFF]		-2.61		
Std6 [MEAN]	0.252			
Std6 [SD]	0.016			
Std6 [%CV]	6.17			
Std6 [%DIFF]		-100.00		
Normal Control [MEAN]	0.530	0.761		
Normal Control [SD]	0.026	0.081		
Normal Control [%CV]	4.94	10.69		

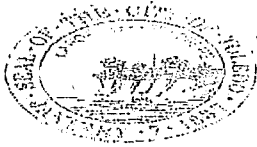
Assay Curve

$y = (A-D)/(1+(x/C)^B) + D$
 A = 0.21556
 B = -1.2172
 C = 0.46435
 D = 1.0989
 R2 coef = 0.99965



Test Report (by Request)

City of Toledo
Water Department



Do not Drink - Do Not Boil -

Face book -

LC:MSMS
513
519
7-2-39
2-MAAD

Test Information

Request: 8/1/2014 9:13:20 PM
Date: 8/1/2014

Dougs lot
Original 8-2

Ours lot
Original 8-2

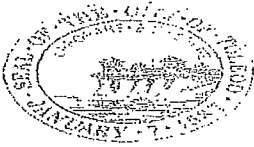
Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.051 Abs	0.044 ng/mL		
Std1	Microcystins ADDA QL	1.143 Abs	< 0.000 ng/mL		
Std2	Microcystins ADDA QL	0.879 Abs	0.187 ng/mL		
Std2	Microcystins ADDA QL	0.936 Abs	0.137 ng/mL		
Std3	Microcystins ADDA QL	0.657 Abs	0.465 ng/mL		
Std3	Microcystins ADDA QL	0.662 Abs	0.456 ng/mL		
Std4	Microcystins ADDA QL	0.464 Abs	1.004 ng/mL		
Std4	Microcystins ADDA QL	0.429 Abs	1.189 ng/mL		
Std5	Microcystins ADDA QL	0.320 Abs	2.420 ng/mL		
Std5	Microcystins ADDA QL	0.350 Abs	1.904 ng/mL		
Std6	Microcystins ADDA QL	0.241 Abs	> 5.550 ng/mL		
Std6	Microcystins ADDA QL	0.263 Abs	4.895 ng/mL		
Normal Control	Microcystins ADDA QL	0.548 Abs	0.703 ng/mL		
Normal Control	Microcystins ADDA QL	0.511 Abs	0.818 ng/mL		
T 7/30	Microcystins ADDA QL	1.113 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
T 7/30	Microcystins ADDA QL	1.043 Abs [1.0780]	0.051 ng/mL [0.022]	Low [Low]	0.167 - 5.550
R 7/31	Microcystins ADDA QL	0.363 Abs	1.740 ng/mL		0.167 - 5.550
R 7/31	Microcystins ADDA QL 1.24	0.401 Abs [0.3820] 2.31	1.380 ng/mL [1.542]		0.167 - 5.550
R 7/31 10X	Microcystins ADDA QL	0.972 Abs	0.107 ng/mL	Low	0.167 - 5.550
R 7/31 10X	Microcystins ADDA QL 0.06	0.990 Abs [0.9810] 0.04 x 10	0.093 ng/mL [0.100]	Low [Low]	0.167 - 5.550
T 7/31	Microcystins ADDA QL	1.098 Abs	0.002 ng/mL	Low	0.167 - 5.550
T 7/31	Microcystins ADDA QL 0.01	1.136 Abs [1.1170] 50.00	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
R 8/1	Microcystins ADDA QL	0.126 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
R 8/1	Microcystins ADDA QL > 5.5	0.109 Abs [0.1175] > 5.5	> 5.550 ng/mL [> 5.55]	Out(LR) [Out(LR)]	0.167 - 5.550
R 8/1 10X	Microcystins ADDA QL	0.481 Abs	0.930 ng/mL		0.167 - 5.550
R 8/1 10X	Microcystins ADDA QL 0.01 = 9.0	0.475 Abs [0.4780] 4.0 x 10	0.955 ng/mL [0.942]	9.4	0.167 - 5.550
CW 8/1	Microcystins ADDA QL	1.115 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
CW 8/1	Microcystins ADDA QL 0.06	1.015 Abs [1.0650] 0.02	0.073 ng/mL [0.033]	Low [Low]	0.167 - 5.550
CW 8/1 UNLYSED ? Doug	Microcystins ADDA QL	0.251 Abs	> 5.550 ng/mL	Out(LR)	0.167 - 5.550
CW 8/1 UNLYSED ? No	Microcystins ADDA QL	0.269 Abs [0.2600]	4.418 ng/mL [5.184]		0.167 - 5.550
J T 8/1 130	Microcystins ADDA QL	1.084 Abs	0.016 ng/mL	Low	0.167 - 5.550
J T 8/1	Microcystins ADDA QL 0.02	1.038 Abs [1.0810] 0.0	0.055 ng/mL [0.036]	Low [Low]	0.167 - 5.550
J T 8/1 UNLYSED	Microcystins ADDA QL	0.370 Abs	1.662 ng/mL		0.167 - 5.550
J T 8/1 UNLYSED	Microcystins ADDA QL 0.55	0.380 Abs [0.3750] 0.42	1.560 ng/mL [1.610]		0.167 - 5.550
B T 8/1 530	Microcystins ADDA QL	0.990 Abs	0.093 ng/mL	Low	0.167 - 5.550
B T 8/1	Microcystins ADDA QL 0.00	1.020 Abs [1.0050] 0.01	0.089 ng/mL [0.081]	Low [Low]	0.167 - 5.550
B T 8/1 UNLYSED	Microcystins ADDA QL	0.334 Abs	2.151 ng/mL		0.167 - 5.550
B T 8/1 UNLYSED	Microcystins ADDA QL 0.92	0.363 Abs [0.3485] 0.79	1.740 ng/mL [1.926]		0.167 - 5.550

TAP Only 1.62 1.62
TAP UNLYSED 0.0 0.01
Clear well Un 2.92 > 5.0
Clear well UNLYSED 0.07 0.02
RAW > 5.5 > 5.0

* LR - Linear Range; [...] - Mean result of duplicate tests
* Generated by Plate Reader version (6.3.1.163/01520/AE:17 /) 8/1/2014 9:15:20 PM
RAW Lyse x 2 3.48 = 6.96 3.80 x 2 = 7.60

11:10 PM 8/1

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Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

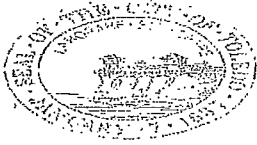
Assay Calibration

Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/1/2014 9:13:20 PM				
Std1	1.051 Abs	0.044 ng/mL		A01
Std1	1.143 Abs	< 0.000 ng/mL		B01
Std2	0.879 Abs	0.187 ng/mL		C01
Std2	0.936 Abs	0.137 ng/mL		D01
Std3	0.657 Abs	0.465 ng/mL		E01
Std3	0.662 Abs	0.456 ng/mL		F01
Std4	0.464 Abs	1.004 ng/mL		G01
Std4	0.429 Abs	1.189 ng/mL		H01
Std5	0.320 Abs	2.420 ng/mL		A02
Std5	0.350 Abs	1.904 ng/mL		B02
Std6	0.241 Abs	> 5.550 ng/mL		C02
Std8	0.263 Abs	4.895 ng/mL		D02
+++++				
8/1/2014 9:13:20 PM				
Normal Control	0.548 Abs	0.703 ng/mL		E02
Normal Control	0.511 Abs	0.818 ng/mL		F02

Statistic				
Std1 [MEAN]	1.097			
Std1 [SD]	0.065			
Std1 [%CV]	5.93			
Std2 [MEAN]	0.908	0.162		
Std2 [SD]	0.040	0.035		
Std2 [%CV]	4.44	21.82		
Std2 [%DIFF]		-2.99		
Std3 [MEAN]	0.660	0.461		
Std3 [SD]	0.004	0.006		
Std3 [%CV]	0.54	1.38		
Std3 [%DIFF]		3.83		
Std4 [MEAN]	0.447	1.096		
Std4 [SD]	0.025	0.131		

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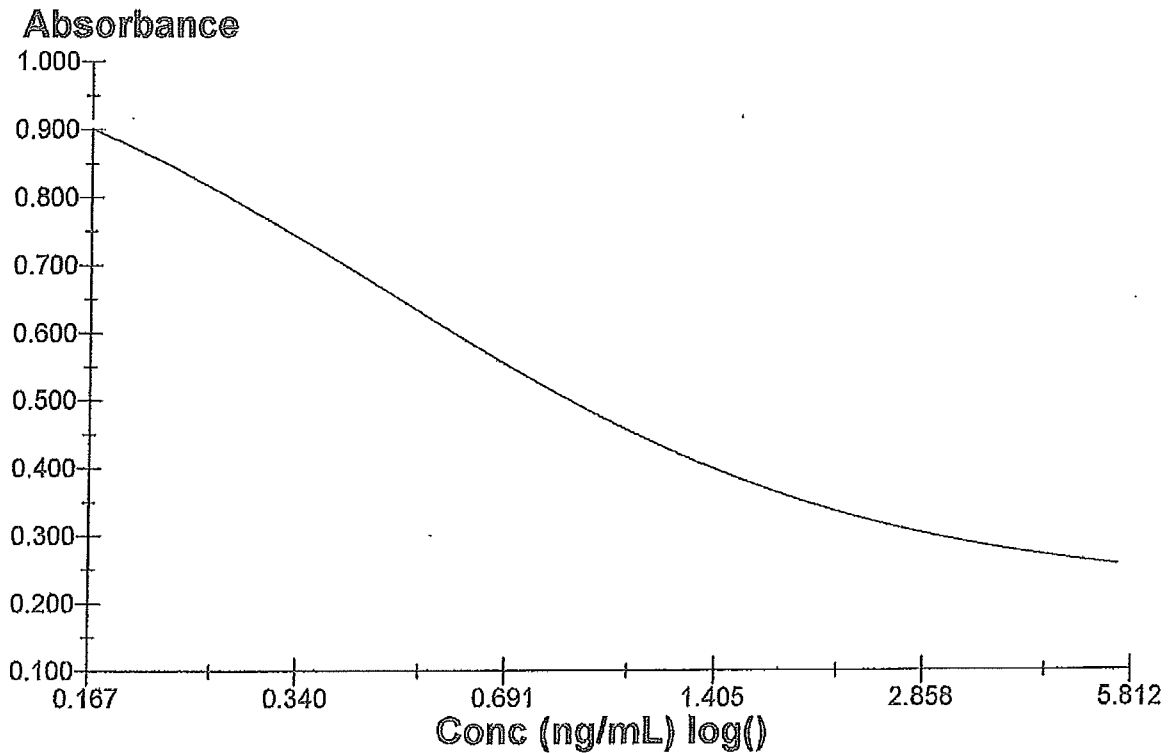


Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	5.54	11.93		
Std4 [%DIFF]		-1.26		
Std5 [MEAN]	0.335	2.162		
Std5 [SD]	0.021	0.365		
Std5 [%CV]	6.33	16.88		
Std5 [%DIFF]		-2.61		
Std6 [MEAN]	0.252			
Std6 [SD]	0.016			
Std6 [%CV]	6.17			
Std6 [%DIFF]		-100.00		
Normal Control [MEAN]	0.530	0.761		
Normal Control [SD]	0.026	0.081		
Normal Control [%CV]	4.94	10.69		

Assay Curve

$y = (A-D)/(1+(x/C)^B) + D$
 A = 0.21556
 B = -1.2172
 C = 0.46435
 D = 1.0989
 R2 coef = 0.99965



ELISA ANALYSIS WORKSHEET

Analysis Date/Analyst

CELLS	SAMPLE ID	Temp °C	pH	Turbidity
1 / 2	Standard 0			
3 / 4	Standard 1			
5 / 6	Standard 2			
7 / 8	Standard 3			
9 / 10	Standard 4			
11 / 12	Standard 5			
13 / 14	Control Standard			
15 / 16	Morone + Whitford L			
17 / 18	↓ DL			
19 / 20	↓ C			
21 / 22	Brint + Main L			
23 / 24	↓ DL			
25 / 26	↓ C			
27 / 28	Alexis + Lewis L			
29 / 30	↓ DL			
31 / 32	↓ C			
33 / 34	Detroit + Alexis L			
35 / 36	↓ DL			
37 / 38	↓ C			
39 / 40	1002 w Alexis L			
41 / 42	↓ DL			
43 / 44	↓ C			
45 / 46	401 L			
47 / 48	↓ DL			

CELLS	SAMPLE ID	Temp °C	pH	Turbidity
49 / 50	401 F C			
51 / 52	St Vincent B C			
53 / 54	↓ DL			
55 / 56	↓ C			
57 / 58	Summit 4 H L			
59 / 60	↓ DL			
61 / 62	↓ C			
63 / 64	ERG I L			
65 / 66	6 AM ↓ DL			
67 / 68	↓ C			
69 / 70	Detroit + Alexis L			
71 / 72	↓ DL			
73 / 74	↓ C			
75 / 76	4710 Detroit KL			
77 / 78	↓ DL			
79 / 80	↓ C			
81 / 82	Oregon DI L L			
83 / 84	↓ DL			
85 / 86	↓ C			
87 / 88	Krager M L			
89 / 90	↓ DL			
91 / 92	↓ C			
93 / 94				
95 / 96				



Test Report (by Request)

1-6-14. 6444743

Ed. Moore

Michelle Bulcer

Test Information

Request: 8/2/2014 1:57:08 PM
Date: 8/2/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.139 Abs	< 0.000 ng/mL		
Std1	Microcystins ADDA QL	1.050 Abs	0.030 ng/mL		
Std2	Microcystins ADDA QL	0.877 Abs	0.178 ng/mL		
Std2	Microcystins ADDA QL	0.914 Abs	0.141 ng/mL		
Std3	Microcystins ADDA QL	0.627 Abs	0.566 ng/mL		
Std3	Microcystins ADDA QL	0.705 Abs	0.409 ng/mL		
Std4	Microcystins ADDA QL	0.498 Abs	0.966 ng/mL		
Std4	Microcystins ADDA QL	0.495 Abs	0.978 ng/mL		
Std5	Microcystins ADDA QL	0.289 Abs	2.892 ng/mL		
Std5	Microcystins ADDA QL	0.321 Abs	2.342 ng/mL		
Std6	Microcystins ADDA QL	0.214 Abs	> 5.550 ng/mL		
Std6	Microcystins ADDA QL	0.231 Abs	4.690 ng/mL		
Normal Control	Microcystins ADDA QL	0.472 Abs	1.082 ng/mL		
Normal Control	Microcystins ADDA QL	0.497 Abs	0.970 ng/mL		
A LYSED	Microcystins ADDA QL	1.134 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
A LYSED	Microcystins ADDA QL	1.048 Abs [1.0910]	0.032 ng/mL [0.003]	Low [Low]	0.167 - 5.550
A UNLYSED	Microcystins ADDA QL	0.824 Abs	0.573 ng/mL		0.167 - 5.550
A UNLYSED	Microcystins ADDA QL	0.700 Abs [0.6620]	0.418 ng/mL [0.490]		0.167 - 5.550
A DECHLOR	Microcystins ADDA QL	0.756 Abs	0.327 ng/mL		0.167 - 5.550
A DECHLOR	Microcystins ADDA QL	0.639 Abs [0.6975]	0.539 ng/mL [0.422]		0.167 - 5.550
B LYSED	Microcystins ADDA QL	1.140 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
B LYSED	Microcystins ADDA QL	1.109 Abs [1.1245]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
B UNLYSED	Microcystins ADDA QL	0.521 Abs	0.876 ng/mL		0.167 - 5.550
B UNLYSED	Microcystins ADDA QL	0.460 Abs [0.4905]	1.141 ng/mL [0.998]		0.167 - 5.550
B DECHLOR	Microcystins ADDA QL	0.440 Abs	1.250 ng/mL		0.167 - 5.550
B DECHLOR	Microcystins ADDA QL	0.482 Abs [0.4610]	1.035 ng/mL [1.136]		0.167 - 5.550
C LYSED	Microcystins ADDA QL	0.795 Abs	0.273 ng/mL		0.167 - 5.550
C LYSED	Microcystins ADDA QL	0.826 Abs [0.8105]	0.234 ng/mL [0.254]		0.167 - 5.550
C UNLYSED	Microcystins ADDA QL	0.795 Abs	0.273 ng/mL		0.167 - 5.550
C UNLYSED	Microcystins ADDA QL	0.823 Abs [0.8090]	0.238 ng/mL [0.255]		0.167 - 5.550
C DECHLOR	Microcystins ADDA QL	0.909 Abs	0.145 ng/mL	Low	0.167 - 5.550
C DECHLOR	Microcystins ADDA QL	0.842 Abs [0.8755]	0.216 ng/mL [0.179]		0.167 - 5.550
D LYSED	Microcystins ADDA QL	1.149 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
D LYSED	Microcystins ADDA QL	1.116 Abs [1.1325]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
D UNLYSED	Microcystins ADDA QL	0.526 Abs	0.857 ng/mL		0.167 - 5.550
D UNLYSED	Microcystins ADDA QL	0.466 Abs [0.4960]	1.111 ng/mL [0.974]		0.167 - 5.550
D DECHLOR	Microcystins ADDA QL	0.493 Abs	0.987 ng/mL		0.167 - 5.550
D DECHLOR	Microcystins ADDA QL	0.473 Abs [0.4830]	1.077 ng/mL [1.031]		0.167 - 5.550
E LYSED	Microcystins ADDA QL	1.101 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
E LYSED	Microcystins ADDA QL	1.049 Abs [1.0750]	0.031 ng/mL [0.014]	Low [Low]	0.167 - 5.550
E UNLYSED	Microcystins ADDA QL	0.471 Abs	1.087 ng/mL		0.167 - 5.550
E UNLYSED	Microcystins ADDA QL	0.495 Abs [0.4830]	0.978 ng/mL [1.031]		0.167 - 5.550
E DECHLOR	Microcystins ADDA QL	0.474 Abs	1.072 ng/mL		0.167 - 5.550
E DECHLOR	Microcystins ADDA QL	0.536 Abs [0.5050]	0.823 ng/mL [0.937]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests

* Generated by Plate Reader version (0.3.1.163/01520/AE:17 /) 8/2/2014 1:59:21 PM



Test Report (by Request)

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
F LYSED	Microcystins ADDA QL	1.145 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
F LYSED	Microcystins ADDA QL	1.069 Abs [1.1070]	0.017 ng/mL [< 0.000]	Low [Out(LR)]	0.167 - 5.550
F UNLYSED	Microcystins ADDA QL	0.618 Abs	0.587 ng/mL		0.167 - 5.550
F UNLYSED	Microcystins ADDA QL	0.580 Abs [0.5990] X	0.686 ng/mL [0.634]		0.167 - 5.550
F DECHLOR	Microcystins ADDA QL	0.613 Abs	0.599 ng/mL		0.167 - 5.550
F DECHLOR	Microcystins ADDA QL	0.620 Abs [0.6165]	0.582 ng/mL [0.591]		0.167 - 5.550
G LYSED	Microcystins ADDA QL	0.787 Abs	0.284 ng/mL		0.167 - 5.550
G LYSED	Microcystins ADDA QL	0.834 Abs [0.8105]	0.225 ng/mL [0.254]		0.167 - 5.550
G UNLYSED	Microcystins ADDA QL	0.719 Abs	0.385 ng/mL		0.167 - 5.550
G UNLYSED	Microcystins ADDA QL	0.818 Abs [0.7685] X	0.244 ng/mL [0.309]		0.167 - 5.550
G DECHLOR	Microcystins ADDA QL	0.815 Abs	0.248 ng/mL		0.167 - 5.550
G DECHLOR	Microcystins ADDA QL	0.772 Abs [0.7935]	0.304 ng/mL [0.275]		0.167 - 5.550
H LYSED	Microcystins ADDA QL	1.028 Abs	0.046 ng/mL	Low	0.167 - 5.550
H LYSED	Microcystins ADDA QL	1.075 Abs [1.0515]	0.014 ng/mL [0.029]	Low [Low]	0.167 - 5.550
H UNLYSED	Microcystins ADDA QL	0.517 Abs	0.891 ng/mL		0.167 - 5.550
H UNLYSED	Microcystins ADDA QL	0.509 Abs [0.5130] X	0.921 ng/mL [0.906]		0.167 - 5.550
H DECHLOR	Microcystins ADDA QL	0.514 Abs	0.902 ng/mL		0.167 - 5.550
H DECHLOR	Microcystins ADDA QL	0.518 Abs [0.5160]	0.887 ng/mL [0.895]		0.167 - 5.550
I LYSED	Microcystins ADDA QL	1.001 Abs	0.066 ng/mL	Low	0.167 - 5.550
I LYSED	Microcystins ADDA QL	1.052 Abs [1.0285]	0.029 ng/mL [0.047]	Low [Low]	0.167 - 5.550
I UNLYSED Tap 6 AM	Microcystins ADDA QL	0.267 Abs	3.408 ng/mL		0.167 - 5.550
I UNLYSED	Microcystins ADDA QL	0.284 Abs [0.2755] X	2.997 ng/mL [3.191]		0.167 - 5.550
I DECHLOR	Microcystins ADDA QL	0.313 Abs	2.463 ng/mL		0.167 - 5.550
I DECHLOR	Microcystins ADDA QL	0.316 Abs [0.3145]	2.414 ng/mL [2.439]		0.167 - 5.550
J LYSED	Microcystins ADDA QL	0.764 Abs	0.316 ng/mL		0.167 - 5.550
J LYSED	Microcystins ADDA QL	0.784 Abs [0.7740]	0.288 ng/mL [0.302]		0.167 - 5.550
J UNLYSED	Microcystins ADDA QL	0.486 Abs	1.017 ng/mL		0.167 - 5.550
J UNLYSED	Microcystins ADDA QL	0.478 Abs [0.4820] X	1.053 ng/mL [1.035]		0.167 - 5.550
J DECHLOR	Microcystins ADDA QL	0.429 Abs	1.315 ng/mL		0.167 - 5.550
J DECHLOR	Microcystins ADDA QL	0.443 Abs [0.4360]	1.232 ng/mL [1.274]		0.167 - 5.550
K LYSED	Microcystins ADDA QL	0.985 Abs	0.079 ng/mL	Low	0.167 - 5.550
K LYSED	Microcystins ADDA QL	0.968 Abs [0.9765]	0.093 ng/mL [0.086]	Low [Low]	0.167 - 5.550
K UNLYSED	Microcystins ADDA QL	0.570 Abs	0.714 ng/mL		0.167 - 5.550
K UNLYSED	Microcystins ADDA QL	0.604 Abs [0.5870] X	0.622 ng/mL [0.667]		0.167 - 5.550
K DECHLOR	Microcystins ADDA QL	0.622 Abs	0.578 ng/mL		0.167 - 5.550
K DECHLOR	Microcystins ADDA QL	0.571 Abs [0.5965]	0.712 ng/mL [0.641]		0.167 - 5.550
L LYSED	Microcystins ADDA QL	1.068 Abs	0.018 ng/mL	Low	0.167 - 5.550
L LYSED	Microcystins ADDA QL	1.078 Abs [1.0730]	0.012 ng/mL [0.015]	Low [Low]	0.167 - 5.550
L UNLYSED	Microcystins ADDA QL	1.074 Abs	0.014 ng/mL	Low	0.167 - 5.550
L UNLYSED	Microcystins ADDA QL	0.951 Abs [1.0125] X	0.107 ng/mL [0.057]	Low [Low]	0.167 - 5.550
L DECHLOR	Microcystins ADDA QL	1.092 Abs	0.002 ng/mL	Low	0.167 - 5.550
L DECHLOR	Microcystins ADDA QL	1.145 Abs [1.1185]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
M LYSED	Microcystins ADDA QL	1.136 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
M LYSED	Microcystins ADDA QL	1.084 Abs [1.1100]	0.008 ng/mL [< 0.000]	Low [Out(LR)]	0.167 - 5.550
M UNLYSED	Microcystins ADDA QL	0.905 Abs	0.149 ng/mL	Low	0.167 - 5.550
M UNLYSED	Microcystins ADDA QL	1.003 Abs [0.9540] X	0.065 ng/mL [0.105]	Low [Low]	0.167 - 5.550
M DECHLOR	Microcystins ADDA QL	1.017 Abs	0.054 ng/mL	Low	0.167 - 5.550
M DECHLOR	Microcystins ADDA QL	1.071 Abs [1.0440]	0.016 ng/mL [0.035]	Low [Low]	0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests

* Generated by Plate Reader version (6.3.1.163/01620/AE:17 /) 8/2/2014 1:59:21 PM



Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

Assay Calibration

Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/2/2014 1:57:08 PM				
Std1	1.139 Abs	< 0.000 ng/mL		A01
Std1	1.050 Abs	0.030 ng/mL		B01
Std2	0.877 Abs	0.178 ng/mL		C01
Std2	0.914 Abs	0.141 ng/mL		D01
Std3	0.627 Abs	0.566 ng/mL		E01
Std3	0.705 Abs	0.409 ng/mL		F01
Std4	0.498 Abs	0.966 ng/mL		G01
Std4	0.495 Abs	0.978 ng/mL		H01
Std5	0.289 Abs	2.892 ng/mL		A02
Std5	0.321 Abs	2.342 ng/mL		B02
Std6	0.214 Abs	> 5.550 ng/mL		C02
Std6	0.231 Abs	4.690 ng/mL		D02

8/2/2014 1:57:08 PM				
Normal Control	0.472 Abs	1.082 ng/mL		E02
Normal Control	0.497 Abs	0.970 ng/mL		F02

Statistic				
Std1 [MEAN]	1.095			
Std1 [SD]	0.063			
Std1 [%CV]	5.75			
Std2 [MEAN]	0.895	0.160		
Std2 [SD]	0.026	0.026		
Std2 [%CV]	2.92	16.40		
Std2 [%DIFF]		-4.19		
Std3 [MEAN]	0.666	0.488		
Std3 [SD]	0.055	0.111		
Std3 [%CV]	8.28	22.77		
Std3 [%DIFF]		9.91		
Std4 [MEAN]	0.497	0.972		
Std4 [SD]	0.002	0.008		

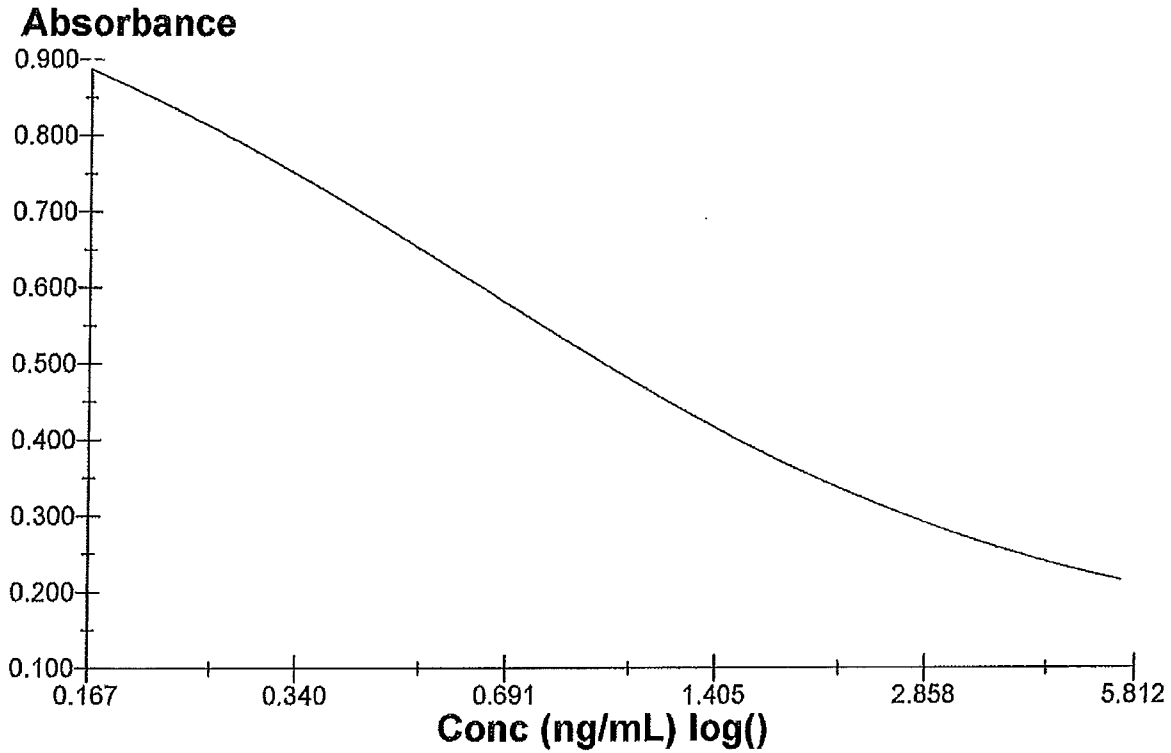


Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	0.43	0.87		
Std4 [%DIFF]		-12.43		
Std5 [MEAN]	0.305	2.617		
Std5 [SD]	0.023	0.389		
Std5 [%CV]	7.42	14.86		
Std5 [%DIFF]		17.88		
Std6 [MEAN]	0.222			
Std6 [SD]	0.012			
Std6 [%CV]	5.40			
Std6 [%DIFF]		-100.00		
Normal Control [MEAN]	0.484	1.026		
Normal Control [SD]	0.018	0.079		
Normal Control [%CV]	3.65	7.72		

Assay Curve

$y = (A-D)/(1+(x/C)^B) + D$
 A = 0.11826
 B = -1.0018
 C = 0.61374
 D = 1.0960
 R2 coef = 0.99643



ELISA ANALYSIS WORKSHEET

CELLS	SAMPLE ID	Temp °C	pH	Turbidity
1 / 2	Standard 0			
3 / 4	Standard 1			
5 / 6	Standard 2			
7 / 8	Standard 3			
9 / 10	Standard 4			
11 / 12	Standard 5			
13 / 14	Control Standard			
15 / 16	2016 Rockwood L			
17 / 18	N UL			
19 / 20	C			
21 / 22	2066 Cass L			
23 / 24	D UL			
25 / 26	C			
27 / 28	EBroadway Pump L			
29 / 30	P UL			
31 / 32	C			
33 / 34	Woodmore L			
35 / 36	G UL			
37 / 38	C			
39 / 40	Tracy + Andrews L			
41 / 42	R UL			
43 / 44	C			
45 / 46	Sheffield + Ebenezer L			
47 / 48	S UL			

Analysis Date/Analyst

CELLS	SAMPLE ID	Temp °C	pH	Turbidity
49 / 50	Sheffield + Ebenezer C	5		
51 / 52	Wales Rd Pump L			
53 / 54	T UL			
55 / 56	C			
57 / 58	TB + Soda L			
59 / 60	U UL			
61 / 62	C			
63 / 64	C + Monroe L			
65 / 66	V UL			
67 / 68	C			
69 / 70	Detroit - W L			
71 / 72	W UL			
73 / 74	C			
75 / 76	Bk Phillips L			
77 / 78	X UL			
79 / 80	C			
81 / 82	204 N Summit L			
83 / 84	Y UL			
85 / 86	C			
87 / 88	Edgewater L			
89 / 90	Z UL			
91 / 92	C			
93 / 94				
95 / 96				



Test Report (by Request)

Test Information

Request: 8/2/2014 2:53:09 PM
Date: 8/2/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.153 Abs	0.001 ng/mL		
Std1	Microcystins ADDA QL	1.149 Abs	0.004 ng/mL		
Std2	Microcystins ADDA QL	0.947 Abs	0.135 ng/mL		
Std2	Microcystins ADDA QL	0.896 Abs	0.175 ng/mL		
Std3	Microcystins ADDA QL	0.627 Abs	0.513 ng/mL		
Std3	Microcystins ADDA QL	0.656 Abs	0.460 ng/mL		
Std4	Microcystins ADDA QL	0.465 Abs	0.980 ng/mL		
Std4	Microcystins ADDA QL	0.435 Abs	1.124 ng/mL		
Std5	Microcystins ADDA QL	0.330 Abs	2.037 ng/mL		
Std5	Microcystins ADDA QL	0.328 Abs	2.065 ng/mL		
Std6	Microcystins ADDA QL	0.218 Abs	> 5.550 ng/mL		
Std6	Microcystins ADDA QL	0.226 Abs	> 5.550 ng/mL		
Normal Control	Microcystins ADDA QL	0.494 Abs	0.864 ng/mL		
Normal Control	Microcystins ADDA QL	0.518 Abs	0.782 ng/mL		
N LYSED	Microcystins ADDA QL	1.098 Abs	0.035 ng/mL	Low	0.167 - 5.550
N LYSED	Microcystins ADDA QL	1.078 Abs [1.0880]	0.047 ng/mL [0.041]	Low [Low]	0.167 - 5.550
N UNLYSED	Microcystins ADDA QL	0.543 Abs	0.707 ng/mL		0.167 - 5.550
N UNLYSED	Microcystins ADDA QL	0.601 Abs [0.5720]	0.566 ng/mL [0.632]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests

* Generated by Plate Reader version (6.3.1.163/01520/AE:17 /) 8/2/2014 2:55:06 PM

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Test Report (by Request)

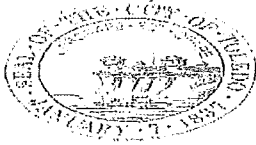
Test Information

Request: 8/2/2014 2:53:10 PM
Date: 8/2/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
N DECHLOR	Microcystins ADDA QL	0.616 Abs	0.534 ng/mL		0.167 - 5.550
N DECHLOR	Microcystins ADDA QL	0.638 Abs [0.6270]	0.492 ng/mL [0.513]		0.167 - 5.550
O LYSED	Microcystins ADDA QL	1.016 Abs	0.087 ng/mL	Low	0.167 - 5.550
O LYSED	Microcystins ADDA QL	1.064 Abs [1.0400]	0.056 ng/mL [0.071]	Low [Low]	0.167 - 5.550
O UNLYSED	Microcystins ADDA QL	0.672 Abs	0.434 ng/mL		0.167 - 5.550
O UNLYSED	Microcystins ADDA QL	0.686 Abs [0.6790]	0.412 ng/mL [0.423]		0.167 - 5.550
O DECHLOR	Microcystins ADDA QL	0.644 Abs	0.481 ng/mL		0.167 - 5.550
O DECHLOR	Microcystins ADDA QL	0.679 Abs [0.6615]	0.423 ng/mL [0.451]		0.167 - 5.550
P LYSED	Microcystins ADDA QL	1.066 Abs	0.055 ng/mL	Low	0.167 - 5.550
P LYSED	Microcystins ADDA QL	1.070 Abs [1.0680]	0.052 ng/mL [0.053]	Low [Low]	0.167 - 5.550
P UNLYSED	Microcystins ADDA QL	0.446 Abs	1.068 ng/mL		0.167 - 5.550
P UNLYSED	Microcystins ADDA QL	0.395 Abs [0.4205]	1.375 ng/mL [1.207]		0.167 - 5.550
P DECHLOR	Microcystins ADDA QL	0.447 Abs	1.063 ng/mL		0.167 - 5.550
P DECHLOR	Microcystins ADDA QL	0.397 Abs [0.4220]	1.360 ng/mL [1.198]		0.167 - 5.550
Q LYSED	Microcystins ADDA QL	1.019 Abs	0.085 ng/mL	Low	0.167 - 5.550
Q LYSED	Microcystins ADDA QL	1.039 Abs [1.0290]	0.072 ng/mL [0.078]	Low [Low]	0.167 - 5.550
Q UNLYSED	Microcystins ADDA QL	0.340 Abs	1.904 ng/mL		0.167 - 5.550
Q UNLYSED	Microcystins ADDA QL	0.367 Abs [0.3535]	1.608 ng/mL [1.745]		0.167 - 5.550
Q DECHLOR	Microcystins ADDA QL	0.389 Abs	1.420 ng/mL		0.167 - 5.550
Q DECHLOR	Microcystins ADDA QL	0.372 Abs [0.3805]	1.562 ng/mL [1.487]		0.167 - 5.550
R LYSED	Microcystins ADDA QL	1.062 Abs	0.057 ng/mL	Low	0.167 - 5.550
R LYSED	Microcystins ADDA QL	0.994 Abs [1.0280]	0.101 ng/mL [0.079]	Low [Low]	0.167 - 5.550
R UNLYSED	Microcystins ADDA QL	0.518 Abs	0.782 ng/mL		0.167 - 5.550
R UNLYSED	Microcystins ADDA QL	0.578 Abs [0.5480]	0.617 ng/mL [0.693]		0.167 - 5.550
R DECHLOR	Microcystins ADDA QL	0.495 Abs	0.860 ng/mL		0.167 - 5.550
R DECHLOR	Microcystins ADDA QL	0.522 Abs [0.5085]	0.769 ng/mL [0.813]		0.167 - 5.550
S LYSED	Microcystins ADDA QL	1.099 Abs	0.035 ng/mL	Low	0.167 - 5.550
S LYSED	Microcystins ADDA QL	1.137 Abs [1.1180]	0.012 ng/mL [0.023]	Low [Low]	0.167 - 5.550
S UNLYSED	Microcystins ADDA QL	0.525 Abs	0.760 ng/mL		0.167 - 5.550
S UNLYSED	Microcystins ADDA QL	0.504 Abs [0.5145]	0.828 ng/mL [0.793]		0.167 - 5.550
S DECHLOR	Microcystins ADDA QL	0.475 Abs	0.937 ng/mL		0.167 - 5.550
S DECHLOR	Microcystins ADDA QL	0.550 Abs [0.5125]	0.688 ng/mL [0.799]		0.167 - 5.550
T LYSED	Microcystins ADDA QL	0.993 Abs	0.102 ng/mL	Low	0.167 - 5.550
T LYSED	Microcystins ADDA QL	1.096 Abs [1.0445]	0.036 ng/mL [0.068]	Low [Low]	0.167 - 5.550
T UNLYSED	Microcystins ADDA QL	0.475 Abs	0.937 ng/mL		0.167 - 5.550
T UNLYSED	Microcystins ADDA QL	0.529 Abs [0.5020]	0.748 ng/mL [0.835]		0.167 - 5.550
T DECHLOR	Microcystins ADDA QL	0.568 Abs	0.641 ng/mL		0.167 - 5.550
T DECHLOR	Microcystins ADDA QL	0.558 Abs [0.5630]	0.667 ng/mL [0.654]		0.167 - 5.550
U LYSED	Microcystins ADDA QL	1.054 Abs	0.062 ng/mL	Low	0.167 - 5.550
U LYSED	Microcystins ADDA QL	1.075 Abs [1.0645]	0.049 ng/mL [0.056]	Low [Low]	0.167 - 5.550
U UNLYSED	Microcystins ADDA QL	0.653 Abs	0.466 ng/mL		0.167 - 5.550
U UNLYSED	Microcystins ADDA QL	0.645 Abs [0.6490]	0.480 ng/mL [0.472]		0.167 - 5.550
U DECHLOR	Microcystins ADDA QL	0.677 Abs	0.426 ng/mL		0.167 - 5.550
U DECHLOR	Microcystins ADDA QL	0.669 Abs [0.6730]	0.439 ng/mL [0.432]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests

* Generated by Plate Reader version (0.3.1.163/01520/AE:17 /) 8/2/2014 2:55:06 PM



Test Report (by Request)

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
V LYSED	Microcystins ADDA QL	1.015 Abs	0.087 ng/mL	Low	0.167 - 5.550
V LYSED	Microcystins ADDA QL	1.029 Abs [1.0220]	0.078 ng/mL [0.083]	Low [Low]	0.167 - 5.550
V UNLYSED	Microcystins ADDA QL	0.461 Abs	0.997 ng/mL		0.167 - 5.550
V UNLYSED	Microcystins ADDA QL	0.480 Abs [0.4605] X	1.002 ng/mL [0.999]		0.167 - 5.550
V DECHLOR	Microcystins ADDA QL	0.510 Abs	0.808 ng/mL		0.167 - 5.550
V DECHLOR	Microcystins ADDA QL	0.491 Abs [0.5005]	0.875 ng/mL [0.840]		0.167 - 5.550
W LYSED	Microcystins ADDA QL	1.028 Abs	0.079 ng/mL	Low	0.167 - 5.550
W LYSED	Microcystins ADDA QL	1.081 Abs [1.0545]	0.046 ng/mL [0.062]	Low [Low]	0.167 - 5.550
W UNLYSED	Microcystins ADDA QL	0.496 Abs	0.856 ng/mL		0.167 - 5.550
W UNLYSED	Microcystins ADDA QL	0.473 Abs [0.4845] X	0.945 ng/mL [0.899]		0.167 - 5.550
W DECHLOR	Microcystins ADDA QL	0.480 Abs	0.917 ng/mL		0.167 - 5.550
W DECHLOR	Microcystins ADDA QL	0.558 Abs [0.5190]	0.667 ng/mL [0.779]		0.167 - 5.550
X LYSED	Microcystins ADDA QL	1.116 Abs	0.024 ng/mL	Low	0.167 - 5.550
X LYSED	Microcystins ADDA QL	0.992 Abs [1.0540]	0.103 ng/mL [0.062]	Low [Low]	0.167 - 5.550
X UNLYSED	Microcystins ADDA QL	0.556 Abs	0.672 ng/mL		0.167 - 5.550
X UNLYSED	Microcystins ADDA QL	0.502 Abs [0.5290] X	0.835 ng/mL [0.748]		0.167 - 5.550
X DECHLOR	Microcystins ADDA QL	0.543 Abs	0.707 ng/mL		0.167 - 5.550
X DECHLOR	Microcystins ADDA QL	0.523 Abs [0.5330]	0.766 ng/mL [0.736]		0.167 - 5.550
Y LYSED	Microcystins ADDA QL	1.019 Abs	0.085 ng/mL	Low	0.167 - 5.550
Y LYSED	Microcystins ADDA QL	1.012 Abs [1.0155]	0.089 ng/mL [0.087]	Low [Low]	0.167 - 5.550
Y UNLYSED	Microcystins ADDA QL	0.598 Abs	0.572 ng/mL		0.167 - 5.550
Y UNLYSED	Microcystins ADDA QL	0.551 Abs [0.5745] X	0.685 ng/mL [0.625]		0.167 - 5.550
Y DECHLOR	Microcystins ADDA QL	0.630 Abs	0.507 ng/mL		0.167 - 5.550
Y DECHLOR	Microcystins ADDA QL	0.655 Abs [0.6425]	0.462 ng/mL [0.484]		0.167 - 5.550
Z LYSED	Microcystins ADDA QL	1.114 Abs	0.026 ng/mL	Low	0.167 - 5.550
Z LYSED	Microcystins ADDA QL	1.097 Abs [1.1055]	0.036 ng/mL [0.031]	Low [Low]	0.167 - 5.550
Z UNLYSED	Microcystins ADDA QL	0.546 Abs	0.699 ng/mL		0.167 - 5.550
Z UNLYSED	Microcystins ADDA QL	0.510 Abs [0.5280] X	0.808 ng/mL [0.751]		0.167 - 5.550
Z DECHLOR	Microcystins ADDA QL	0.576 Abs	0.622 ng/mL		0.167 - 5.550
Z DECHLOR	Microcystins ADDA QL	0.534 Abs [0.5550]	0.733 ng/mL [0.674]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests

* Generated by Plate Reader version (6.3.1.163/01620/AE:17 /) 8/2/2014 2:55:08 PM



Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

Assay Calibration

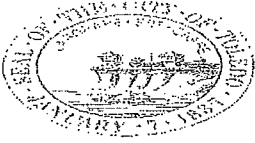
Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/2/2014 2:53:09 PM				
Std1	1.153 Abs	0.001 ng/mL		A01
Std1	1.149 Abs	0.004 ng/mL		B01
Std2	0.947 Abs	0.135 ng/mL		C01
Std2	0.896 Abs	0.175 ng/mL		D01
Std3	0.627 Abs	0.513 ng/mL		E01
Std3	0.656 Abs	0.460 ng/mL		F01
Std4	0.465 Abs	0.980 ng/mL		G01
Std4	0.435 Abs	1.124 ng/mL		H01
Std5	0.330 Abs	2.037 ng/mL		A02
Std5	0.328 Abs	2.065 ng/mL		B02
Std6	0.218 Abs	> 5.550 ng/mL		C02
Std6	0.226 Abs	> 5.550 ng/mL		D02

8/2/2014 2:53:09 PM				
Normal Control	0.494 Abs	0.864 ng/mL		E02
Normal Control	0.518 Abs	0.782 ng/mL		F02

Statistic				
Std1 [MEAN]	1.151	0.003		
Std1 [SD]	0.003	0.002		
Std1 [%CV]	0.25	84.85		
Std2 [MEAN]	0.922	0.155		
Std2 [SD]	0.036	0.028		
Std2 [%CV]	3.91	18.25		
Std2 [%DIFF]		-7.19		
Std3 [MEAN]	0.641	0.487		
Std3 [SD]	0.021	0.037		
Std3 [%CV]	3.20	7.70		
Std3 [%DIFF]		9.68		
Std4 [MEAN]	0.450	1.052		
Std4 [SD]	0.021	0.102		

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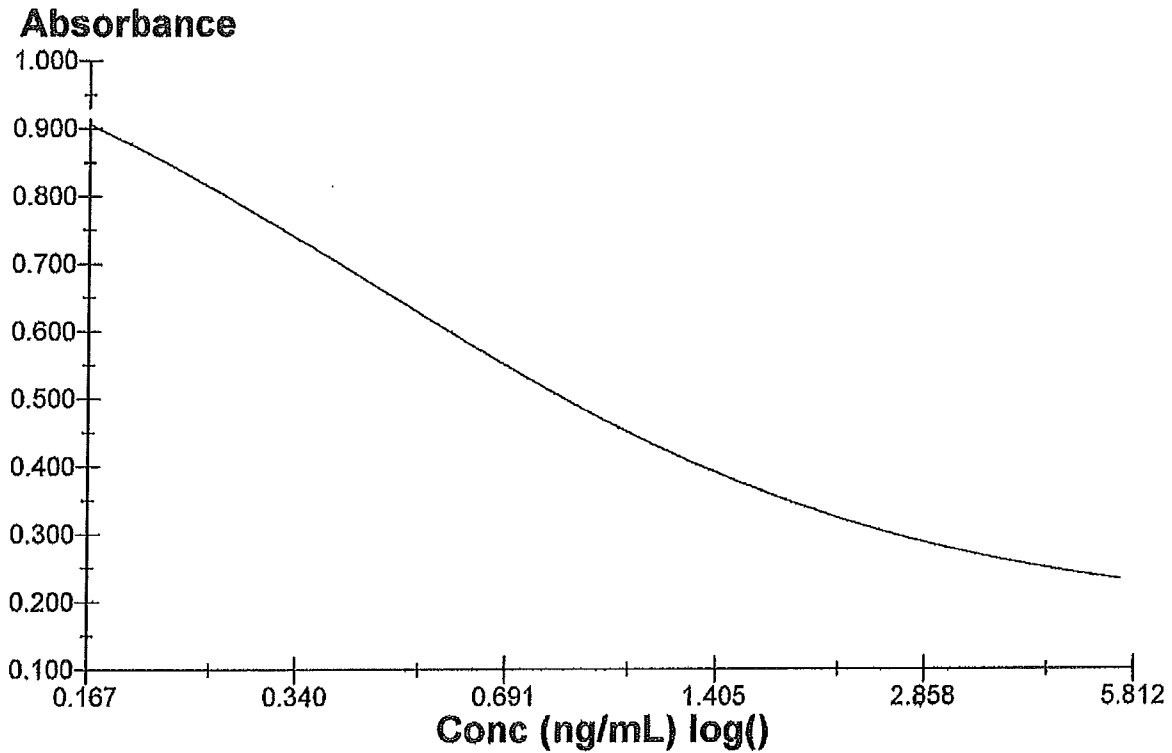


Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	4.71	9.68		
Std4 [%DIFF]		-5.23		
Std5 [MEAN]	0.329	2.051		
Std5 [SD]	0.001	0.020		
Std5 [%CV]	0.43	0.97		
Std5 [%DIFF]		-7.61		
Std6 [MEAN]	0.222			
Std6 [SD]	0.006			
Std6 [%CV]	2.55			
Std6 [%DIFF]		-100.00		
Normal Control [MEAN]	0.506	0.823		
Normal Control [SD]	0.017	0.058		
Normal Control [%CV]	3.35	7.05		

Assay Curve

$y = (A-D)/(1+(x/C)^B) + D$
 A = 0.17522
 B = -1.1003
 C = 0.44529
 D = 1.1547
 R2 coef = 0.99805



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ELISA ANALYSIS WORKSHEET

CELLS	SAMPLE ID	Temp °C	pH	Turbidity
1 / 2	Standard 0			
3 / 4	Standard 1			
5 / 6	Standard 2			
7 / 8	Standard 3			
9 / 10	Standard 4			
11 / 12	Standard 5			
13 / 14	Control Standard			
15 / 16	642 Stern L			
17 / 18	UL AA			
19 / 20	C			
21 / 22	1899 Front St L			
23 / 24	UL AB			
25 / 26	C			
27 / 28	1414 S Detroit L AC			
29 / 30	UL			
31 / 32	C			
33 / 34	Stickney Fire L AD			
35 / 36	UL			
37 / 38	C			
39 / 40	Bob Evans Reynolds L AE			
41 / 42	UL			
43 / 44	C			
45 / 46	9332 St Lawrence L AF			
47 / 48	UL			

Analysis Date/Analyst

CELLS	SAMPLE ID	Temp °C	pH	Turbidity
49 / 50	9332 St Lawrence C AF			
51 / 52	Burns King Seaw L AC			
53 / 54	UL			
55 / 56	C			
57 / 58	Panacea House L AH			
59 / 60	UL			
61 / 62	C			
63 / 64	Holland Sq + Belmont L AI			
65 / 66	UL			
67 / 68	C			
69 / 70	Holland Sq + Centret L AJ			
71 / 72	UL			
73 / 74	C			
75 / 76	UTKCD L AK			
77 / 78	UL			
79 / 80	C			
81 / 82	SWPS L AL			
83 / 84	UL			
85 / 86	C			
87 / 88	NLP5 L AM			
89 / 90	UL			
91 / 92	C			
93 / 94				
95 / 96				



Test Report (by Request)

Test Information

Request: 8/2/2014 3:58:09 PM
Date: 8/2/2014

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
Std1	Microcystins ADDA QL	1.124 Abs	< 0.000 ng/mL		
Std1	Microcystins ADDA QL	1.109 Abs	0.004 ng/mL		
Std2	Microcystins ADDA QL	0.879 Abs	0.142 ng/mL		
Std2	Microcystins ADDA QL	0.838 Abs	0.176 ng/mL		
Std3	Microcystins ADDA QL	0.610 Abs	0.476 ng/mL		
Std3	Microcystins ADDA QL	0.611 Abs	0.474 ng/mL		
Std4	Microcystins ADDA QL	0.421 Abs	1.081 ng/mL		
Std4	Microcystins ADDA QL	0.428 Abs	1.045 ng/mL		
Std5	Microcystins ADDA QL	0.297 Abs	2.214 ng/mL		
Std5	Microcystins ADDA QL	0.308 Abs	2.052 ng/mL		
Std6	Microcystins ADDA QL	0.190 Abs	> 5.550 ng/mL		
Std6	Microcystins ADDA QL	0.203 Abs	> 5.550 ng/mL		
Normal Control	Microcystins ADDA QL	0.453 Abs	0.929 ng/mL		
Normal Control	Microcystins ADDA QL	0.441 Abs	0.982 ng/mL		
AA LYSED	Microcystins ADDA QL	1.008 Abs	0.055 ng/mL	Low	0.167 - 5.550
AA LYSED	Microcystins ADDA QL	1.011 Abs [1.0095]	0.054 ng/mL [0.054]	Low [Low]	0.167 - 5.550
AA UNLYSED	Microcystins ADDA QL	0.780 Abs	0.233 ng/mL		0.167 - 5.550
AA UNLYSED	Microcystins ADDA QL	0.878 Abs [0.8290]	0.143 ng/mL [0.184]	Low	0.167 - 5.550
AA DECHLOR	Microcystins ADDA QL	0.852 Abs	0.164 ng/mL	Low	0.167 - 5.550
AA DECHLOR	Microcystins ADDA QL	0.776 Abs [0.8140]	0.237 ng/mL [0.198]		0.167 - 5.550
AB LYSED	Microcystins ADDA QL	1.024 Abs	0.046 ng/mL	Low	0.167 - 5.550
AB LYSED	Microcystins ADDA QL	0.995 Abs [1.0095]	0.063 ng/mL [0.054]	Low [Low]	0.167 - 5.550
AB UNLYSED	Microcystins ADDA QL	0.452 Abs	0.932 ng/mL		0.167 - 5.550
AB UNLYSED	Microcystins ADDA QL	0.414 Abs [0.4330]	1.118 ng/mL [1.020]		0.167 - 5.550
AB DECHLOR	Microcystins ADDA QL	0.454 Abs	0.924 ng/mL		0.167 - 5.550
AB DECHLOR	Microcystins ADDA QL	0.498 Abs [0.4760]	0.759 ng/mL [0.836]		0.167 - 5.550
AC LYSED	Microcystins ADDA QL	0.979 Abs	0.072 ng/mL	Low	0.167 - 5.550
AC LYSED	Microcystins ADDA QL	1.098 Abs [1.0385]	0.009 ng/mL [0.039]	Low [Low]	0.167 - 5.550
AC UNLYSED	Microcystins ADDA QL	0.633 Abs	0.433 ng/mL		0.167 - 5.550
AC UNLYSED	Microcystins ADDA QL	0.593 Abs [0.6130]	0.510 ng/mL [0.470]		0.167 - 5.550
AC DECHLOR	Microcystins ADDA QL	0.650 Abs	0.404 ng/mL		0.167 - 5.550
AC DECHLOR	Microcystins ADDA QL	0.612 Abs [0.6310]	0.472 ng/mL [0.437]		0.167 - 5.550
AD LYSED	Microcystins ADDA QL	1.061 Abs	0.027 ng/mL	Low	0.167 - 5.550
AD LYSED	Microcystins ADDA QL	1.079 Abs [1.0700]	0.018 ng/mL [0.022]	Low [Low]	0.167 - 5.550
AD UNLYSED	Microcystins ADDA QL	0.454 Abs	0.924 ng/mL		0.167 - 5.550
AD UNLYSED	Microcystins ADDA QL	0.443 Abs [0.4485]	0.972 ng/mL [0.948]		0.167 - 5.550
AD DECHLOR	Microcystins ADDA QL	0.479 Abs	0.825 ng/mL		0.167 - 5.550
AD DECHLOR	Microcystins ADDA QL	0.484 Abs [0.4815]	0.807 ng/mL [0.816]		0.167 - 5.550
AE LYSED	Microcystins ADDA QL	1.086 Abs	0.015 ng/mL	Low	0.167 - 5.550
AE LYSED	Microcystins ADDA QL	1.032 Abs [1.0590]	0.042 ng/mL [0.028]	Low [Low]	0.167 - 5.550
AE UNLYSED	Microcystins ADDA QL	0.686 Abs	0.349 ng/mL		0.167 - 5.550
AE UNLYSED	Microcystins ADDA QL	0.736 Abs [0.7110]	0.282 ng/mL [0.314]		0.167 - 5.550
AE DECHLOR	Microcystins ADDA QL	0.655 Abs	0.396 ng/mL		0.167 - 5.550
AE DECHLOR	Microcystins ADDA QL	0.751 Abs [0.7030]	0.264 ng/mL [0.325]		0.167 - 5.550

* LR - Linear Range; [...] - Mean result of duplicate tests
* Generated by Plate Reader version (S.3.1.163/01520/AE:17 /) 8/2/2014 4:00:53 PM

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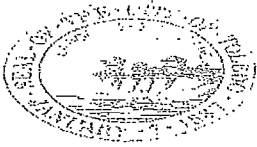


Test Report (by Request)

Name/ID	Assay	Absorbance	Concentration	Interpretation	Reference
AF LYSED	Microcystins ADDA QL	1.168 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
AF LYSED	Microcystins ADDA QL	1.177 Abs [1.1725]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
AF UNLYSED	Microcystins ADDA QL	0.929 Abs	0.105 ng/mL	Low	0.167 - 5.550
AF UNLYSED	Microcystins ADDA QL	0.904 Abs [0.9165]	0.123 ng/mL [0.114]	Low [Low]	0.167 - 5.550
AF DECHLOR	Microcystins ADDA QL	0.934 Abs	0.102 ng/mL	Low	0.167 - 5.550
AF DECHLOR	Microcystins ADDA QL	0.992 Abs [0.9630]	0.085 ng/mL [0.082]	Low [Low]	0.167 - 5.550
AG LYSED	Microcystins ADDA QL	1.099 Abs	0.008 ng/mL	Low	0.167 - 5.550
AG LYSED	Microcystins ADDA QL	1.164 Abs [1.1315]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
AG UNLYSED	Microcystins ADDA QL	0.517 Abs	0.699 ng/mL		0.167 - 5.550
AG UNLYSED	Microcystins ADDA QL	0.565 Abs [0.5410]	0.572 ng/mL [0.632]		0.167 - 5.550
AG DECHLOR	Microcystins ADDA QL	0.519 Abs	0.694 ng/mL		0.167 - 5.550
AG DECHLOR	Microcystins ADDA QL	0.521 Abs [0.5200]	0.688 ng/mL [0.680]		0.167 - 5.550
AH LYSED	Microcystins ADDA QL	1.088 Abs	0.014 ng/mL	Low	0.167 - 5.550
AH LYSED	Microcystins ADDA QL	1.161 Abs [1.1245]	< 0.000 ng/mL [< 0.00]	Out(LR) [Out(LR)]	0.167 - 5.550
AH UNLYSED	Microcystins ADDA QL	0.527 Abs	0.670 ng/mL		0.167 - 5.550
AH UNLYSED	Microcystins ADDA QL	0.570 Abs [0.5485]	0.561 ng/mL [0.613]		0.167 - 5.550
AH DECHLOR	Microcystins ADDA QL	0.537 Abs	0.643 ng/mL		0.167 - 5.550
AH DECHLOR	Microcystins ADDA QL	0.537 Abs [0.5370]	0.643 ng/mL [0.643]		0.167 - 5.550
AI LYSED	Microcystins ADDA QL	1.107 Abs	0.005 ng/mL	Low	0.167 - 5.550
AI LYSED	Microcystins ADDA QL	1.105 Abs [1.1060]	0.006 ng/mL [0.005]	Low [Low]	0.167 - 5.550
AI UNLYSED	Microcystins ADDA QL	0.783 Abs	0.229 ng/mL		0.167 - 5.550
AI UNLYSED	Microcystins ADDA QL	0.843 Abs [0.8130]	0.172 ng/mL [0.199]		0.167 - 5.550
AI DECHLOR	Microcystins ADDA QL	0.878 Abs	0.143 ng/mL	Low	0.167 - 5.550
AI DECHLOR	Microcystins ADDA QL	0.915 Abs [0.8965]	0.115 ng/mL [0.129]	Low [Low]	0.167 - 5.550
AJ LYSED	Microcystins ADDA QL	1.130 Abs	< 0.000 ng/mL	Out(LR)	0.167 - 5.550
AJ LYSED	Microcystins ADDA QL	1.106 Abs [1.1180]	0.005 ng/mL [< 0.000]	Low [Out(LR)]	0.167 - 5.550
AJ UNLYSED	Microcystins ADDA QL	0.871 Abs	0.148 ng/mL	Low	0.167 - 5.550
AJ UNLYSED	Microcystins ADDA QL	0.800 Abs [0.8355]	0.212 ng/mL [0.179]		0.167 - 5.550
AJ DECHLOR	Microcystins ADDA QL	0.844 Abs	0.171 ng/mL		0.167 - 5.550
AJ DECHLOR	Microcystins ADDA QL	0.937 Abs [0.8905]	0.100 ng/mL [0.133]	Low [Low]	0.167 - 5.550
AK LYSED	Microcystins ADDA QL	1.050 Abs	0.032 ng/mL	Low	0.167 - 5.550
AK LYSED	Microcystins ADDA QL	1.014 Abs [1.0320]	0.052 ng/mL [0.042]	Low [Low]	0.167 - 5.550
AK UNLYSED	Microcystins ADDA QL	0.742 Abs	0.275 ng/mL		0.167 - 5.550
AK UNLYSED	Microcystins ADDA QL	0.737 Abs [0.7395]	0.281 ng/mL [0.278]		0.167 - 5.550
AK DECHLOR	Microcystins ADDA QL	0.735 Abs	0.284 ng/mL		0.167 - 5.550
AK DECHLOR	Microcystins ADDA QL	0.696 Abs [0.7155]	0.334 ng/mL [0.308]		0.167 - 5.550
AL LYSED	Microcystins ADDA QL	1.014 Abs	0.052 ng/mL	Low	0.167 - 5.550
AL LYSED	Microcystins ADDA QL	1.031 Abs [1.0225]	0.043 ng/mL [0.047]	Low [Low]	0.167 - 5.550
AL UNLYSED	Microcystins ADDA QL	0.765 Abs	0.249 ng/mL		0.167 - 5.550
AL UNLYSED	Microcystins ADDA QL	0.759 Abs [0.7620]	0.255 ng/mL [0.252]		0.167 - 5.550
AL DECHLOR	Microcystins ADDA QL	0.671 Abs	0.371 ng/mL		0.167 - 5.550
AL DECHLOR	Microcystins ADDA QL	0.658 Abs [0.6645]	0.391 ng/mL [0.381]		0.167 - 5.550
AM LYSED	Microcystins ADDA QL	0.995 Abs	0.063 ng/mL	Low	0.167 - 5.550
AM LYSED	Microcystins ADDA QL	1.024 Abs [1.0095]	0.046 ng/mL [0.054]	Low [Low]	0.167 - 5.550
AM UNLYSED	Microcystins ADDA QL	0.437 Abs	1.001 ng/mL		0.167 - 5.550
AM UNLYSED	Microcystins ADDA QL	0.435 Abs [0.4360]	1.010 ng/mL [1.005]		0.167 - 5.550
AM DECHLOR	Microcystins ADDA QL	0.437 Abs	1.001 ng/mL		0.167 - 5.550
AM DECHLOR	Microcystins ADDA QL	0.421 Abs [0.4290]	1.081 ng/mL [1.040]		0.167 - 5.550

* LR - Linear Range; [.,.] - Mean result of duplicate tests

* Generated by Plate Reader version (0.3.1.163/01520/AE:17 /) 8/2/2014 4:00:53 PM



Assay Calibration Report

Assay Information

Assay Name: Microcystins ADDA QL
 Normal: 0.167 - 5.550
 # of decimals: 3
 Assay Substances:

Assay Mode: 4-Parameter Logistic
 Units: ng/mL
 Assay Description:

Controls:
 Normal Control
 Standards:
 Std1, Concentration = 0.000, Minimum number to use: 2
 Std2, Concentration = 0.167, Minimum number to use: 2
 Std3, Concentration = 0.444, Minimum number to use: 2
 Std4, Concentration = 1.110, Minimum number to use: 2
 Std5, Concentration = 2.220, Minimum number to use: 2
 Std6, Concentration = 5.550, Minimum number to use: 2
 Curve valid interval: 7 days 0 hours
 Axis Mode: Y = Abs, X = Log(Conc)

Assay Calibration

Current Calibration Status: "

Name	Absorbance	Concentration	Interpretation	Position
8/2/2014 3:58:09 PM				
Std1	1.124 Abs	< 0.000 ng/mL		A01
Std1	1.109 Abs	0.004 ng/mL		B01
Std2	0.879 Abs	0.142 ng/mL		C01
Std2	0.838 Abs	0.176 ng/mL		D01
Std3	0.610 Abs	0.476 ng/mL		E01
Std3	0.611 Abs	0.474 ng/mL		F01
Std4	0.421 Abs	1.081 ng/mL		G01
Std4	0.428 Abs	1.045 ng/mL		H01
Std5	0.297 Abs	2.214 ng/mL		A02
Std5	0.308 Abs	2.052 ng/mL		B02
Std6	0.190 Abs	> 5.550 ng/mL		C02
Std6	0.203 Abs	> 5.550 ng/mL		D02
+++++				
8/2/2014 3:58:09 PM				
Normal Control	0.453 Abs	0.929 ng/mL		E02
Normal Control	0.441 Abs	0.982 ng/mL		F02

Statistic				
Std1 [MEAN]	1.116			
Std1 [SD]	0.011			
Std1 [%CV]	0.95			
Std2 [MEAN]	0.859	0.159		
Std2 [SD]	0.029	0.024		
Std2 [%CV]	3.38	15.12		
Std2 [%DIFF]		-4.79		
Std3 [MEAN]	0.610	0.475		
Std3 [SD]	0.001	0.001		
Std3 [%CV]	0.12	0.30		
Std3 [%DIFF]		6.98		
Std4 [MEAN]	0.424	1.063		
Std4 [SD]	0.005	0.025		

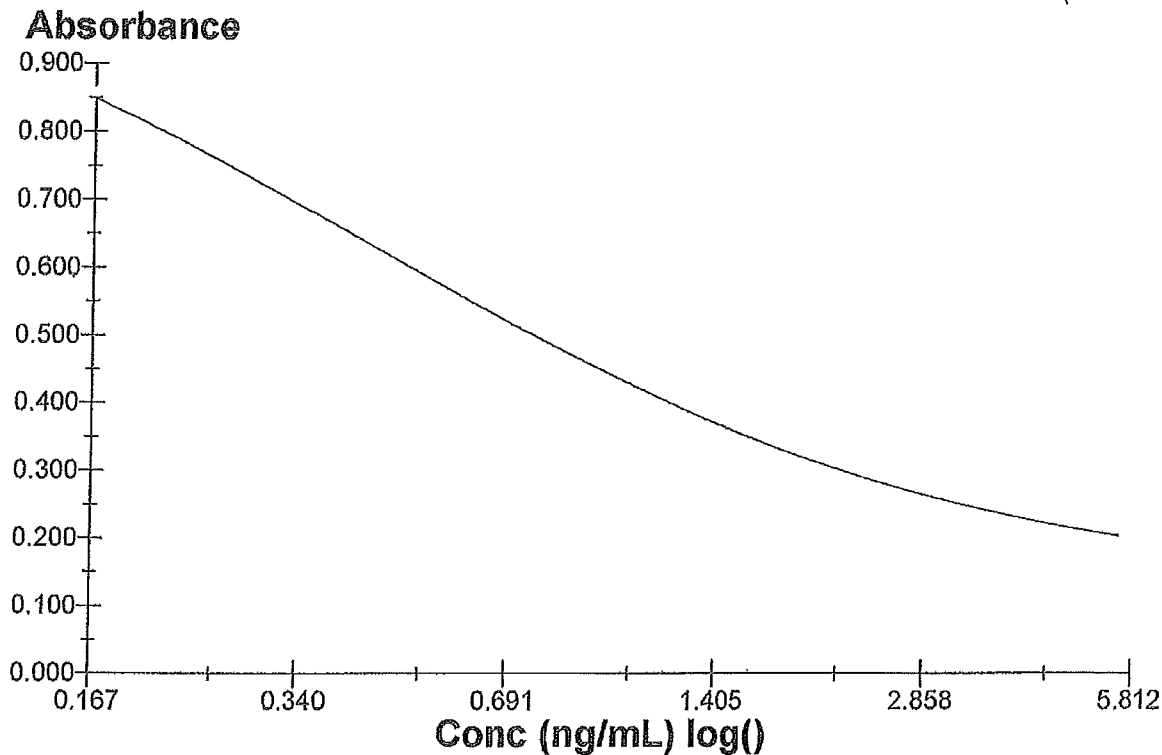


Assay Calibration Report

Name	Absorbance	Concentration	Interpretation	Position
Std4 [%CV]	1.17	2.39		
Std4 [%DIFF]		-4.23		
Std5 [MEAN]	0.303	2.133		
Std5 [SD]	0.008	0.115		
Std5 [%CV]	2.57	5.37		
Std5 [%DIFF]		-3.92		
Std6 [MEAN]	0.197			
Std6 [SD]	0.009			
Std6 [%CV]	4.68			
Std6 [%DIFF]		-100.00		
Normal Control [MEAN]	0.447	0.956		
Normal Control [SD]	0.008	0.037		
Normal Control [%CV]	1.90	3.92		

Assay Curve

$y = (A-D)/(1+(x/C)^B) + D$
 A = 0.12685
 B = -0.99072
 C = 0.45227
 D = 1.1179
 R2 coef = 0.99911



Ohio EPA 8/2/2014

Freeze Thaw Results

Sample ID	Sample Location	Date and Time Collected	Lysed Microcystin Sample Result (ppb) Run Time: 4:11	Unlysed Microcystin Sample Result (ppb)
167424	Wendy's Alford and Detroit	8/2/2014 12:25		<0.30
167425	Main and Brint	8/2/2014 12:18	0.122	<0.30
167426	Summit and Bush	8/2/2014 13:15		0.420
167427	Detroit/Alexis BP	8/2/2014 12:23	0.145	0.49
167428	BK/Secor	8/2/2014 13:05		<0.30
167429	NWPS	8/2/2014 12:45	0.044	<0.30
167430	1474 Detroit, F.D.	8/2/2014 12:20		<0.30
167431	Bob Evans Restaurant Reynolds	8/2/2014 12:40		<0.30
167432	4251 S. Clark TFD	8/2/2014 12:46	0.106	0.45
167433	Central/Secor	8/2/2014 13:35		<0.30
167434	BP	8/2/2014 12:31		<0.30
167435	T. Bell 401 S. Erie	8/2/2014 11:58		0.30
167436	SWPS	8/2/2014 13:10	0.072	<0.30
167437	Fire Station 1899 Front St	8/2/2014 12:30		<0.30
167438	8 ft	8/2/2014 12:19		<0.30
167439	E. Broadway Pump St.	8/2/2014 12:55		0.52
167440	Shell Station	8/2/2014 12:35	0.123	0.42
167441	BP Detroit/Alexis	8/2/2014 12:23		0.52
167442	Sunoco Gas Station Bancroft and Holland - Sylvania	8/2/2014 13:02	0.080	<0.30
167443	Sammys Restruant Central and Holland - Sylvania	8/2/2014 13:19		<0.30
167444	Bull Tracy and Andrus	8/2/2014 14:37		0.42
167445	Woodmore	8/2/2014 12:10	0.102	0.73
167446	Bull Sheffieldd and Florence	8/2/2014 12:25		0.52
167447	Bull Wakes Rd Pump and Hyd	8/2/2014 13:15	0.850	0.46
167448	2616 Heatherdown	8/2/2014 12:25		0.43
167449	Burger King	8/2/2014 12:15	0.097	0.41
167450	6230 Summit	8/2/2014 12:56		0.65
167451	4710 Detroit	8/2/2014 13:10		0.50
167452	6268 Edgewater	8/2/2014 13:10		0.61
167453	3332 St. Lawrence	8/2/2014 12:50		0.49
167454	Fire Station 6 642 Starr Ave	8/2/2014 12:10		0.33
167455	Bahiamar and Suder	8/2/2014 12:38		0.44
167456	Monroe and Whiteford	8/2/2014 12:30	0.118	0.40
167457	UTMCO	8/2/2014 12:30		0.44
167458	2566 Cass	8/2/2014 12:45	0.106	0.42
167459	Sunoco Western Detroit	8/2/2014 12:40		0.59

Results of ELISA analysis performed by City of Toledo Water Research lab performed afterno
Samples collected in the early morning hours of August 3, 2014 by WTP and Distribution sys
Duplicates of samples delivered by TPD/Sheriff patrol/OSHP Airplane and medivac chopped

ID	Location	Results, ug/L	
		Lysed	Non-lysed
BA	Raw	>5.55	>5.55
BB	Raw after	>5.55	>5.55
BC	Baffles	3.13	2.609
BD	Filter Appl	1.884	1.825
BE	Filter Efflu	0.713	0.983
BF	Clearwell	1.412	1.25
BG	Plant Tap	0.294	0.451
BH	A - Monro	0.268	0.235
BI	B - Brint/M	0.451	0.615
BJ	C - Alexis/l	0.599	0.567
BK	Alexis/Lew	0.493	0.685
BL	J - Detroit/	0.703	0.678

oon of 8-3-14
item staff
to ODR in Cincinnati.



LAKE SUPERIOR STATE UNIVERSITY

Environmental Analysis Laboratory

Date: August 3, 2014

To: Ohio EPA

From: Mr. Benjamin Southwell ph: (906) 635-2076 bsouthwell@lssu.edu
Environmental Laboratory Manager and Chemist, LSSU

Subject: Data Report for Cyanotoxin Sample Supplied 8/2/2014

Listed below are the analysis results for the supplied sample. Detection limits for each toxin listed are 0.2 µg/L.

Sample Name	Collection Date	Anatoxin-a (µg/L)	Cylindrospermopsin (µg/L)	MYC-RR (µg/L)	MYC-YR (µg/L)	MYC-LR (µg/L)	MYC-LA (µg/L)	MYC-LF (µg/L)	MYC-LW (µg/L)
Toledo Tap	8/2/2014	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Notes:

1. Samples arrived to LSSU with chlorine residual. Samples quenched on site. (~4 hours with chlorine residual)
2. All method Quality Control objectives met. (Duplicate, Fortified Matrix, Lab Blank, Method Blank)

650 W. Easterday Ave., Sault Ste. Marie, MI 49783
Telephone: 906-632-6841 Fax: 906-635-2266
<http://www.lssu.edu/academics/stem/eal/>

Moore, Ed

From: Baker, Michael [Mike.Baker@epa.ohio.gov]
Sent: Saturday, August 02, 2014 2:05 AM
To: Moore, Ed
Cc: Butler, Craig
Subject: Public Advisory

MR. Moore:

I am writing to confirm Ohio EPA's recommendation and the City's intent to issue a do not drink advisory for the City of Toledo's public water system. I understand the anomalies in the microcystin analyses, raise some uncertainty in the levels of toxins present in the City's finished water, however having multiple results showing levels above the recommended threshold means issuing an advisory is the prudent action to protect public health. I appreciate the City's cooperation. I understand the City is issuing the advisory for the City of Toledo and those portions of Lucas County served by the City. I also understand the distribution staff are conducting further evaluation of the distribution system, including travel times and a sampling plan to assess whether the advisory area should be expanded or can be reduced. The City should be implementing its contingency plan including notification of the Lucas County Emergency Management Agency and Health Department as well as all critical water users. I am sending an Ohio EPA staff person, Justin Bowerman to the Collins Park Water Treatment Plant to provide assistance. Please let me know if there is other specific assistance the City needs during this time. We will assess further recommendations after receiving additional analytical results from Oregon.

Michael G. Baker
Division of Drinking and Ground Waters
Ohio Environmental Protection Agency

Moore, Ed

From: Ward, Lisa
Sent: Saturday, August 02, 2014 1:20 AM
To: Ward, Lisa; 'citydesk@theblade.com'; 'news@wnwo.com'; 'news@wspd.com'; 'news@wtol.com'; 'bill.hormann@13abc.com'; 'brandibrown@urbanradio.fm'; 'brian.trauring@13abc.com'; 'carlyryan@theblade.com'; 'christine.long@13abc.com'; 'dmurray@theblade.com'; 'dpatch@theblade.com'; 'dkoerner@theblade.com'; 'fhword@att.net'; 'fseely@wtol.com'; 'fred@wspd.com'; 'hkemler@toledoportauthority.org'; 'imessina@theblade.com'; 'john@toledo.com'; 'kimbates@theblade.com'; 'london.mitchell@cumulus.com'; 'michelle_turner@wgte.org'; 'sigov@theblade.com'; 'laprensa1@yahoo.com'; 'wtvg.news@13abc.com'; 'sottney@toledofreepress.com'; 'mmiller@toledofreepress.com'; 'juicetalk1073@yahoo.com'; 'scottsands@clearchannel.com'; 'editor@toledobiz.com'; THE TOLEDO JOURNAL; 'tomtroy@theblade.com'; 'tdurham@theblade.com'; 'kfranck@theblade.com'; 'jblue@wnwo.com'; 'michaelmiller@wspd.com'; 'bethchurch@welchpublishing.com'; 'editor@adamstreetpublishing.com'
Cc: 'maggiebthurber@gmail.com'; *City Council
Subject: DO NOT DRINK TOLEDO PUBLIC WATER UNTIL FURTHER NOTICE

URGENT NOTICE TO RESIDENTS OF TOLEDO & LUCAS COUNTY WHO RECEIVE WATER FROM THE CITY OF TOLEDO

DO NOT DRINK THE WATER
DO NOT BOIL THE WATER

Chemists testing water at Toledo's Collins Park Water Treatment Plant had two sample readings for microcystin in excess of the recommended "DO NOT DRINK" 1 microgram per liter standard. This notice applies to ALL customers of Toledo water.

Most importantly, water should not be consumed until an all clear is issued. It is important to state that this drinking water alert does NOT recommend boiling, and in fact, boiling water can worsen the situation. Water should not be given to pets.

Additional information as to where to obtain water will be forthcoming, steps will be taken to provide drinkable water if necessary.

What should you do?

DO NOT DRINK THE WATER. Alternative water should be used for drinking, making infant formula, making ice, brushing teeth and preparing food. Pets should not drink the water.

DO NOT BOIL THE WATER. Boiling the water will not destroy the toxins - it will increase the concentration of the toxins.

Consuming water containing algal toxins may result in abnormal liver function, diarrhea, vomiting, nausea, numbness or dizziness. Seek medical attention if you feel you have been exposed to algal toxins and are having adverse health effects. Skin contact with contaminated water can cause irritation or rashes. Contact a veterinarian immediately if pets or livestock show signs of illness.

What happened? What is being done?

Lake Erie, which is a source of drinking water for the Toledo water system may have been impacted by a harmful algal bloom (HAB). These organisms are capable of producing a number of toxins that may pose a risk to human and animal health. HABs occur when excess nitrogen and phosphorus are present in lakes and streams. Such nutrients can come from runoff of over-fertilized fields and lawns, from malfunctioning septic systems and from livestock pens.

Additional monitoring is being conducted and we will let you know when the situation has been resolved or if additional precautions should be taken. The water system is running additional tests to verify the severity of the microcystin levels in our water supply.

Please stay tuned to media for more information and share this information with friends, family or neighbors that may not have been informed through this media release. A phone number for the public to call will be included in a future release.

For information concerning this release please contact Lisa Ward, Public Information Officer for the City of Toledo - 419-262-2643.

DRINKING WATER WARNING

Algal toxins are present in [name] water system

DO NOT DRINK THE WATER

Toxins from harmful algal blooms were recently found in our treated water supply. A sample collected on [date] shows microcystin toxin at [level] µg/L. The Ohio Environmental Protection Agency recommends that you do not drink the water at microcystin levels above 1 µg/L.

What should I do?

- **DO NOT DRINK THE WATER. Alternative water should be used for drinking, making infant formula, making ice, brushing teeth, and preparing food. Pets should not drink the water.**
- Healthy adults may use the water for bathing, washing hands, washing dishes and doing laundry. Special attention may be needed when bathing children to prevent ingestion. The water may be used for flushing toilets. Skin irritation, such as a rash may occur from exposure when bathing and washing hands. Providing a final rinse of skin with uncontaminated water is recommended.
- **Do not boil the water.** Boiling the water will not destroy toxins. Some toxins may become more dangerous as a result of boiling.
- Consuming water containing algal toxins may result in abnormal liver function, diarrhea, vomiting, nausea, numbness or dizziness. Seek medical attention if you feel you have been exposed to algal toxins and are having adverse health effects. Skin contact with contaminated water can cause irritation or rashes. Contact a veterinarian immediately if pets or livestock show signs of illness.

What happened? What is being done?

[Lake name], which is a source of drinking water for the [public water system] is experiencing a harmful algal bloom (HAB). These organisms are capable of producing a number of toxins that may pose a risk to human and animal health. HABs occur when excess nitrogen and phosphorus are present in lakes and streams. Such nutrients can come from runoff of over-fertilized fields and lawns, from malfunctioning septic systems and from livestock pens.

Additional monitoring is being conducted, and we will let you know when the situation has been resolved or if additional precautions should be taken. The water system is [describe what is being done]. We are working closely with [insert partners] to minimize any potential harm.

For more information, please contact _____ at _____.
Additional information about harmful algal blooms can be found at www.ohioalgaefinfo.com.

If you believe you or your children have been exposed to algal toxins and are experiencing adverse health effects, you should seek medical attention. After contacting medical personnel,

individuals are also encouraged to report human health concerns to your local health department, [Insert local health department name] at [Insert telephone number].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

PWSID#: _____ STUID#: _____ Date distributed:

**Agreement between Ohio Environmental Protection Agency,
United States Environmental Protection Agency
and the City of Toledo**

Water Testing Protocol for Microcystin Toxin

The following items have been agreed to between the OEPA, USEPA and the City of Toledo for the testing and operations protocol of the Toledo water treatment plant and distribution system:

1. Use unlysed sampling for microcystin detection with sodium thiosulfate quench to eliminate chlorine residual at the time of collection for all distribution and plant sampling.
2. Use lysed sampling for microcystin detection for raw water.
3. Raise plant chlorine levels to 2.7 parts per million - up from 2.2 parts per million.
 - a. Notes: Potential impact on Total Trihalomethanes (TTHM's) and clear well retention time is 18.8 hours at 88 MGD.
4. Raise carbon feed rate from 6.3 parts per million to 15 parts per million.
5. Collect and analyze another round of distribution system samples per the above agreed protocol on 8/3/14.
6. Evaluate the removal of the "DRINKING WATER WARNING" depending on the results of samples collected on 8/2/14 and 8/3/14 and analyzed in accordance with the protocols outlined above.
7. Issue an advisory against excessive water usage - car washing, lawn watering, irrigation system usage etc., to bring the system back online.
8. In order to maximize chlorine contact time the system will not be flushed.
9. Obtain a Water Treatment Plant tap sample on 8/4 AM.
10. Toledo will maintain microcystin levels below 1.0 micrograms per liter.
11. City of Toledo will continue to provide copies of all testing to OEPA and notify the agency to discuss appropriate actions anytime microcystin levels in tap samples exceed 0.6 micrograms per liter.
12. Following any microcystin drinking water advisory event, regular daily sampling and analysis will be initiated until three consecutive days of raw water samples less than 5.0 micrograms per liter and non-detect readings ~~below 1.0 micrograms per liter~~ at the tap.

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Following these three days, daily sampling will continue with analysis performed twice per week for one month.

D. Michael Collins 8/3/14 Craig W. Butler

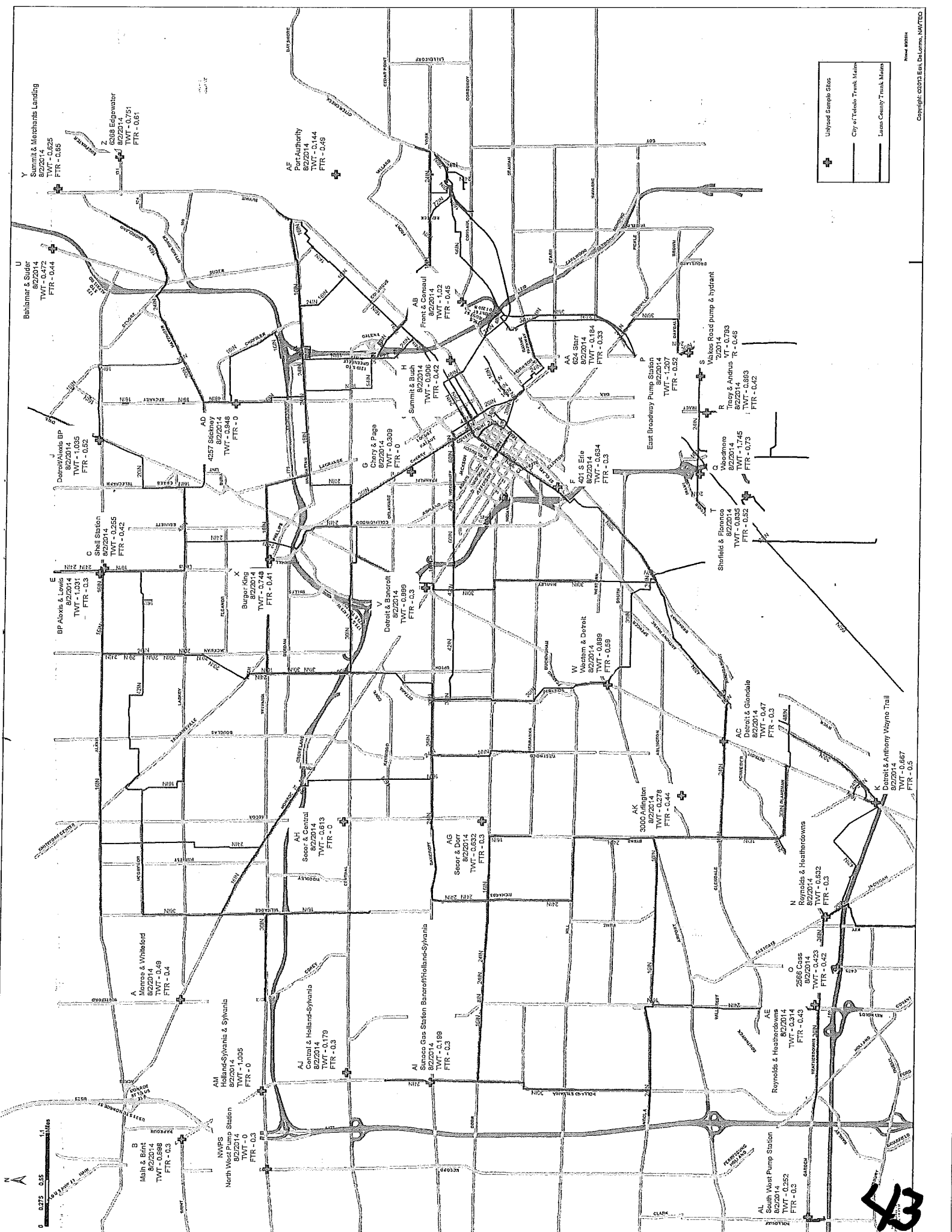
D. Michael Collins, Mayor
City of Toledo

Date

Craig Butler, Director
Ohio Environmental Protection Agency

Date

cc. Tom Speth, United States Environmental Protection Agency



+	Unyielded Sample Sites
—	City of Detroit Trunk Main
—	Lansing County Trunk Main

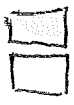


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World Health Organization Standard = 1.045

City of Toledo 8/3/2014

SampleLocation	#	Station_Code	SampleDate	Sample Time	Result	Quant Level	Sample Water Type
Toledo Low Service Raw	1	IN21783-RS001	8/3/2014	00 00	2.792 ug/L	0.3	Lake Erie
Toledo Low Service Raw 10X Dilution	2	IN21783-RS001	8/3/2014	00 00	0.129 ug/L	0.3	Lake Erie
Toledo Plant Raw	3	IN21783-RS003	8/3/2014	19 00	5.089 ug/L	0.3	Lake Erie
Toledo Plant Raw 10X Dilution	4	IN21783-RS001	8/3/2014	19 00	0.524 ug/L	0.3	Lake Erie
Toledo Settled 80	5		8/3/2014	19 00	1.235 ug/L	0.3	Treat Process
Toledo Filter 80	6		8/3/2014	19 00	1.578 ug/L	0.3	Treat Process
Toledo Clearwell	7		8/3/2014	19 00	1.339 ug/L	0.3	Treat Process
Toledo Tap	8	TP4964-EP001	8/3/2014	19 00	0.322 ug/L	0.3	Finished
Woodmore	9		8/3/2014	18 50	0.208 ug/L	0.3	Dist System
E Broadway Pump Station	10		8/3/2014	18 15	0.317 ug/L	0.3	Dist System
Tracy & Andrus	11		8/3/2014	18 20	0.291 ug/L	0.3	Dist System
Sheffield & Florence	12		8/3/2014	18 45	0.239 ug/L	0.3	Dist System
Wales Rd	13		8/3/2014	18 35	0.165 ug/L	0.3	Dist System
Monroe & Whiteford	14		8/3/2014	18 45	0.451 ug/L	0.3	Dist System
Brint & Main	15		8/3/2014	18 30	0.396 ug/L	0.3	Dist System
Holland Sylvania & Sylvania	16		8/3/2014	19 05	0.425 ug/L	0.3	Dist System
Secor & Central	17		8/3/2014	18 05	0.234 ug/L	0.3	Dist System
Holland Sylvania & Bancroft	18		8/3/2014	18 27	0.612 ug/L	0.3	Dist System
3000 Arlington UTMC	19		8/3/2014	19 05	0.561 ug/L	0.3	Dist System
Secor & Dorr	20		8/3/2014	18 15	0.226 ug/L	0.3	Dist System
Summit & Bush	21		8/3/2014	19 04	0.188 ug/L	0.3	Dist System
Cherry & Page	22		8/3/2014	19 39	0.377 ug/L	0.3	Dist System
S Detroit & Western	23		8/3/2014	18 35	0.326 ug/L	0.3	Dist System
401 S Erie	24		8/3/2014	17 57	0.511 ug/L	0.3	Dist System
Bahamar & Suder	25		8/3/2014		0.519 ug/L	0.3	Dist System
Fairview & Philips	26		8/3/2014	19 52	0.334 ug/L	0.3	Dist System
Detroit & Glendale	27		8/3/2014	19 28	0.365 ug/L	0.3	Dist System
Eastgate & Heatherdowns	28		8/3/2014	18 55	0.456 ug/L	0.3	Dist System
Stickney Fire Station	29		8/3/2014	20 12	0.195 ug/L	0.3	Dist System
Reynolds & Heatherdowns	30		8/3/2014	18 20	0.508 ug/L	0.3	Dist System
Cass Pump Station	31		8/3/2014	18 34	0.403 ug/L	0.3	Dist System
Detroit & Trail	32		8/3/2014	19 05	0.155 ug/L	0.3	Dist System
Alexis & Lewis Shell	33		8/3/2014	20 33	0.275 ug/L	0.3	Dist System
Alexis & Lewis BP	34		8/3/2014	20 41	0.441 ug/L	0.3	Dist System
Front & Consaul	35		8/3/2014	21 25	0.319 ug/L	0.3	Dist System
Detroit & Alexis	36		8/3/2014	20 50	0.297 ug/L	0.3	Dist System
Edgewater	37		8/3/2014	21 55	0.212 ug/L	0.3	Dist System
Summit & Merchants Landing	38		8/3/2014	21 21	0.803 ug/L	0.3	Dist System
642 Starr	39		8/3/2014	22 10	1.037 ug/L	0.3	Dist System

 = Retested on 8/9/2014

World Health Organization Standard = 1.045 | City of Toledo 8/4/2014

SampleLocation	#	Station_Code	SampleD ate	Sample Time	Result	Quant Level	Sample Water Type
Summit & Merchant	1		8/4/2014		0.237 ug/L	0.3	Dist System
Summit at N. Shoreland	2		8/4/2014		0.283 ug/L	0.3	Dist System
Summit and Shoreland	3		8/4/2014		0.180 ug/L	0.3	Dist System
Starr & Main	4		8/4/2014		0.181 ug/L	0.3	Dist System
Starr & Arden	5		8/4/2014		0.255 ug/L	0.3	Dist System
Starr & Euclid	6		8/4/2014		0.187 ug/L	0.3	Dist System
Tap EP001 3:10 am	7	TP4964-EP001	8/4/2014	03 10	0.349 ug/L	0.3	Finished
Clearwell 4:30 am	8		8/4/2014	04 30	0.307 ug/L	0.3	Process
Plant raw 3:10 am	9		8/4/2014	03 10	>5.55 ug/L	0.3	Process

**Toledo Distribution System Samples Analyzed by Ohio EPA, Division of Environmental Services
(August 3, 2014)**

Sample ID	Sample Location	Date and Time Collected	Lysed, unquenched Microcystin Sample Result (ppb)	Unlysed, unquenched Microcystin Sample Result (ppb)	Unlysed, quenched Microcystin sample result (ppb)
167430	1474 Detroit, F.D.	8/2/2014 12:20		<0.30	
167466	1474 Detroit, F.D.	8/2/2014 12:20			<0.30
167458	2566 Cass	8/2/2014 12:45	0.106	0.42	
167494	2566 Cass	8/2/2014 12:45			<0.30
167448	2616 Heatherdown	8/2/2014 12:25		0.43	
167484	2616 Heatherdown	8/2/2014 12:25			0.31
167453	3332 St. Lawrence	8/2/2014 12:50		0.49	
167489	3332 St. Lawrence	8/2/2014 12:50			0.54
167432	4251 S. Clark TFD	8/2/2014 12:46	0.106	0.45	
167468	4251 S. Clark TFD	8/2/2014 12:46			0.57
167451	4710 Detroit	8/2/2014 13:10		0.50	
167487	4710 Detroit	8/2/2014 13:10			0.53
167450	6230 Summit	8/2/2014 12:56		0.65	
167486	6230 Summit	8/2/2014 12:56			0.34
167452	6268 Edgewater	8/2/2014 13:10		0.61	
167488	6268 Edgewater	8/2/2014 13:10			0.68
167438	8 ft	8/2/2014 12:19		<0.30	

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**Toledo Distribution System Samples Analyzed by Ohio EPA, Division of Environmental Services
(August 3, 2014)**

167474	8 ft	8/2/2014 12:19			<0.30
167455	Bahiamar and Suder	8/2/2014 12:38		0.44	
167491	Bahiamar and Suder	8/2/2014 12:38			0.53
167428	BK/Secor	8/2/2014 13:05		<0.30	
167464	BK/Secor	8/2/2014 13:05			<0.30
167431	Bob Evans Restaurant Reynolds	8/2/2014 12:40		<0.30	
167467	Bob Evans Restaurant Reynolds	8/2/2014 12:40			<0.30
167434	BP	8/2/2014 12:31		<0.30	
167470	BP	8/2/2014 12:31			<0.30
167441	BP Detroit/Alexis	8/2/2014 12:23		0.52	
167477	BP Detroit/Alexis	8/2/2014 12:23			0.44
167446	Bull Sheffieldd and Florence	8/2/2014 12:25		0.52	
167482	Bull Sheffieldd and Florence	8/2/2014 12:25			0.48
167444	Bull Tracy and Andrus	8/2/2014 14:37		0.42	
167480	Bull Tracy and Andrus	8/2/2014 14:37			0.44
167447	Bull Wakes Rd Pump and Hyd	8/2/2014 13:15	0.850	0.46	
167483	Bull Wakes Rd Pump and Hyd	8/2/2014 13:15			0.6
167449	Burger King	8/2/2014 12:15	0.097	0.41	
167485	Burger King	8/2/2014 12:15			0.36
167433	Central/Secor	8/2/2014 13:35		<0.30	

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**Toledo Distribution System Samples Analyzed by Ohio EPA, Division of Environmental Services
(August 3, 2014)**

167469	Central/Secor	8/2/2014 13:35			<0.30
167427	Detroit/Alexis BP	8/2/2014 12:23	0.145	0.49	
167463	Detroit/Alexis BP	8/2/2014 12:23			0.62
167439	E. Broadway Pump St.	8/2/2014 12:55		0.52	
167475	E. Broadway Pump St.	8/2/2014 12:55			0.45
167437	Fire Station 1899 Front St	8/2/2014 12:30		<0.30	
167473	Fire Station 1899 Front St	8/2/2014 12:30			<0.30
167454	Fire Station 6 642 Starr Ave	8/2/2014 12:10		0.33	
167490	Fire Station 6 642 Starr Ave	8/2/2014 12:10			<0.30
167425	Main and Brint	8/2/2014 12:18	0.122	<0.30	
167461	Main and Brint	8/2/2014 12:18			0.32
167456	Monroe and Whiteford	8/2/2014 12:30	0.118	0.40	
167492	Monroe and Whiteford	8/2/2014 12:30			<0.30
167429	NWPS	8/2/2014 12:45	0.044	<0.30	
167465	NWPS	8/2/2014 12:45			<0.30
167443	Sammys Restruant Central and Holland - Sylvania	8/2/2014 13:19		<0.30	
167479	Sammys Restruant Central and Holland - Sylvania	8/2/2014 13:19			<0.30
167440	Shell Station	8/2/2014 12:35	0.123	0.42	
167476	Shell Station	8/2/2014 12:35			0.31
167426	Summit and Bush	8/2/2014 13:15		0.42	

**Toledo Distribution System Samples Analyzed by Ohio EPA, Division of Environmental Services
(August 3, 2014)**

167462	Summit and Bush	8/2/2014 13:15			0.42
167442	Sunoco Gas Station Bancroft and Holland - Sylvania	8/2/2014 13:02	0.080	<0.30	
167478	Sunoco Gas Station Bancroft and Holland - Sylvania	8/2/2014 13:02			<0.30
167459	Sunoco Western Detroit	8/2/2014 12:40		0.59	
167495	Sunoco Western Detroit	8/2/2014 12:40			0.52
167436	SWPS	8/2/2014 13:10	0.072	<0.30	
167472	SWPS	8/2/2014 13:10			<0.30
167435	T. Bell 401 S. Erie	8/2/2014 11:58		0.30	
167471	T. Bell 401 S. Erie	8/2/2014 11:58			0.31
167457	UTMCO	8/2/2014 12:30		0.44	
167493	UTMCO	8/2/2014 12:30			<0.30
167424	Wendy's Alford and Detroit	8/2/2014 12:25		<0.30	
167460	Wendy's Alford and Detroit	8/2/2014 12:25			0.33
167445	Woodmore	8/2/2014 12:10	0.102	0.73	
167481	Woodmore	8/2/2014 12:10			0.74

Laboratory Inorganic Analysis Data Report

Sample 167464			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 1:05 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location BK/Secor			

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
<i>Microcystins_DW</i>	Microcystins	101043-37	<0.30	0.25	1	0.3	0.1	ug/L	08/03/14	U+

Field Comments

Lab Comments

QC / Sample Comments

Approved By **On**

Murphy, Tim

From: Baker, Michael [Mike.Baker@epa.ohio.gov]
Sent: Sunday, August 03, 2014 10:38 PM
To: McClure, Andrew; Moore, Ed; Murphy, Tim
Subject: FW: Toledo microcystin results
Attachments: 167464-DW-NWDO-DDAGW.PDF; 167463-DW-NWDO-DDAGW.PDF; 167462-DW-NWDO-DDAGW.PDF; 167461-DW-NWDO-DDAGW.PDF; 167460-DW-NWDO-DDAGW.PDF; 167495-DW-NWDO-DDAGW.PDF; 167494-DW-NWDO-DDAGW.PDF; 167493-DW-NWDO-DDAGW.PDF; 167492-DW-NWDO-DDAGW.PDF; 167491-DW-NWDO-DDAGW.PDF; 167490-DW-NWDO-DDAGW.PDF; 167489-DW-NWDO-DDAGW.PDF; 167488-DW-NWDO-DDAGW.PDF; 167487-DW-NWDO-DDAGW.PDF; 167486-DW-NWDO-DDAGW.PDF; 167485-DW-NWDO-DDAGW.PDF; 167484-DW-NWDO-DDAGW.PDF; 167483-DW-NWDO-DDAGW.PDF; 167482-DW-NWDO-DDAGW.PDF; 167481-DW-NWDO-DDAGW.PDF; 167480-DW-NWDO-DDAGW.PDF; 167479-DW-NWDO-DDAGW.PDF; 167478-DW-NWDO-DDAGW.PDF; 167477-DW-NWDO-DDAGW.PDF; 167476-DW-NWDO-DDAGW.PDF; 167475-DW-NWDO-DDAGW.PDF; 167474-DW-NWDO-DDAGW.PDF; 167473-DW-NWDO-DDAGW.PDF; 167472-DW-NWDO-DDAGW.PDF; 167471-DW-NWDO-DDAGW.PDF; 167470-DW-NWDO-DDAGW.PDF; 167469-DW-NWDO-DDAGW.PDF; 167468-DW-NWDO-DDAGW.PDF; 167467-DW-NWDO-DDAGW.PDF; 167466-DW-NWDO-DDAGW.PDF; 167465-DW-NWDO-DDAGW.PDF

From: Roberts, Steven
Sent: Sunday, August 3, 2014 10:28 PM
To: Baker, Michael; Messer, Elizabeth; Mehl, James; Butler, Craig; Canepa, James; Nabors, Shannon; Mckee, Clayton; Leifheit, Kirk
Subject: Toledo microcystin results

Please see the attached results.

Steve

Steve Roberts
Division of Environmental Services
Quality Assurance Supervisor
DMR-QA state coordinator
8955 East Main St.
Reynoldsburg, OH 43068
Phone: 614-644-4225
Fax: 614-644-4272
steve.roberts@epa.ohio.gov

Please note the new email address

Laboratory Inorganic Analysis Data Report

Sample 167492			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/03/2014 12:30 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Monroe and Whiteford			

<i>Analysis</i>	<i>Parameter</i>	<i>Storet</i>	<i>Result</i>	<i>Value</i>	<i>DF</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Date</i>	<i>Qualifier</i>
<i>Microcystins_DW</i>	Microcystins	101043-37	<0.30	0.16	1	0.3	0.1	ug/L	08/03/14	U+

Field Comments

Lab Comments

QC / Sample Comments

Approved By **On**

Laboratory Inorganic Analysis Data Report

Sample 167463			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:23 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Detroit/Alexis BP			

<i>Analysis</i>	<i>Parameter</i>	<i>Storet</i>	<i>Result</i>	<i>Value</i>	<i>DF</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Date</i>	<i>Qualifier</i>
<i>Microcystins_DW</i>	Microcystins	101043-37	0.62	0.62	1	0.3	0.1	ug/L	08/03/14	

Field Comments

Lab Comments

QC / Sample Comments

Approved By

On

Laboratory Inorganic Analysis Data Report

Sample 167495			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:40 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Sunoco Western Detroit.			

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
<i>Microcystins_DW</i>	Microcystins	101043-37	0.52	0.52	1	0.3	0.1	ug/L	08/03/14	

Field Comments

Lab Comments

QC / Sample Comments

Approved By

On

OhioEPA Division of Environmental Services
Laboratory Inorganic Analysis Data Report

Sample 167491			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:38 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Bahiamar and Suder			

<i>Analysis</i>	<i>Parameter</i>	<i>Storet</i>	<i>Result</i>	<i>Value</i>	<i>DF</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Date</i>	<i>Qualifier</i>
<i>Microcystins_DW</i>	Microcystins	101043-37	0.53	0.53	1	0.3	0.1	ug/L	08/03/14	

Field Comments

Lab Comments

QC / Sample Comments

Approved By

On

Laboratory Inorganic Analysis Data Report

Sample 167462			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 1:15 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Summit and Bush			

<i>Analysis</i>	<i>Parameter</i>	<i>Storet</i>	<i>Result</i>	<i>Value</i>	<i>DF</i>	<i>RL</i>	<i>MDL</i>	<i>Units</i>	<i>Date</i>	<i>Qualifier</i>
<i>Microcystins_DW</i>	Microcystins	101043-37	0.42	0.42	1	0.3	0.1	ug/L	08/03/14	

Field Comments

Lab Comments

QC / Sample
Comments

Approved By

On

Laboratory Inorganic Analysis Data Report

Sample 167494			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:45 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location 2566 Cass			

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
<i>Microcystins_DW</i>	Microcystins	101043-37	<0.30	0.27	1	0.3	0.1	ug/L	08/03/14	U+

Field Comments

Lab Comments

QC / Sample Comments

Approved By **On**

OhioEPA Division of Environmental Services

Laboratory Inorganic Analysis Data Report

Sample 167490			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:10 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Fire Station 6 642 Starr Ave.			

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
Microcystins_DW	Microcystins	101043-37	<0.30	0.23	1	0.3	0.1	ug/L	08/03/14	U+

Field Comments

Lab Comments

QC / Sample Comments

Approved By

On

Laboratory Inorganic Analysis Data Report

Sample 167461			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:18 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location Main and Brint			

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
<i>Microcystins_DW</i>	Microcystins	101043-37	0.32	0.32	1	0.3	0.1	ug/L	08/03/14	

Field Comments

Lab Comments

QC / Sample Comments

Approved By **On**

OhioEPA Division of Environmental Services

Laboratory Inorganic Analysis Data Report

Sample 167489			
Date Received 08/02/2014 6:37 PM	Matrix DW	Collected by	
Begin	End	Sample Type PLANT	
Date Collected	08/02/2014 12:50 PM	Station ID	
Program NWDO-DDAGW		Customer ID	
Client DDAGW_DW		External ID	
OEPA Division DDAGW		County	
Location 3332 St. Lawrence			

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
<i>Microcystins_DW</i>	Microcystins	101043-37	0.54	0.54	1	0.3	0.1	ug/L	08/03/14	

Field Comments

Lab Comments

QC / Sample Comments

Approved By

On

From: <Craig.Butler2@epa.ohio.gov>

Date: August 4, 2014 at 9:28:28 AM EDT

To: "ed.moore@toledo.oh.gov" <ed.moore@toledo.oh.gov>

Cc: Michael Baker <Mike.Baker@epa.ohio.gov>, James Canepa
<James.Canepa@epa.ohio.gov>

Subject: Advisory

Dear Mayor Collins:

I am writing to confirm Ohio EPA's recommendation to the City of Toledo to lift its "Do Not Drink" advisory issued on August 2, 2014 at 2:00 am for users of the City's public water system. Laboratory analyses of samples collected at the Collins Park Water Treatment Plant and throughout the distribution system indicate that contaminants have been consistently below the drinking water advisory threshold.

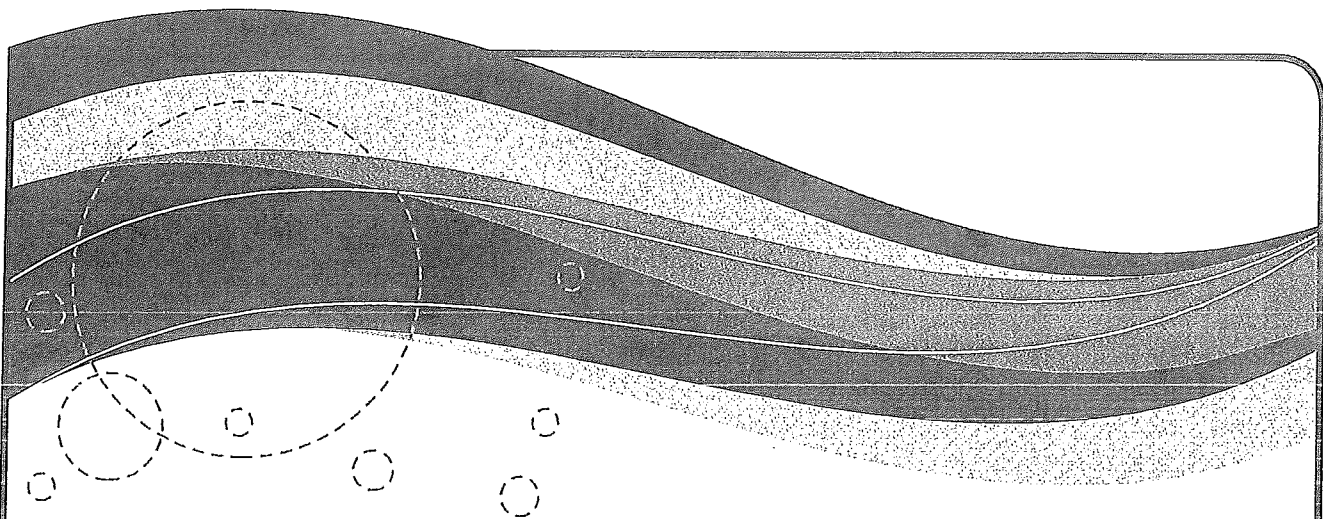
Sincerely

Craig Butler
Director

Facts About
Cyanobacteria &
Cyanobacterial Harmful Algal Blooms

Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Environmental Health
Division of Environmental Hazards & Health Effects





Facts about Cyanobacteria (Blue-green Algae) and Cyanobacterial Harmful Algal Blooms (CyanoHABs)

Cyanobacteria (blue-green algae)

Cyanobacteria are bacteria that grow in water and are photosynthetic (use sunlight to create food and support life). Cyanobacteria live in terrestrial, fresh, brackish, or marine water. They usually are too small to be seen, but sometimes can form visible colonies. Cyanobacteria have been found among the oldest fossils on earth and are one of the largest groups of bacteria. Cyanobacteria have been linked to human and animal illnesses around the world, including North and South America, Africa, Australia, Europe, Scandinavia, and China.

Cyanobacterial blooms and how they form

Cyanobacterial blooms occur when algae that are normally present grow exuberantly. Within a few days, a bloom can cause clear water to become cloudy. The blooms usually float to the surface and can be many inches thick, especially near the shoreline. Cyanobacterial blooms can form in warm, slow-moving waters that are rich in nutrients such as fertilizer runoff or septic tank overflows. Blooms can occur at any time, but most often occur in late summer or early fall.

They can occur in marine, estuarine, and fresh waters, but the blooms of greatest concern are the ones that occur in fresh water, such as drinking water reservoirs or recreational waters.

What a cyanobacterial bloom looks like

Some cyanobacterial blooms can look like foam, scum, or mats on the surface of fresh water lakes and ponds. The blooms can be blue, bright green, brown, or red and may look like paint floating on the water. Some blooms may not affect the appearance of the water. As algae in a cyanobacterial bloom die, the water may smell bad.

Cyanobacterial harmful algal blooms (CyanoHABs)

CyanoHABs are algae blooms that threaten people, animals, or the environment. They are dangerous for many reasons:

- Dense CyanoHABs can block sunlight and use up all the oxygen in the water, killing other plants and animals.
- Some cyanobacteria that can form CyanoHABs produce toxins that are among the most powerful natural poisons known. These toxins have no known antidotes.
- CyanoHABs can make people, their pets, and other animals sick. Often, the first sign that an HAB exists is a sick dog that has been swimming in an algae-filled pond.
- Children are at higher risk than adults for illness from CyanoHABs because they weigh less and can get a relatively larger dose of toxin.

Other effects of fresh-water CyanoHABs

- CyanoHABs can make drinking water smell and taste bad.
- They can make recreational areas unpleasant.

Species of cyanobacteria that form CyanoHABs in fresh water

- *Microcystis aeruginosa*
- *Anabaena circinalis*
- *Anabaena flos-aquae*
- *Aphanizomenon flos-aquae*
- *Cylindrospermopsis raciborskii*

Cyanotoxins

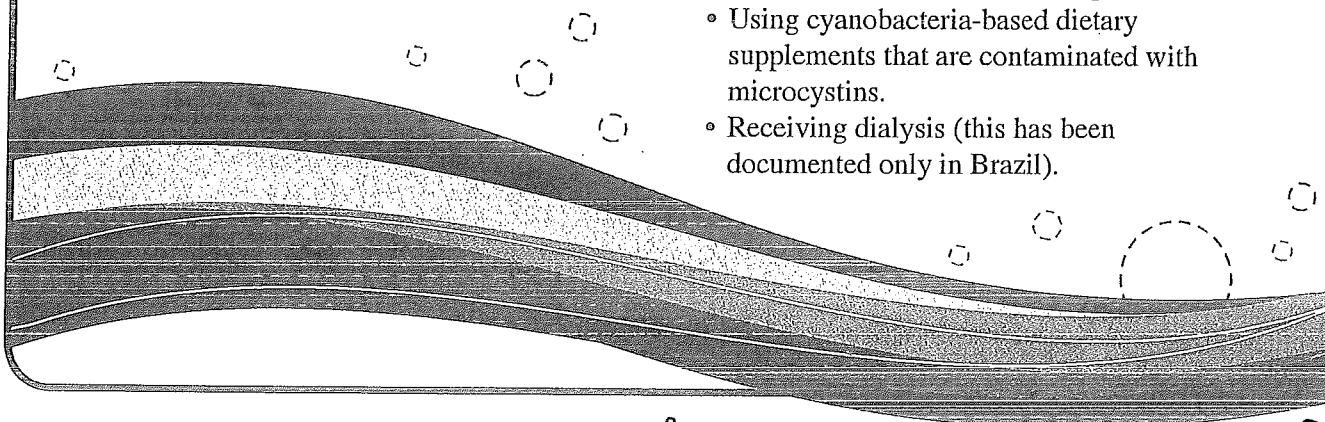
Cyanotoxins are a diverse group of chemical substances that are categorized by their specific toxic effects as follows:

- Neurotoxins affect the nervous system.
 - Anatoxin-a
 - Anatoxin-a(s)
 - Saxitoxin
 - Neosaxitoxin
- Hepatotoxins affect the liver.
 - Microcystins
 - Nodularins
 - Cylindrospermopsin
- Tumor promoters are chemicals that can increase tumor growth.
 - Microcystins
- Lipopolysaccharides are chemicals that can affect the gastrointestinal system.

See the table below for a list of cyanotoxins and their specific toxic mechanisms, their effects, the symptoms they cause, and treatments for poisoning.

How you could be exposed to CyanoHABs and cyanotoxins

- Drinking water that comes from a lake or reservoir with a CyanoHAB.
- Drinking untreated water.
- Engaging in recreational activities in waters with CyanoHABs.
- Inhaling aerosols from water-related activities such as jet-skiing or boating.
- Inhaling aerosols when watering lawns, irrigating golf-courses, etc. with pond water.
- Using cyanobacteria-based dietary supplements that are contaminated with microcystins.
- Receiving dialysis (this has been documented only in Brazil).



Types of illnesses people and animals can get from exposure to CyanoHABs

- **Getting it on the skin** may give people a rash, hives, or skin blisters (especially on the lips and under swimsuits).
- **Inhaling water droplets** from irrigation or water-related recreational activities can cause runny eyes and nose, a sore throat, asthma-like symptoms, or allergic reactions.
- **Swallowing water** that has cyanobacterial toxins in it can cause
 - Acute, severe gastroenteritis (including diarrhea and vomiting).
 - Liver toxicity (i.e., increased serum levels of liver enzymes). Symptoms of liver poisoning may take hours or days to show up in people or animals. Symptoms include abdominal pain, diarrhea, and vomiting.
 - Kidney toxicity.
 - Neurotoxicity. These symptoms can appear within 15 to 20 minutes after exposure. In dogs, the neurotoxins can cause salivation and other neurologic symptoms, including weakness, staggering, difficulty breathing, convulsions, and death. People may have numb lips, tingling fingers and toes, or they may feel dizzy.

Testing for cyanobacterial toxins

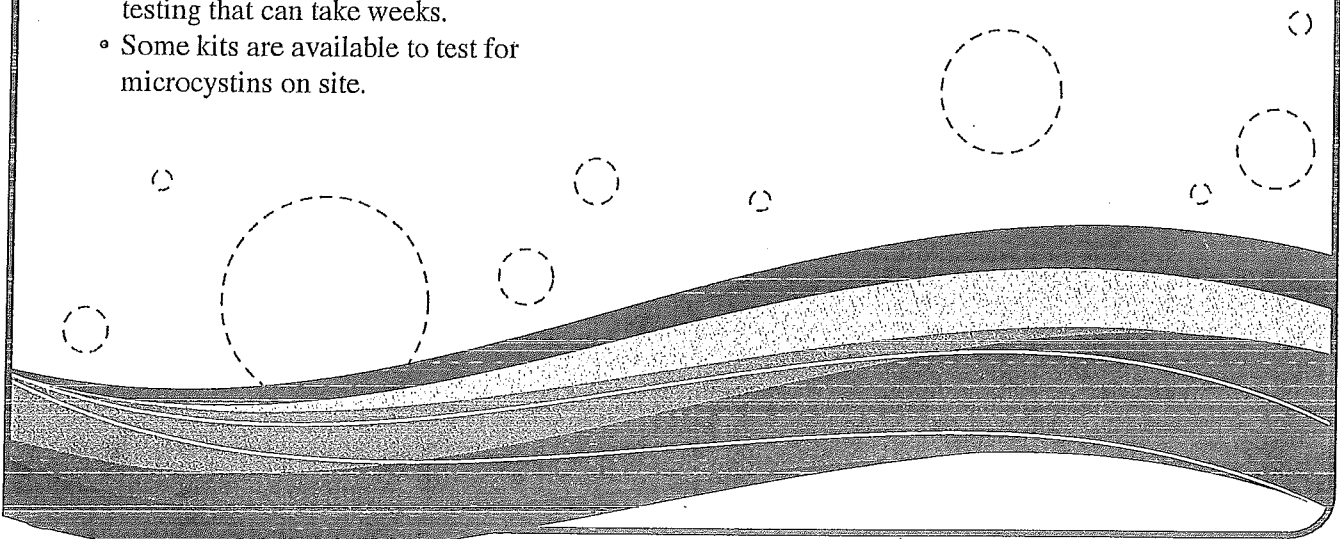
- Most of the toxins require specialized testing that can take weeks.
- Some kits are available to test for microcystins on site.

How to protect yourself, your family, and your pets from exposure to CyanoHABs

- Don't swim, water ski, or boat in areas where the water is discolored or where you see foam, scum, or mats of algae on the water.
- If you do swim in water that might have a CyanoHAB, rinse off with fresh water as soon as possible.
- Don't let pets or livestock swim in or drink from areas where the water is discolored or where you see foam, scum, or mats of algae on the water.
- If pets (especially dogs) swim in scummy water, rinse them off immediately—do not let them lick the algae (and toxins) off their fur.
- Don't irrigate lawns or golf courses with pond water that looks scummy or smells bad.
- Report any "musty" smell or taste in your drinking water to your local water utility.
- Respect any water-body closures announced by local public health authorities.

How to treat people or animals that have been exposed to cyanobacterial toxins

- Get medical treatment right away if you think you, your pet, or your livestock might have been poisoned by cyanobacterial toxins.
- Remove people from exposure and give them supportive treatment.



How to help reduce the occurrence of CyanoHABs

- Reduce nutrient loading of local ponds and lakes by using only the recommended amounts of fertilizers and pesticides on your yard.
- Properly maintain your household septic system.
- Maintain a buffer of natural vegetation around ponds and lakes to filter incoming water.

How to get more information about cyanobacteria:

Federal

Centers for Disease Control and Prevention (CDC)

Harmful Algal Blooms (HABs) site

<http://www.cdc.gov/habs>

This site defines HABs; describes CDC's HABs-related activities; and provides links to data, publications, and other HABs resources.

Cyanobacteria site

<http://www.cdc.gov/hab/cyanobacteria/>

This site defines cyanobacteria; describes CDC's cyanobacteria-related activities; and provides links to data, publications, and other cyanobacteria resources.

Environmental Protection Agency (EPA)

Drinking Water Contaminant Candidate List Site

<http://www.epa.gov/safewater/ccl/cclfs.html>

This site provides information about EPA's list of contaminants that are not regulated,

occur in public water systems, and may require regulation under the Safe Drinking Water Act. Algae that can be harmful are on this list.

International

State of Queensland Australia

HAB site

http://www.nrm.qld.gov.au/water/blue_green/index.html

This site describes the state's plans and procedures for agency responding to HABs.

World Health Organization

Water Site

<http://www.who.int/topics/water/en/>

This site provides links to drinking and recreational water quality, including the impacts of cyanobacteria and cyanobacterial toxins.

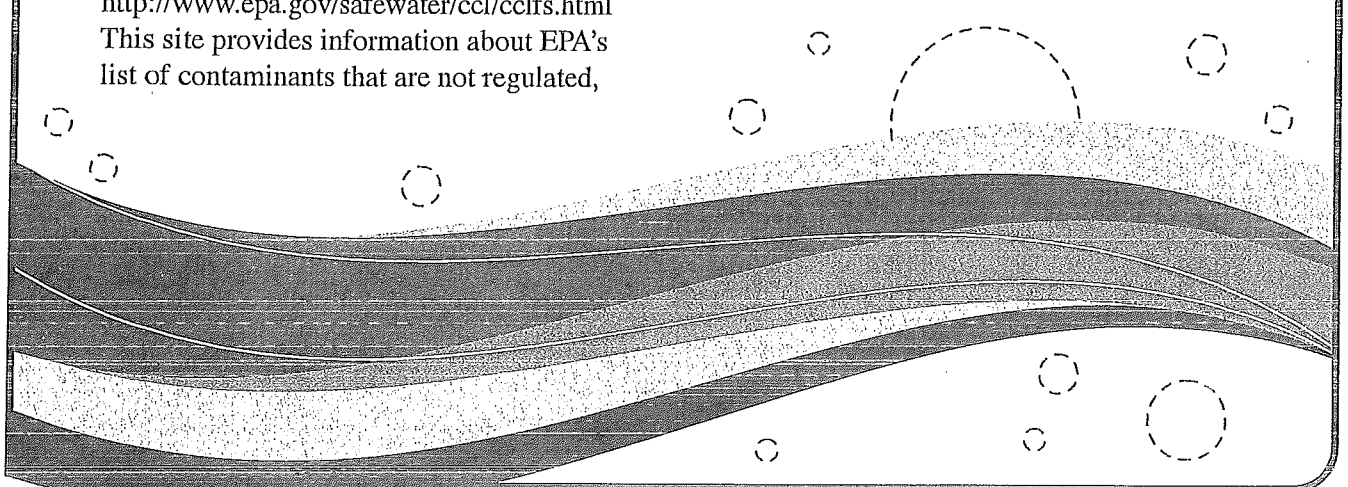
States

North Carolina Department of Health and Human Services

Occupational and Environmental Epidemiology program, HABs Site

<http://www.epi.state.nc.us/epi/hab/>

This site gives an overview of North Carolina's HAB program and provides links to the state's HAB-related surveillance, research, and education activities.



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Cyanobacterial toxins, effects, signs and symptoms of poisoning, and therapy

Toxin	Acute Effect	Signs and Symptoms	Therapy
Anatoxin-a	Neurotoxicity	<i>Humans:</i> not documented. <i>Animals:</i> progression of muscle fasciculations, decreased movement, abdominal breathing, cyanosis; convulsions, death. <i>Birds:</i> opisthotonos ("s"-shaped neck).	Supportive care. Respiratory support may allow time for detoxification and respiratory recovery.
Anatoxin-a (s)	Neurotoxicity	<i>Humans:</i> not documented. <i>Pigs:</i> hypersalivation, mucoid nasal discharge, tremors, fasciculations, ataxia, diarrhea, recumbency. <i>Ducks:</i> regurgitation, paresis, opisthotonos, clonic seizures. <i>Mice:</i> lacrimation, hypersalivation, urination, defecation, death from respiratory arrest. <i>Rats:</i> red-pigmented ears.	Supportive care.
Cylindrospermopsin	Hepatotoxicity, renal toxicity, chromosome breakage, aneuploidy	<i>Humans:</i> enlarged liver, malaise, anorexia, vomiting, headache. <i>Mice:</i> huddling, anorexia, slight diarrhea, gasping respiration.	Supportive care.
Microcystins	Hepatotoxicity	<i>Humans:</i> elevated gamma-glutamyl transpeptidase. <i>Humans, mice:</i> elevated alanine aminotransferase. <i>Rats:</i> embryo lethality, teratogenicity. <i>Mammals:</i> weakness, reluctance to move, anorexia, pallor of extremities and mucous membranes, mental derangement, survivors may be photosensitized.	<i>Humans:</i> powdered charcoal, supportive care. <i>Animals:</i> cholestyramine.
Nodularin	Hepatotoxicity	<i>Humans:</i> Skin and eye irritation from skin contact. <i>Experimental systems:</i> inhibition of protein phosphatases, tumor-promoter.	Supportive care.
Saxitoxin, neosaxitoxin	Neurotoxicity	<i>Humans:</i> paresthesia and numbness of lips and mouth within ½ to 3 hours after exposure, extending to face, neck, extremities; motor weakness; incoordination; respiratory and muscular paralysis. <i>Animals:</i> incoordination, death by respiratory failure.	Activated charcoal, artificial respiration. Supportive care.

References:

Carmichael WW, Beasley V, Bunner DL, Eloff JN, Falconer IR, Gorham PR, et al. Naming of cyclic heptapeptide toxins of cyanobacteria (blue-green algae). *Toxicon*. 1988;26:971-3.

Carmichael, WW, Falconer IR. Diseases related to freshwater blue-green algal toxins, and control measures. P. 187-209. In: Falconer I R (ed.). *Algal Toxins in Seafood and Drinking Water*. London: Academic Press. 1993: pp187-209.

Dahlem AM, Hassan AS, Swanson SP, Carmichael WW, Beasley VR. A model system for studying the bioavailability of intestinally administered microcystin-LR, a hepatotoxic peptide from the cyanobacterium *Microcystis aeruginosa*. *Pharmacol. Toxicol.* 1989;64:177-81.

Falconer, IR, Beresford AM, Runnegar MT. 1983. Evidence of liver damage by toxin from a bloom of blue-green algae, *Microcystis aeruginosa*. *Med J Aust.* 1983;1: 511-4.

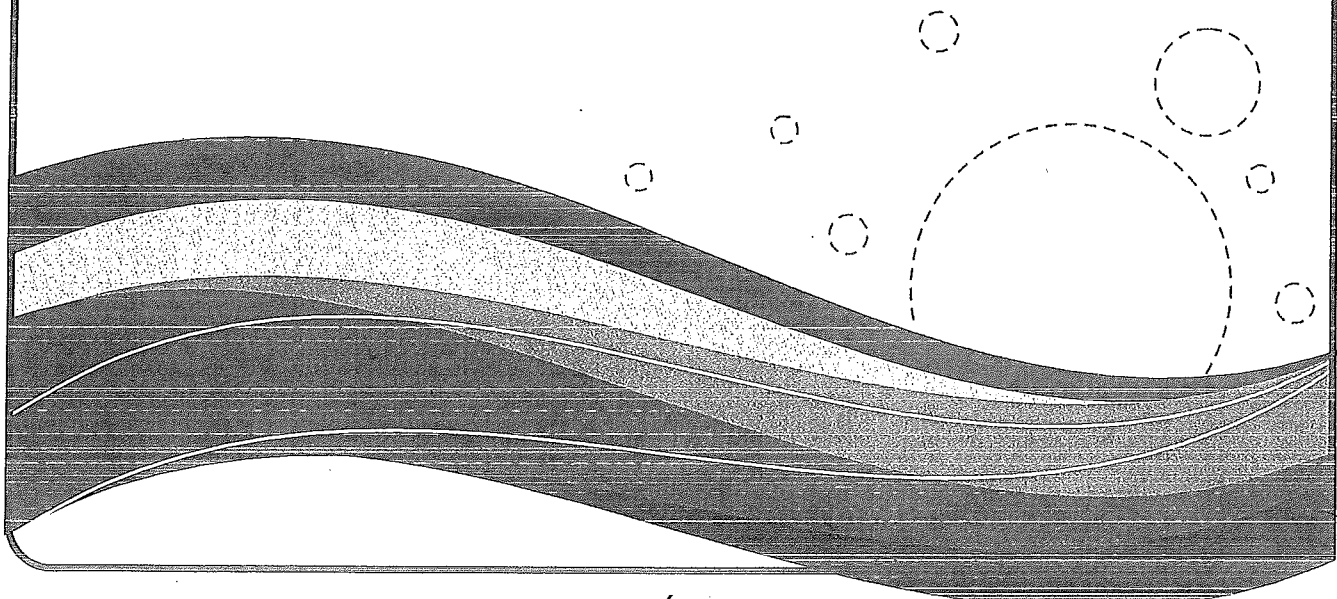
Hawkins PR, Chandrasena NR, Jones GJ, Humpage AR, Falconer IR. Isolation and toxicity of *Cylindrospermopsis raciborskii* from an ornamental lake. *Toxicon*. 1997;35:341-346.

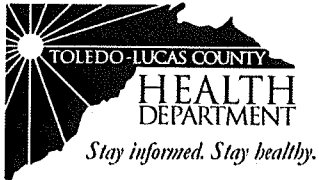
Humpage A R, Hardy SJ, Moore EJ, Froschio SM, Falconer IR. Microcystins (cyanobacterial toxins) in drinking water enhance the growth of aberrant crypt foci in the mouse colon. *J Toxicol Environ Health, Part A.* 2000;61:155-65.

Kirpenko YA, Sirenko LA, Kirpenko NI. Some aspects concerning remote after-effects of blue-green algal toxin impact on warm-blooded animals. In: Carmichael WW (ed.). *The Water Environment, Algal Toxins and Health*. New York: Plenum, 1981: pp257-69.

Soong F S, Maynard E, Kirke K, Luke C. Illness associated with blue-green algae. *Med J Aust.* 1992;156:67.

Turner PC, Gammie AJ, Hollinrake K, Codd GA (1990). Pneumonia associated with contact with cyanobacteria. *Br Med J.* 1990;300:1440-1.





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Health Commissioner

Larry J. Vasko, R.S., M.P.H
Deputy Health Commissioner

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Christopher A. Sherman, MD, MBA

For Immediate Release

August 4, 2014
Public Information Officer
Stacy Weber
(419) 213-4143

Health Update: Flushing Plumbing Systems that have been inactive since August 1st.

If you're lines have been used since Friday, August 1st, 2014 you do not need to flush your system.

Following are step-by-step procedures citizens can use to flush their plumbing system if their lines have not been used since Friday, August 1st, 2014. To protect the health and safety of our communities, we recommend that you read carefully and follow the steps for clearing your plumbing. **Thank you for your cooperation.**

For Residents

How to flush your plumbing system

Please complete these steps in the order set out below. Finish each step completely before moving on to the next step.

1. Flush ALL hot water taps for 15 minutes

Begin the flushing procedure by opening the hot water taps in your bathroom(s). Open ALL hot water lavatory (sink) fixtures, hot water bath fixtures, and any other hot water fixtures, such as kitchens, wet bars, etc. **Run these hot water fixtures for at least 15 minutes. Shut water off after 15 minutes.** After you have flushed each hot water faucet for 15 minutes, your hot water heater will be safe for use.

2. Flush ALL cold water taps for five minutes

Once the hot water tank and hot water piping have been flushed, open ALL of the cold water fixtures, flush each toilet at least one time. **Run these cold water fixtures for at least five minutes. Shut water off after five minutes.** This does include the water in your refrigerator water dispenser.

3. Flush ALL remaining faucets and appliances

(Before starting step 3, please see How to Flush Plumbing Appliances and Faucets for more information.) Open any remaining fixtures such as hose bibs, external faucets or fixtures not

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used for drinking for at least five minutes to finish the plumbing system flushing. Take additional steps to remove water from other appliances. See How to Flush Plumbing Appliances and Faucets for more information. This includes:

- Ice makers
- Dishwashers
- Humidifiers
- Continuous Positive Airway Pressure (CPAP)
- Oral, medical or health care devices
- Baby formula, food and drinks made with water during DO NOT USE
- Water filters
- Water Softeners
- Reverse osmosis units

**For Restaurants
How to flush your plumbing system**

If you're lines have been used since Friday, August 1st, 2014 you do not need to flush your system. Thank you for your cooperation.

Please follow the same guidelines for residents if you have not used tap water since Friday, August 1st, 2014. All food contact surfaces should be cleaned and sanitized after flushing; including, sinks, ice machines, steam tables, proofers, and anything in your operations that utilizes tap water.

**For Healthcare Providers
How to flush your plumbing system**

If you're lines have been used since Friday, August 1st, 2014 you do not need to flush your system. Thank you for your cooperation.

Please follow the same guidelines for residents if you have not used tap water since Friday, August 1st, 2014. All food contact surfaces should be cleaned and sanitized after flushing; including, sinks, ice machines, steam tables, proofers, and anything in your operations that utilizes tap water. **Flush critical equipment such as sterilization units and eye wash stations twice for 15 minutes and follow normal testing protocols before use.**

The Toledo-Lucas County Health Department will not need to test your water before you resume operations. We are checking with Ohio Department of Health to see if any other guidelines will be forthcoming.

For questions, please contact 419-936-2020.

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HOW TO FLUSH PLUMBING APPLIANCES



To protect the health and safety of our communities, we recommend that you read carefully and follow the steps for flushing plumbing appliances.

- **Ice makers**

If you have an ice maker in your refrigerator, first throw away all ice and then:

If you have a filter on your ice maker

Some refrigerators, with ice makers, also have filters on the small water line that feed the ice maker. If you have filters on your ice maker, you want to replace the filter **AFTER** flushing your refrigerator's ice maker. These filters require routine replacement. This would be a good time to replace the filter to ensure that the water line to the ice maker is completely flushed. Some refrigerators also provide filtered cold water. Check to make sure that you have replaced any filter **AFTER** flushing cold water supply. Then flush cold-water dispenser for five minutes.

After flushing these lines, let the ice maker container fill up completely and discard this ice and clean the container before replacing. If you have more than one refrigerator make sure you perform the same procedure on those units as well.

- *Water filters*

Clean or change your water filters, or contact the filter manufacturer for more details.

- *Water supplies for pets*

Pets need clean water too. Be sure to empty all water bowls, bottles, or other water supplies for your pet. Wash the pet bowl, bottle or other water supply. Then refill with tap water.

- *Point of entry/point of use devices (this may not apply to everyone)*

If you have a Point of Entry water treatment system such as a water softener or filter, which all of the home's water passes through before it enters the main plumbing system, you should consider the following general guidelines before completing your household plumbing flushing.

- *Water Softeners:*

Household water softener, which uses a natural or synthetic resin material to exchange sodium for calcium and magnesium present in the water, should be manually regenerated before flushing your plumbing system. This will ensure that the softener resin has been backwashed and cleaned before flushing procedures begin. If you are unsure of how to manually initiate a regeneration cycle, refer to your softener owner's manual or call your equipment supplier for assistance.

HOW TO FLUSH PLUMBING APPLIANCES

- *Sediment Filters:*

Household water filters usually fall into two basic categories:

- 1. Pressure filters, which can be backwashed to clean.*
- 2. Cartridge filters, which have a replaceable element or cartridge.*

If your home has a pressure filter that can be backwashed, you should initiate a manual backwash of the filter before proceeding with, and after completing, the flushing procedures. If you have a whole house cartridge filter system, you should replace the cartridges after completing the flushing procedures.

- *Point of use filters/treatment:*

If you have or use Point of Use filters, which are typically attached to your kitchen faucet you should replace the filter before using the faucet-connected unit. These filters require periodic replacement anyway so this would be a good time to do this.

- *Reverse Osmosis:*

Reverse Osmosis drinking water treatment often have pre-filters, which you may want to replace before flushing the RO System. However the actual Reverse Osmosis membrane module should not require replacement. If the manufacturer of the membrane suggests that you replace this part of the system you should ask them to give you the specific reasons why.