

## TECHNICAL MEMORANDUM

Results of the additional Cyanobacteria and Microcystin Monitoring in Copco and Iron Gate reservoirs: July 17<sup>th</sup>, 2012

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## Introduction

Sampling results from the July 11<sup>th</sup> sampling event revealed that one site in Copco reservoir (Copco Cove), had cell counts above the California posting guideline of 40,000 cells/mL for *Microcystis aeruginosa* (MSAE), and above 100,000 cells/mL for other potentially toxigenic algae – in this case *Anabaena flos-aqua* (SWCRB 2010)(Appendix 1). Since a site at Copco Reservoir was above the voluntary posting guidelines, public access to this reservoir was posted with health advisory signs on July 17, 2012. At PacifiCorp's request, E&S Environmental Chemistry, Inc. sampled Copco and Iron Gate reservoir public health monitoring sites (Table 1) on July 17 to confirm the high cell counts in Copco reservoir, and continue the public health monitoring in Iron Gate reservoir. This was an additional sampling event and the results are reported in this abbreviated memo. Samples were collected from the according to the standard operating procedure (SOP) developed by the Klamath Blue Green Algae Working Group (<http://www.kbmp.net/collaboration/klamath-hydroelectric-settlement-agreement-monitoring>).

<b>Location</b>	<b>Approximate River Mile</b>	<b>Site ID</b>
Copco Reservoir at Mallard Cove	201.5	CRMC
Copco Reservoir at Copco Cove	200.0	CRCC
Iron Gate Reservoir at Camp Creek	192.8	IRCC
Iron Gate Reservoir at John Williams campground	192.4	IRJW

## Results

The July 17 sampling results from the reservoir sites show cell counts below the posting guidelines at all locations (Table 2). Results from the microcystin analysis are not yet available but will be reported in subsequent memos when the data are available.

**Table 2.** Summary of public health monitoring on July 17<sup>th</sup>, 2012.

Date	Time	Location	RM	Sample ID	Depth	MSAE	AFA	ANA	Other	Microcystin (ug/L)
7/17/2012	18:15	CRMC	201.5	KR12822	SG	7,362	0	0	0	*
7/17/2012	18:45	CRCC	200.0	KR12823	SG	9,095	167	543	0	*
7/17/2012	19:15	IRCC	192.8	KR12824	SG	259	0	0	35 <sup>(7)</sup>	*
7/17/2012	19:30	IRJW	192.4	KR12825	SG	0	893	3,046	7,527 <sup>(6)</sup>	*

<sup>1</sup>MSAE = *Microcystis aeruginosa* (cells/mL)

<sup>2</sup>AFA = *Aphanizomenon flos-aquae* (cells/mL)

<sup>3</sup>ANA = *Anabaena flos-aquae* (cells/mL)

Other = either <sup>5</sup>*Planktothrix (Oscillatoria) sp.* or <sup>6</sup>*Gloeotrichia echinulata* or <sup>7</sup>*Anabaena sp.* or <sup>8</sup>*Lyngbya sp.* (cells/mL)

“0” value indicates non-detect by analytical laboratory

## References

SWRCB. 2010. Cyanobacteria in California Recreational Water Bodies: Providing Voluntary Guidance about Harmful Algal Blooms, Their Monitoring, and Public Notification. July 2010. Document provided as part of Blue-green Algae Work Group of State Water Resources Control Board (SWRCB) and Office of Environmental Health and Hazard Assessment (OEHHA).

# Appendix 1

## Cumulative Species data for 2012 Public Health Samples

**Table 3. Summary of cyanobacteria public health monitoring (2012).**

Date	Time	Location	RM	Sample ID	Depth	MSAE	AFA	ANA	Other	Microcystin (ug/L)
5/21/2012	12:40	CRMC	201.5	KR12800	SG	0	0	26	290 <sup>(5)</sup> / 329 <sup>(8)</sup>	**
5/21/2012	13:10	CRCC	200.0	KR12801	SG	0	0	0	58 <sup>(5)</sup>	**
5/21/2012	11:30	IRCC	192.8	KR12802	SG	0	0	0	0	ND
5/21/2012	11:50	IRJW	192.4	KR12803	SG	0	0	0	0	ND
6/12/2012	15:00	CRMC	201.5	KR12804	SG	2,832	0	2,124	1,035 <sup>(5)</sup>	0.29
6/12/2012	16:00	CRCC	200.0	KR12805	SG	8,575	0	0	0	0.74
6/12/2012	13:50	IRCC	192.8	KR12806	SG	0	0	0	0	0.3
6/12/2012	14:00	IRJW	192.4	KR12807	SG	0	0	67	0	ND
6/12/2012	14:10	KRBI	189.7	KR12809	SG	0	0	0	0	ND
6/25/2012	13:25	CRMC	201.5	KR12810	SG	119	0	0	24 <sup>(5)</sup>	ND
6/25/2012	12:45	CRCC	200.0	KR12811	SG	284	0	56	111 <sup>(5)</sup>	0.37
6/25/2012	14:15	IRCC	192.8	KR12812	SG	0	0	0	28 <sup>(5)</sup>	0.16
6/25/2012	14:05	IRJW	192.4	KR12813	SG	117	0	87	0	0.19
6/25/2012	13:50	KRBI	189.7	KR12815	SG	0	0	0	0	ND
7/11/2012	11:50	CRMC	201.5	KR12816	SG	2,019	0	2,042	0	*
7/11/2012	12:30	CRCC	200.0	KR12817	SG	694,479	0	1,173,209	0	*
7/11/2012	14:00	IRCC	192.8	KR12818	SG	821	0	1,195	112 <sup>(7)</sup>	*
7/11/2012	14:15	IRJW	192.4	KR12819	SG	26,670	0	3,196	499 <sup>(7)</sup>	*
7/11/2012	14:30	KRBI	189.7	KR12821	SG	0	0	0	0	*
7/17/2012	18:15	CRMC	201.5	KR12822	SG	7,362	0	0	0	*
7/17/2012	18:45	CRCC	200.0	KR12823	SG	9,095	167	543	0	*
7/17/2012	19:15	IRCC	192.8	KR12824	SG	259	0	0	35 <sup>(7)</sup>	*
7/17/2012	19:30	IRJW	192.4	KR12825	SG	0	893	3,046	7,527 <sup>(6)</sup>	*

\* Results were not available upon release of this memo and will be release with the subsequent memo

\*\*Bottles were damaged during shipping and could not be analyzed

## Appendix 2

### Laboratory Data Sheets July 17<sup>th</sup>, 2012 Public Health Sampling

Phytoplankton Sample Analysis					
Sample:	Klamath Basin				
Sample Site:	KR 12822				
Sample Depth:					
Sample Date:	17-Jul-12				
Total Density (#/mL):	526				
Total Biovolume (um <sup>3</sup> /mL):	58,899				
Trophic State Index:	29.5				
Species	Density #/mL	Density Percent	Biovolume um <sup>3</sup> /mL	Biovolume Percent	Group
1 Microcystis aeruginosa	526	100.0	58,899	100.0	bluegreen
Microcystis aeruginosa cells/mL =	7,362				
Note: Toxic Algae Only					
Aquatic Analysts	Sample ID: QF75				

Phytoplankton Sample Analysis					
Sample:	Klamath Basin				
Sample Site:	KR 12823				
Sample Depth:					
Sample Date:	17-Jul-12				
Total Density (#/mL):	856				
Total Biovolume (um <sup>3</sup> /mL):	119,657				
Trophic State Index:	34.6				
Species	Density #/mL	Density Percent	Biovolume um <sup>3</sup> /mL	Biovolume Percent	Group
1 Microcystis aeruginosa	827	96.6	72,761	60.8	bluegreen
2 Anabaena flos-aquae	21	2.4	36,372	30.4	bluegreen
3 Aphanizomenon flos-aquae	8	1.0	10,523	8.8	bluegreen
Microcystis aeruginosa cells/mL =	9,095				
Aphanizomenon flos-aquae cells/mL =	167				
Anabaena flos-aquae cells/mL =	543				
Note: Toxic Algae Only					
Aquatic Analysts	Sample ID: QF76				

Phytoplankton Sample Analysis					
Sample:		Klamath Basin			
Sample Site:		KR 12824			
Sample Depth:					
Sample Date:		17-Jul-12			
Total Density (#/mL):		30			
Total Biovolume (um <sup>3</sup> /mL):		4,424			
Trophic State Index:		12.2			
Species	Density #/mL	Density Percent	Biovolume um <sup>3</sup> /mL	Biovolume Percent	Group
1 Microcystis aeruginosa	26	85.7	2,074	46.9	bluegreen
2 Anabaena sp.	4	14.3	2,350	53.1	bluegreen
Microcystis aeruginosa cells/mL =		259			
Anabaena sp. cells/mL =		35			
Note: Toxic Algae Only					
Aquatic Analysts			Sample ID: QF77		

Phytoplankton Sample Analysis					
Sample:		Klamath Basin			
Sample Site:		KR 12825			
Sample Depth:					
Sample Date:		17-Jul-12			
Total Density (#/mL):		134			
Total Biovolume (um <sup>3</sup> /mL):		772,187			
Trophic State Index:		48.0			
Species	Density #/mL	Density Percent	Biovolume um <sup>3</sup> /mL	Biovolume Percent	Group
1 Anabaena flos-aquae	90	66.7	204,115	26.4	bluegreen
2 Aphanizomenon flos-aquae	39	28.9	56,262	7.3	bluegreen
3 Gloeotrichia echinulata	6	4.4	511,810	66.3	bluegreen
Anabaena flos-aquae cells/mL =		3,046			
Gloeotrichia echinulata cells/mL =		7,527			
Aphanizomenon flos-aquae cells/mL =		893			
Note: Toxic Algae Only					
Aquatic Analysts			Sample ID: QF78		