TECHNICAL MEMORANDUM

Results of Cyanobacteria and Microcystin Monitoring in the Vicinity of the Klamath Hydroelectric Project

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Introduction

This technical memorandum summarizes the results for the 2021 public health monitoring for cyanobacteria species and an associated toxin, microcystin, from Upper Klamath Lake and within PacifiCorp's Klamath Hydroelectric Project (Project) from Keno Reservoir to the Klamath River downstream Iron Gate Dam. Microcystin results from 2021 baseline monitoring program are also included in the results summaries below. This monitoring is particularly focused on *Microcystis aeruginosa* (MSAE) which is known to produce microcystin. Monitoring is being conducted pursuant to Interim Measure 15, Water Quality Monitoring Activities, contained in the Klamath Hydroelectric Settlement Agreement (KHSA) executed between the United States Department of Interior, the states of California and Oregon, PacifiCorp, and other parties.

Results from the baseline and public health sampling are used in coordination with the appropriate public health authority to determine if public health advisories are warranted[1,2]. In addition to PacifiCorp's website (https://www.pacificorp.com/energy/hydro/klamath-river.html), these memos are also posted on the Klamath Basin Monitoring Program's (KBMP) website (www.kbmp.net) and inform the Blue Green Algae tracker on the KBMP website.

The data in Appendix 1 and Appendix 2 summarize results from all of the 2021 public health sampling events to date and microcystin results from the 2021 baseline sampling events, respectively.

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[1] The California State Water Resources Control Board (SWRCB) provides guidelines for posting advisories in recreation water (California SWRCB 2016) for Project waters in California. SWRCB recommends posting advisories in recreation waters at three levels based on laboratory testing for microcystin. The posting levels are Caution, Warning, and Danger at microcystin concentrations of 0.8, 6, and 20 µg/L respectively. Toxin producing cells at concentrations of over 4,000 cells/mL or blooms, scums, or mats would result in posting at the Caution level.

[2] Postings of Project waters in Oregon are coordinated with the Oregon Health Authority (OHA). The health advisory guideline for recreational use in Oregon waters is microcystin concentrations of 8 µg/L (OHA 2019).

Methods

PacifiCorp and the Oregon Department of Environmental Quality (ODEQ) are conducting public health sampling at ten sites (Table 1). Samples are collected and sent for laboratory analysis of potentially toxigenic cyanobacteria, notably MSAE and microcystin, from:

- Three shoreline sites in Upper Klamath Lake, Oregon
- One shoreline site in Keno Reservoir, Oregon
- One shoreline site in J.C. Boyle Reservoir, Oregon
- Four shoreline sites in coves in Copco and Iron Gate reservoirs (i.e., two cove sites in each reservoir), California
- One Klamath River site below Iron Gate Dam near the hatchery bridge, California

Table 1. Sites of cyanobacteria and microcystin public health monitoring in Upper Klamath Lake, Keno Reservoir, J.C Boyle Reservoir, Copco Reservoir, Iron Gate Reservoir, and the Klamath River during 2021.

Location	Approximate River Mile	Sampling Entity	Site ID
Upper Klamath Lake at Eagle Ridge County Park	N/A	ODEQ	UKEP
Upper Klamath Lake at Howard's Bay Park	N/A	ODEQ	UKHP
Upper Klamath Lake at Moore Park	N/A	ODEQ	UKMP
Keno Reservoir at Keno Park	234.0	ODEQ	KEKP
J.C. Boyle Reservoir at Topsy Campground	225.0	ODEQ	BRTC
Copco Reservoir at Mallard Cove	201.5	PacifiCorp	CRMC
Copco Reservoir at Copco Cove	200.0	PacifiCorp	CRCC
Iron Gate Reservoir at Camp Creek	192.8	PacifiCorp	IRCC
Iron Gate Reservoir at John Williams Campground	192.4	PacifiCorp	IRJW
Klamath River below Iron Gate dam near Hatchery Bridge	189.7	PacifiCorp	KRBI

Samples are planned to be taken once in May, November, and December and twice per month in June, July, August, September, and October.

In addition to public health sampling, monthly and bi-monthly baseline sampling for microcystin is conducted by PacifiCorp from May through October at 12 locations extending from Link River Dam to the Klamath River downstream of Iron Gate Reservoir (Table 2).

Table 2. Sites of microcystin baseline monitoring from Link River Dam to the Klamath River downstream of Iron Gate reservoir during 2021.

Site Description	Approximate River Mile	Depth (m)	Sampling Entity	Site ID
Link River Dam	254.4	0.5	PacifiCorp	KR25411
Keno Reservoir at Miller Island	246.0	0.5	PacifiCorp	KR24600
Klamath River below Keno Dam near a USGS Gage	231.8	0.5	PacifiCorp	KR23340
Klamath River below JC Boyle Reservoir	224.6	0.5	PacifiCorp	KR22460
Klamath River at USGS Gage	219.5	0.5	PacifiCorp	KR21950
Klamath River above Shovel Creek	206.4	0.5	PacifiCorp	KR20642
Copco Reservoir at Buoy Line (surface)	198.7	0.5	PacifiCorp	KR19874
Copco Reservoir at Buoy Line (integrated)	198.7	0-8	PacifiCorp	KR19874
Klamath River below Copco 2 Reservoir	196.5	0.5	PacifiCorp	KR19645
Iron Gate Reservoir at Log Boom (surface)	190.2	0.5	PacifiCorp	KR19019
Iron Gate Reservoir at Log Boom (integrated)	190.2	0-8	PacifiCorp	KR19019
Klamath River below Hatchery Bridge	189.7	0.5	PacifiCorp	KR18973

Public health samples are taken as grab samples offshore according to the standard operating procedure (SOP) developed by the Klamath Blue Green Algae Working Group (www.kbmp.net/collaboration/klamath-hydroelectric-settlement-agreement-monitoring).

Samples for determination of microcystin toxin are placed in a cooler on ice and shipped to the U.S. Environmental Protection Agency (EPA) Region 9 Laboratory in Richmond, California. The samples are analyzed using the competitive Enzyme-Linked ImmunoSorbent Assay (ELISA) method based on the EnviroLogix QuantiPlate Kit with a detection limit of 0.10 µg/L and a quantification limit of 0.15 µg/L. This test method does not distinguish between the specific microcystin congeners, but detects their presence to differing degrees. That is, ELISA test results yield one value as the sum of measurable microcystin variants.

Results

All public health samples (Table 3) were collected as planned in November and December 2021.

Table 3. Summary of available public health laboratory microcystin results from sampling November and December 2021.

Date	Time	Site ID	RM	Sampling Entity	Sample ID	Depth (m)	Microcystin (µg/L)
11/08/2021	12:12	UKEP	N/A	ODEQ	UKEP21012	SG	0.14[C1, J]
11/08/2021	12:35	UKHP	N/A	ODEQ	UKHP21012	SG	7.1
11/08/2021	12:53	UKMP	N/A	ODEQ	UKMP21012	SG	ND
11/08/2021	11:03	KEKP	234	ODEQ	KEKP21012	SG	ND
11/08/2021	10:25	BRTC	225	ODEQ	BRTC21012	SG	ND
11/14/2021	14:30	CRMC	201.5	PacifiCorp	KR21855	SG	ND

11/14/2021	15:40	CRCC	200.0	PacifiCorp	KR21856	SG	ND
11/14/2021	16:15	IRCC	192.8	PacifiCorp	KR21857	SG	ND
11/14/2021	16:40	IRJW	192.4	PacifiCorp	KR21858	SG	ND
11/14/2021	17:15	KRBI	189.7	PacifiCorp	KR21859	SG	ND
11/15/2021	11:46	UKEP	N/A	ODEQ	UKEP21013	SG	ND
11/15/2021	12:11	UKHP	N/A	ODEQ	UKHP21013	SG	ND
11/15/2021	12:30	UKMP	N/A	ODEQ	UKMP21013	SG	ND
11/15/2021	10:36	KEKP	234	ODEQ	KEKP21013	SG	ND
11/15/2021	10:00	BRTC	225	ODEQ	BRTC21013	SG	ND
12/14/2021	08:55	CRMC	201.5	PacifiCorp	KR21860	SG	ND
12/14/2021	15:15	CRCC	200.0	PacifiCorp	KR21861	SG	ND
12/14/2021	16:15	IRCC	192.8	PacifiCorp	KR21862	SG	ND
12/14/2021	16:30	IRJW	192.4	PacifiCorp	KR21863	SG	ND
12/14/2021	16:50	KRBI	189.7	PacifiCorp	KR21864	SG	ND

"ND" value indicates a result less than the laboratory analytical detection limit (0.1 µg/L)
"C1" indicates the reported concentration for this analyte is below the quantitation limit.
"J" indicates the reported result for this analyte should be considered an estimated value.

References

California SWRCB 2016. Draft Statewide Voluntary Guidance on CyanoHABs in Recreational Waters. Available online at:
http://www.mywaterquality.ca.gov/monitoring_council/cyanohab_network/docs/triggers.pdf

Oregon Health Authority. 2019. Oregon Harmful Algal Bloom Surveillance (HABS) Program – Recreational Use Public Health Advisory Guidelines, Cyanobacterial Blooms in Freshwater Bodies. 27 pp. Available online at:
https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RECREATION/HARMFULALGAEBLOOMS/Documents/Advisory-Guidelines-Harmful-Cyanobacterial-Blooms-Recreational-Waters.pdf

Appendix 1
Cyanobacteria Species and Microcystin Data for 2021 Public Health Samples

Table A1. Summary of available public health laboratory microcystin results from 2021 sampling.

Date	Time	Site ID	RM	Sampling Entity	Sample ID	Depth (m)	Microcystin (µg/L)
5/17/2021	11:27	UKEP	N/A	ODEQ	UKEP2101	SG	ND
5/17/2021	11:52	UKHP	N/A	ODEQ	UKHP2101	SG	ND
5/17/2021	12:09	UKMP	N/A	ODEQ	UKMP2101	SG	ND
5/17/2021	10:25	KEKP	234	ODEQ	KEKP2101	SG	ND
5/17/2021	09:45	BRTC	225	ODEQ	BRTC2101	SG	ND
5/25/2021	10:55	CRMC	201.5	PacifiCorp	KR21800	SG	ND
5/25/2021	10:05	CRCC	200.0	PacifiCorp	KR21801	SG	ND
5/25/2021	09:25	IRCC	192.8	PacifiCorp	KR21802	SG	ND
5/25/2021	08:45	IRJW	192.4	PacifiCorp	KR21803	SG	ND
5/25/2021	11:35	KRBI	189.7	PacifiCorp	KR21804	SG	ND
6/1/2021	11:00	UKEP	N/A	ODEQ	UKEP2102	SG	2.6
6/1/2021	11:37	UKHP	N/A	ODEQ	UKHP2102	SG	0.44
6/1/2021	11:53	UKMP	N/A	ODEQ	UKMP2102	SG	ND
6/1/2021	10:11	KEKP	234	ODEQ	KEKP2102	SG	ND
6/1/2021	09:51	BRTC	225	ODEQ	BRTC2102	SG	ND
6/8/2021	18:25	CRMC	201.5	PacifiCorp	KR21805	SG	ND
6/8/2021	14:15	CRCC	200.0	PacifiCorp	KR21806	SG	ND
6/8/2021	15:30	IRCC	192.8	PacifiCorp	KR21807	SG	ND
6/8/2021	15:45	IRJW	192.4	PacifiCorp	KR21808	SG	ND
6/8/2021	16:10	KRBI	189.7	PacifiCorp	KR21809	SG	ND
6/14/2021	11:35	UKEP	N/A	ODEQ	UKEP2103	SG	0.44
6/14/2021	12:10	UKHP	N/A	ODEQ	UKHP2103	SG	0.10[C1, J]
6/14/2021	12:28	UKMP	N/A	ODEQ	UKMP2103	SG	ND
6/14/2021	10:46	KEKP	234	ODEQ	KEKP2103	SG	0.13[C1, J]
6/14/2021	10:27	BRTC	225	ODEQ	BRTC2103	SG	ND
6/29/2021	09:40	CRMC	201.5	PacifiCorp	KR21810	SG	5.9
6/29/2021	08:05	CRCC	200.0	PacifiCorp	KR21811	SG	0.86
6/29/2021	07:30	IRCC	192.8	PacifiCorp	KR21812	SG	0.18
6/29/2021	07:15	IRJW	192.4	PacifiCorp	KR21813	SG	0.54
6/29/2021	10:25	KRBI	189.7	PacifiCorp	KR21814	SG	0.10[C1, J]
7/12/2021	11:19	UKEP	N/A	ODEQ	UKEP2104	SG	0.34
7/12/2021	11:46	UKHP	N/A	ODEQ	UKHP2104	SG	1.5
7/12/2021	12:04	UKMP	N/A	ODEQ	UKMP2104	SG	1.0
7/12/2021	10:26	KEKP	234	ODEQ	KEKP2104	SG	0.22
7/12/2021	10:08	BRTC	225	ODEQ	BRTC2104	SG	0.19
7/13/2021	15:10	CRMC	201.5	PacifiCorp	KR21815	SG	1.9
7/13/2021	10:50	CRCC	200.0	PacifiCorp	KR21816	SG	30
7/13/2021	12:20	IRCC	192.8	PacifiCorp	KR21817	SG	0.9
7/13/2021	12:30	IRJW	192.4	PacifiCorp	KR21818	SG	0.38
7/13/2021	12:55	KRBI	189.7	PacifiCorp	KR21819	SG	0.15
7/26/2021	11:10	UKEP	N/A	ODEQ	UKEP2105	SG	77
7/26/2021	11:44	UKHP	N/A	ODEQ	UKHP2105	SG	0.5
7/26/2021	12:02	UKMP	N/A	ODEQ	UKMP2105	SG	0.25
7/26/2021	10:19	KEKP	234	ODEQ	KEKP2105	SG	ND
7/26/2021	10:00	BRTC	225	ODEQ	BRTC2105	SG	ND

Table A1 cont.

Date	Time	Site ID	RM	Sampling Entity	Sample ID	Depth (m)	Microcystin (µg/L)
7/27/2021	9:25	CRMC	201.5	PacifiCorp	KR21820	SG	170
7/27/2021	8:00	CRCC	200.0	PacifiCorp	KR21821	SG	37
7/27/2021	7:30	IRCC	192.8	PacifiCorp	KR21822	SG	0.45
7/27/2021	7:10	IRJW	192.4	PacifiCorp	KR21823	SG	0.86
7/27/2021	10:05	KRBI	189.7	PacifiCorp	KR21824	SG	0.26
8/9/2021	11:32	UKEP	N/A	ODEQ	UKEP2106	SG	2.8
8/9/2021	12:21	UKHP	N/A	ODEQ	UKHP2106	SG	0.19
8/9/2021	12:38	UKMP	N/A	ODEQ	UKMP2106	SG	0.92
8/9/2021	10:38	KEKP	234	ODEQ	KEKP2106	SG	ND
8/9/2021	10:13	BRTC	225	ODEQ	BRTC2106	SG	ND
8/XX/2021	XX:XX	CRMC	201.5	PacifiCorp	KR21825	SG	NS
8/XX/2021	XX:XX	CRCC	200.0	PacifiCorp	KR21826	SG	NS
8/10/2021	7:35	IRCC	192.8	PacifiCorp	KR21827	SG	0.30
8/10/2021	7:50	IRJW	192.4	PacifiCorp	KR21828	SG	0.26
8/10/2021	8:05	KRBI	189.7	PacifiCorp	KR21829	SG	0.32
8/23/2021	11:14	UKEP	N/A	ODEQ	UKEP2107	SG	9.2
8/23/2021	11:41	UKHP	N/A	ODEQ	UKHP2107	SG	250
8/23/2021	11:58	UKMP	N/A	ODEQ	UKMP2107	SG	4.0
8/23/2021	10:15	KEKP	234	ODEQ	KEKP2107	SG	0.17
8/23/2021	9:55	BRTC	225	ODEQ	BRTC2107	SG	0.12[C1, J]
8/24/2021	8:10	CRMC	201.5	PacifiCorp	KR21830	SG	900
8/24/2021	9:50	CRCC	200.0	PacifiCorp	KR21831	SG	30
8/24/2021	9:20	IRCC	192.8	PacifiCorp	KR21832	SG	0.34
8/24/2021	9:10	IRJW	192.4	PacifiCorp	KR21833	SG	0.57
8/24/2021	8:50	KRBI	189.7	PacifiCorp	KR21834	SG	0.29
9/7/2021	11:27	UKEP	N/A	ODEQ	UKEP2108	SG	910
9/7/2021	12:01	UKHP	N/A	ODEQ	UKHP2108	SG	440
9/7/2021	12:18	UKMP	N/A	ODEQ	UKMP2108	SG	24
9/7/2021	10:34	KEKP	234	ODEQ	KEKP2108	SG	1.7
9/7/2021	10:13	BRTC	225	ODEQ	BRTC2108	SG	18
9/14/2021	18:00	CRMC	201.5	PacifiCorp	KR21835	SG	4.5
9/14/2021	14:00	CRCC	200.0	PacifiCorp	KR21836	SG	6.2
9/14/2021	15:10	IRCC	192.8	PacifiCorp	KR21837	SG	ND
9/14/2021	15:25	IRJW	192.4	PacifiCorp	KR21838	SG	0.19
9/14/2021	15:45	KRBI	189.7	PacifiCorp	KR21839	SG	0.16
9/21/2021	11:10	UKEP	N/A	ODEQ	UKEP2109	SG	120
9/21/2021	11:37	UKHP	N/A	ODEQ	UKHP2109	SG	87
9/21/2021	11:54	UKMP	N/A	ODEQ	UKMP2109	SG	11[C1, J]
9/21/2021	10:14	KEKP	234	ODEQ	KEKP2109	SG	6.5
9/21/2021	09:55	BRTC	225	ODEQ	BRTC2109	SG	0.72
9/28/2021	08:30	CRMC	201.5	PacifiCorp	KR21840	SG	0.21
9/28/2021	09:15	CRCC	200.0	PacifiCorp	KR21841	SG	2.8
9/28/2021	09:40	IRCC	192.8	PacifiCorp	KR21842	SG	0.43
9/28/2021	10:00	IRJW	192.4	PacifiCorp	KR21843	SG	2.5
9/28/2021	10:15	KRBI	189.7	PacifiCorp	KR21844	SG	ND
10/10/2021	10:44	UKEP	N/A	ODEQ	UKEP21010	SG	0.17
10/10/2021	11:04	UKHP	N/A	ODEQ	UKHP21010	SG	81
10/10/2021	11:26	UKMP	N/A	ODEQ	UKMP21010	SG	0.94
10/10/2021	10:00	KEKP	234	ODEQ	KEKP21010	SG	0.38
10/10/2021	09:42	BRTC	225	ODEQ	BRTC21010	SG	0.60

Table A1 cont.

Date	Time	Site ID	RM	Sampling Entity	Sample ID	Depth (m)	Microcystin (µg/L)
10/12/2021	08:40	CRMC	201.5	PacifiCorp	KR21845	SG	ND
10/12/2021	15:05	CRCC	200.0	PacifiCorp	KR21846	SG	ND
10/12/2021	16:15	IRCC	192.8	PacifiCorp	KR21847	SG	0.11[C1, J]
10/12/2021	12:45	IRJW	192.4	PacifiCorp	KR21848	SG	0.16
10/12/2021	16:40	KRBI	189.7	PacifiCorp	KR21849	SG	ND
10/19/2021	11:30	UKEP	N/A	ODEQ	UKEP21011	SG	1.3
10/19/2021	11:53	UKHP	N/A	ODEQ	UKHP21011	SG	0.33
10/19/2021	12:10	UKMP	N/A	ODEQ	UKMP21011	SG	0.12[C1, J]
10/19/2021	10:18	KEKP	234	ODEQ	KEKP21011	SG	0.11[C1, J]
10/19/2021	09:44	BRTC	225	ODEQ	BRTC21011	SG	0.14[C1, J]
10/26/2021	10:00	CRMC	201.5	PacifiCorp	KR21850	SG	0.12[C1, J]
10/26/2021	08:55	CRCC	200.0	PacifiCorp	KR21851	SG	0.11[C1, J]
10/26/2021	08:15	IRCC	192.8	PacifiCorp	KR21852	SG	0.12[C1, J]
10/26/2021	07:55	IRJW	192.4	PacifiCorp	KR21853	SG	0.10[C1, J]
10/26/2021	10:45	KRBI	189.7	PacifiCorp	KR21854	SG	ND
11/08/2021	12:12	UKEP	N/A	ODEQ	UKEP21012	SG	0.14[C1, J]
11/08/2021	12:35	UKHP	N/A	ODEQ	UKHP21012	SG	7.1
11/08/2021	12:53	UKMP	N/A	ODEQ	UKMP21012	SG	ND
11/08/2021	11:03	KEKP	234	ODEQ	KEKP21012	SG	ND
11/08/2021	10:25	BRTC	225	ODEQ	BRTC21012	SG	ND
11/14/2021	14:30	CRMC	201.5	PacifiCorp	KR21855	SG	ND
11/14/2021	15:40	CRCC	200.0	PacifiCorp	KR21856	SG	ND
11/14/2021	16:15	IRCC	192.8	PacifiCorp	KR21857	SG	ND
11/14/2021	16:40	IRJW	192.4	PacifiCorp	KR21858	SG	ND
11/14/2021	17:15	KRBI	189.7	PacifiCorp	KR21859	SG	ND
11/15/2021	11:46	UKEP	N/A	ODEQ	UKEP21013	SG	ND
11/15/2021	12:11	UKHP	N/A	ODEQ	UKHP21013	SG	ND
11/15/2021	12:30	UKMP	N/A	ODEQ	UKMP21013	SG	ND
11/15/2021	10:36	KEKP	234	ODEQ	KEKP21013	SG	ND
11/15/2021	10:00	BRTC	225	ODEQ	BRTC21013	SG	ND
12/14/2021	08:55	CRMC	201.5	PacifiCorp	KR21860	SG	ND
12/14/2021	15:15	CRCC	200.0	PacifiCorp	KR21861	SG	ND
12/14/2021	16:15	IRCC	192.8	PacifiCorp	KR21862	SG	ND
12/14/2021	16:30	IRJW	192.4	PacifiCorp	KR21863	SG	ND
12/14/2021	16:50	KRBI	189.7	PacifiCorp	KR21864	SG	ND

"ND" value indicates a result less than the laboratory analytical detection limit (0.1 µg/L)
"C1" indicates the reported concentration for this analyte is below the quantitation limit.
"J" indicates the reported result for this analyte should be considered an estimated value.
“NS” indicates Not Sampled.

Appendix 2
Microcystin Data for 2021 Baseline Samples

Table A2-1. Summary of 2021 baseline laboratory microcystin results for samples collected in Oregon.

Date	Time	Site ID	RM	Sampling Entity	Sample ID	Depth (m)	Microcystin (µg/L)
5/12/2021	08:25	KR21950	219.5	PacifiCorp	KR21038	0.5	ND
5/12/2021	07:45	KR22460	224.6	PacifiCorp	KR21037	0.5	ND
5/12/2021	09:30	KR23340	233.4	PacifiCorp	KR21039	0.5	ND
5/12/2021	10:25	KR24600	246	PacifiCorp	KR21040	0.5	ND
6/9/2021	11:55	KR21950	219.5	PacifiCorp	KR21064	0.5	ND
6/9/2021	11:00	KR22460	224.6	PacifiCorp	KR21063	0.5	ND
6/9/2021	12:50	KR23340	233.4	PacifiCorp	KR21065	0.5	ND
6/9/2021	13:35	KR24600	246	PacifiCorp	KR21066	0.5	ND
7/12/2021	18:10	KR21950	219.5	PacifiCorp	KR21092	0.5	0.14[C1, J]
7/12/2021	17:30	KR22460	224.6	PacifiCorp	KR21091	0.5	0.15
7/12/2021	16:50	KR23340	233.4	PacifiCorp	KR21093	0.5	0.17
7/12/2021	14:35	KR25411	254.4	PacifiCorp	KR21090	0.5	0.24
7/12/2021	14:50	KR25411	254.4	PacifiCorp	KR21097	0.5	0.24
7/12/2021	16:00	KR24600	246	PacifiCorp	KR21094	0.5	0.25
7/26/2021	13:30	KR25411	254.4	PacifiCorp	KR21099	0.5	0.28
7/26/2021	13:50	KR25411	254.4	PacifiCorp	KR21103	0.5	0.20
8/9/2021	18:05	KR21950	219.5	PacifiCorp	KR21120	0.5	ND
8/9/2021	17:15	KR22460	224.6	PacifiCorp	KR21119	0.5	ND
8/9/2021	16:35	KR23340	233.4	PacifiCorp	KR21121	0.5	ND
8/9/2021	15:40	KR24600	246	PacifiCorp	KR21122	0.5	ND
8/9/2021	14:20	KR25411	254.4	PacifiCorp	KR21118	0.5	0.11[C1, J]
8/9/2021	14:30	KR25411	254.4	PacifiCorp	KR21125	0.5	0.12[C1, J]
8/23/2021	11:35	KR25411	254.4	PacifiCorp	KR21127	0.5	0.61
8/23/2021	12:10	KR25411	254.4	PacifiCorp	KR21131	0.5	0.26
9/13/2021	17:55	KR21950	219.5	PacifiCorp	KR21148	0.5	0.77
9/13/2021	17:15	KR22460	224.6	PacifiCorp	KR21147	0.5	0.96
9/13/2021	16:35	KR23340	233.4	PacifiCorp	KR21149	0.5	1.7
9/13/2021	15:40	KR24600	246	PacifiCorp	KR21150	0.5	1.2
9/13/2021	14:20	KR25411	254.4	PacifiCorp	KR21146	0.5	0.88
9/13/2021	15:00	KR25411	254.4	PacifiCorp	KR21153	0.5	1.5
9/27/2021	14:40	KR25411	254.4	PacifiCorp	KR21155	0.5	0.90
9/27/2021	14:50	KR25411	254.4	PacifiCorp	KR21159	0.5	0.71
10/11/2021	18:50	KR21950	219.5	PacifiCorp	KR21176	0.5	ND
10/11/2021	18:15	KR22460	224.6	PacifiCorp	KR21175	0.5	ND
10/11/2021	17:25	KR23340	233.4	PacifiCorp	KR21177	0.5	ND
10/11/2021	16:20	KR24600	246	PacifiCorp	KR21178	0.5	0.11[C1, J]
10/11/2021	14:45	KR25411	254.4	PacifiCorp	KR21174	0.5	0.25
10/11/2021	15:05	KR25411	254.4	PacifiCorp	KR21181	0.5	0.19
10/25/2021	14:30	KR25411	254.4	PacifiCorp	KR21182	0.5	0.12[C1, J]
10/25/2021	14:40	KR25411	254.4	PacifiCorp	KR21185	0.5	0.15

"ND" value indicates a result less than the laboratory analytical detection limit (0.1 µg/L)
"C1" indicates the reported concentration for this analyte is below the quantitation limit.
"J" indicates the reported result for this analyte should be considered an estimated value.

Table A2-2. Summary of 2021 baseline laboratory microcystin results for samples collected in California.

Date	Time	Site ID	RM	Sampling Entity	Sample ID	Depth (m)	Microcystin (µg/L)
5/11/2021	10:15	KR19019	190.1	PacifiCorp	KR21023	0.5	ND
5/11/2021	10:30	KR19019	190.1	PacifiCorp	KR21024	0-8	ND
5/11/2021	12:25	KR19645	196.4	PacifiCorp	KR21027	0.5	ND
5/11/2021	13:15	KR19874	198.7	PacifiCorp	KR21028	0.5	ND
5/11/2021	13:35	KR19874	198.7	PacifiCorp	KR21029	0-8	ND
5/11/2021	17:20	KR20642	206.4	PacifiCorp	KR21032	0.5	ND
6/8/2021	10:30	KR19019	190.1	PacifiCorp	KR21049	0.5	ND
6/8/2021	10:55	KR19019	190.1	PacifiCorp	KR21050	0-8	ND
6/8/2021	14:55	KR19645	196.4	PacifiCorp	KR21053	0.5	ND
6/8/2021	12:55	KR19874	198.7	PacifiCorp	KR21054	0.5	ND
6/8/2021	13:20	KR19874	198.7	PacifiCorp	KR21055	0-8	ND
6/8/2021	17:55	KR20642	206.4	PacifiCorp	KR21058	0.5	ND
7/13/2021	13:00	KR18973	189.7	PacifiCorp	KR21076	0.5	0.11[C1, J]
7/13/2021	13:30	KR18973	189.7	PacifiCorp	KR21089	0.5	0.13[C1, J]
7/13/2021	7:15	KR19019	190.1	PacifiCorp	KR21077	0.5	0.33
7/13/2021	7:40	KR19019	190.1	PacifiCorp	KR21078	0-8	0.41
7/13/2021	11:35	KR19645	196.4	PacifiCorp	KR21081	0.5	1.8
7/13/2021	9:35	KR19874	198.7	PacifiCorp	KR21082	0.5	3.3
7/13/2021	9:55	KR19874	198.7	PacifiCorp	KR21083	0-8	2.4
7/13/2021	14:40	KR20642	206.4	PacifiCorp	KR21086	0.5	ND
8/XX/2021	XX:XX	KR18973	189.7	PacifiCorp	KR21104	0.5	NS
8/XX/2021	XX:XX	KR18973	189.7	PacifiCorp	KR21117	0.5	NS
8/XX/2021	XX:XX	KR19019	190.1	PacifiCorp	KR21105	0.5	NS
8/XX/2021	XX:XX	KR19019	190.1	PacifiCorp	KR21106	0-8	NS
8/XX/2021	XX:XX	KR19645	196.4	PacifiCorp	KR21109	0.5	NS
8/XX/2021	XX:XX	KR19874	198.7	PacifiCorp	KR21110	0.5	NS
8/XX/2021	XX:XX	KR19874	198.7	PacifiCorp	KR21111	0-8	NS
8/XX/2021	XX:XX	KR20642	206.4	PacifiCorp	KR21114	0.5	NS
9/14/2021	15:50	KR18973	189.7	PacifiCorp	KR21132	0.5	0.16
9/14/2021	16:25	KR18973	189.7	PacifiCorp	KR21145	0.5	0.10[C1, J]
9/14/2021	09:55	KR19019	190.1	PacifiCorp	KR21133	0.5	0.35
9/14/2021	10:20	KR19019	190.1	PacifiCorp	KR21134	0-8	0.22
9/14/2021	14:40	KR19645	196.4	PacifiCorp	KR21137	0.5	0.46
9/14/2021	12:45	KR19874	198.7	PacifiCorp	KR21138	0.5	2.7
9/14/2021	13:05	KR19874	198.7	PacifiCorp	KR21139	0-8	0.44
9/14/2021	17:30	KR20642	206.4	PacifiCorp	KR21142	0.5	0.31
10/12/2021	16:50	KR18973	189.7	PacifiCorp	KR21160	0.5	ND
10/12/2021	16:55	KR18973	189.7	PacifiCorp	KR21173	0.5	ND
10/12/2021	10:35	KR19019	190.1	PacifiCorp	KR21161	0.5	0.10[C1, J]
10/12/2021	11:00	KR19019	190.1	PacifiCorp	KR21162	0-8	0.10[C1, J]
10/12/2021	15:40	KR19645	196.4	PacifiCorp	KR21165	0.5	ND
10/12/2021	13:50	KR19874	198.7	PacifiCorp	KR21166	0.5	ND
10/12/2021	14:10	KR19874	198.7	PacifiCorp	KR21167	0-8	ND
10/12/2021	08:00	KR20642	206.4	PacifiCorp	KR21170	0.5	ND

"ND" value indicates a result less than the laboratory analytical detection limit (0.1 µg/L)
"C1" indicates the reported concentration for this analyte is below the quantitation limit.
"J" indicates the reported result for this analyte should be considered an estimated value.
"NS" indicates Not Sampled.