Technical Memorandum

Microcystin Bioaccumulation in Klamath River Fish and Freshwater Mussel Tissue: Preliminary 2007 Results



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Although the presence of *Microcystis aeruginosa* and the hepatotoxin toxin microcystin is well established in the Klamath River system (e.g., Kann and Corum 2006 and 2007), only minimal data collection efforts regarding bioaccumulation of this cyanotoxin have previously been reported. For example, trace concentrations of microcystin were found in Klamath River steelhead livers in 2005 (Fetcho 2006). The following memorandum provides a preliminary presentation of microcystin tissue analyses performed by the California Department of Fish and Game, under contract to the State Water Resources Control Board (SWRCB) on Klamath River fish and freshwater mussels in 2007; these analyses were funded through a grant to the SWRCB from US EPA Region 9. The SWRCB provided the results (shown in Appendix I) to the Karuk Tribe. Fish samples were collected by the California Department of Fish and Game (CDFG) and freshwater mussel samples were provided by the Karuk Tribe. All tissue samples were extracted and analyzed for microcystin by the CDFG Fish and Wildlife Water Pollution Control Laboratory in Rancho Cordova, CA using LC/MS/MS methodology (see Appendix I for detection limits and QA description).

Microcystin analyses were performed on composite (consisting of 6 yearling fall Chinook) liver, stomach, and fillet samples collected from the Iron Gate Hatchery on July 13th, a composite mussel sample (analyzed in triplicate and comprised of 13 whole *Gonidea angulata*) collected from the Klamath River in the Seiad Valley area on July 20th (note that the lab report in Appendix I incorrectly identifies the composite mussel sample as being from Copco Reservoir); individual Klamath River mussel samples collected on July 20th, July 24th, and November 5-6th; and yellow perch (both individual fillets and liver composites) collected from Copco and Iron Gate Reservoirs on September 6-7th (Table 1). A variety of known microcystin (MCYST) congeners were analyzed, including MCYST-RR, -LR, -YR, -LA, -LW, -LF, and the demethylated analogues of –RR, and –LR denoted RR-DM and LR-DM (results reported in ng/g fresh weight or ppb; Table 1).

Microcystin Tissue Data

Results for tissue concentration of various MCYST congeners showed some level of bioaccumulation in the majority (85%) of samples tested in July and September (Table 1). The lack of MCYST detection in any of the mussels collected in November (Table 1), along with survey data showing that Mi*crocystis* and microcystin had declined substantially by late October (Kann 2007), indicates that depuration (clearing of toxin) occurred (Table 1). Differential uptake of the MCYST congeners occurred both between organisms (fish *vs.* freshwater mussels) and between fish liver *vs.* fish fillets (Figure 1). Of the tissue types from IG Hatchery, only the liver composite showed a detectable MCYST level with 301 ng/g of MCYST-LA (Table 1; Figure 1). Freshwater mussel composites and individual whole mussels showed elevated concentrations of

MCYST-RR, MCYST-LR MCYST-LR-DM, and MCYST-LA, with MCYST-LR and –LA being the most dominant congeners (Figure 1). Yellow perch fillets were dominated by the demethylated version of MCYST-LR (MCYST-LR-DM) with MCYST-YR also detected (Figure 1). In contrast, yellow perch livers showed concentrations of both demethylated –LR and –RR, as well as MCYST-LA (Figure 1). Such differential organ/tissue distribution among MCYST congeners has been shown in other studies (Xie et al. 2005; Dietrich et al. 2007) and is likely due to a combination of differential degradation and transport of congeners (Xie et al. 2004).

Analysis with Respect to Public Health Guideline Values

Although the MCYST concentrations in fish livers from both IG Hatchery and yellow perch from Copco and IG reservoirs (Figure 1) may have negative sublethal effects on survival, growth, and population development of those fish (e.g., Ibelings and Havens 2007), because the livers are generally removed prior to human consumption, this section will focus only on perch fillets from the reservoirs and mussels from the Klamath River which are generally eaten whole. Thus, although the main site of MCYST accumulation in mussels may be the hepatopancreas (e.g., Chen and Xie 2005), measured concentrations in Table 1 reflect exposure expected from ingestion of whole mussels.

The following comparison of Klamath River microcystin tissue concentrations to public health guideline values is based on a recent comprehensive review of cyanobacterial toxin accumulation by Ibelings and Chorus (2007). Table 2 from Ibelings and Chorus (2007) entitled *"Tolerable doses to microcystin-LR in relation to frequency and duration of exposure"* is reproduced here:

Temporal pattern of exposure and ensuing Tolerable Intake (TI)	Assumptions	Tolerable Intake per kg	Tolerable Intake for a 10 kg child	Tolerable Intake for a 75 kg adult	Guideline <u>for food</u> AF = 1	e value ($\mu g k g^{-1}$) AF = 0.2
Acute TI	NOAEL ¹ of 250 µg/kg and day, extrapolation factors of 100	2.5 µg per kg and single exposure	25 μg per single exposure	190 μg per single exposure	Adult: 1900, Child: 250	Adult: 380, Child: 50
Seasonal TDI	NOAEL of 0.4 µg/kg and day, extrapolation factors of 100 (Chorus and Bartram, 1999, adapted)	0.4 μg per kg and day	4 μg per day	30 µg per day	Adult: 300, Child: 40	Adult: 60, Child: 8
Lifetime TDI	NOAEL of 0.4 µg/kg and day, extrapolation factors of 100 and uncertainty factor of 10 (Chorus and Bartram, 1999)	0.04 μg per kg and day	0.4 μg per day	3 μg per day	Adult: 30, Child: 4.0^2	Adult: 6, Child: 0.8 ²

Tolerable doses in seafood related to the frequency and duration of the exposure. A distinction is made between intake by small children and adults, and a further distinction between an Allocation Factor (AF) of 1 (toxins present in food only) and – following the derivation of the provisional WHO GV for Drinking-water – an AF of 0.2 (80% of the dose is taken in—mainly—via drinking water, only 20% via food). For calculating guideline values, following eq. (2) in Section <u>3</u> a consumption (C) of 100 g fish (per day) is assumed. Acute TI: single exposure event (e.g. week-end fishing trip). Seasonal TDI: ongoing, "daily" exposure for several weeks during the cyanobacterial season. Lifetime TDI: ongoing "daily" exposure for many months in settings where microcystin-producing cyanobacteria proliferate perennially. ¹NOAEL= no observed adverse effect level. ²Original values in Ibelings and Chorus contained a typo and were listed incorrectly as 0.4 and 0.08 μ g/kg; correct values are as shown above.

Although at least 80 different MCYST congeners are known to date, risk assessment determinations such as those in the above table are based largely on MCYST-LR (Dietrich et al. 2007; Ibelings and Chorus 2007), and as noted by Ibelings and Havens (2007) more research is needed on toxic effects of MCYST congeners other than MCYST-LR. However, as reviewed in Sivonen and Jones (1999), most of the known congeners are highly toxic within a comparatively narrow range, and as Dietrich et al. (2007) note, current risk extrapolation from rodents as well as synergistic or antagonistic effects of the various MCYST congeners may cause underestimation of overall potential risk to humans.

Höger (2003) provides an LD₅₀ range of 50-300 μ g/kg (i.p. mouse) for a demethylated –LR variant (D-Asp3) and both Höger (2003) and Sivonen and Jones (1999) show that both MCYST-LR and MCYST-LA have LD_{50's} of 50 μ g/kg. Other MCYST congeners detected in tissue of Klamath River organisms have been shown to have higher LD₅₀ values than does MCYST-LR (meaning they are less toxic). For example, MCYST-RR has an LD₅₀ of 600 μ g/kg, while a demethylated-RR variant had an LD₅₀ of 250 μ g/kg (Sivonen and Jones 1999), and are therefore not directly comparable to guideline values in Table 2 from Ibelings and Chorus (2007). It should be noted however, that MCYST-YR was present in 41% of yellow perch fillets at values exceeding 2 ng/g (Figure 1) and that the LD₅₀ of 70 μ g/kg for MCYST-YR is only slightly higher than the MCYST-LR LD₅₀ of 50 μ g/kg (Sivonen and Jones 1999).

Variability in MCYST congener toxicity notwithstanding, evaluation of the three variants (-LR, LR-DM, and -LA) that have similar LD₅₀ values (using the lower range for demethylated -LR) provides for the best comparison to the guideline values derived by Ibelings and Chorus (2007) that are based on toxicity work for MCYST-LR. It should be noted that this approach likely underestimates toxicity due to the exclusion of several of the congeners. Although a more conservative approach with respect to public health would be to use the sum of all MCYST congeners, for the comparison below individual concentrations as well as the sum of MCYST-LR, LR-DM, and -LA were evaluated.

For the following comparisons to Ibelings and Chorus (2007) it is assumed that the only exposure is through ingestion; therefore guideline values were evaluated for Allocation Factor=1 (see reproduced Table 2 above for AF description as well as assumptions regarding frequency and quantity of tissue consumed). Concentration of the three MCYST congeners in freshwater mussels collected in July shows that MCYST-LR and MCYST-LA levels exceeded all three guideline TDI levels for children (Lifetime, Seasonal, and Acute), and that the concentration of MCYST-LR-DM often exceeded the Lifetime TDI guideline level (Figure 2). For yellow perch fillets, only MCYST-LR-DM exceeded the various TDI values, with a majority of samples exceeding the Seasonal TDI (Figure 2). The sum of MCYST-LR, LR-DM, and -LA in mussels exceeded the Lifetime TDI guideline for children by 8 to 663x, the Seasonal TDI by 0.8 to 66x, and the Acute TDI by 0.1 to 10.6x (including a sample at Big Bar approximately 140 miles downstream of Iron Gate Dam that was over 2x the acute TDI threshold; Figure 3a; Table 2). For yellow perch filets, 66% of the samples were greater than 10x (up to 100x) the Lifetime TDI and 1-10x greater than the seasonal TDI, with several samples exceeding the Acute TDI (Figure 3a; Table 2). In addition, numerous exceedances of the adult Lifetime TDI were also observed for both mussels and yellow perch fillets, as well as several exceedances of both Seasonal and Acute TDI levels (Figure 3b; Table 2).

Summary

Tissue concentration results for various MCYST congeners showed some level of bioaccumulation in the majority (85%) of samples tested in July and September. Differential uptake of the MCYST congeners occurred both between organisms (fish *vs.* freshwater mussels) and between fish liver *vs.* fish fillets (fish muscle tissue). Evaluation of bioaccumulation in yellow perch fillets and freshwater mussels with respect to public health guidelines indicates that all TDI guideline levels as defined by Ibelings and Chorus (2007) were exceeded to varying degrees in tested Klamath River organisms, including several observations of values exceeding Acute TDI thresholds. Current public health advisories for toxic cyanobacteria in the Klamath River system are primarily for recreational contact and do not warn against ingestion of fish or freshwater mussels. In light of these bioaccumulation data, public health advisories should include warnings for ingestion of fish and freshwater mussels.

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Lab		Date Colle			MCYST-	MCYST-	MCYST-		MCYST-	MCYST-	MCYST-	MCYST-	TOTAL-
Sample-Id	Location	cted	Organism	Туре	RR (ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)
L-463-07-1	IG Hatchery	7/13	fish_liver	composite	ND	ND	ND	ND	ND	301.00	ND	ND	301.00
L-463-07-2	IG Hatchery	7/13	fish_stoma ch	composite	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-463-07-3	IG Hatchery	7/13	fish_fillet	composite	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-475-07-13	KR	7/20	mussel	composite	ND	ND	ND	ND	ND	57.00	ND	ND	57.00
L-475-07-13Dup	KR	7/20	mussel	composite	ND	ND	ND	ND	ND	32.30	ND	ND	32.30
L-475-07-13Trip	KR	7/20	mussel	composite	ND	ND	ND	ND	ND	34.20	ND	ND	34.20
L-405-07-1	KR near I5	7/11	mussel	individual	136.00	ND	396.00	36.60	ND	2220.00	ND	14.50	2803.10
L-405-07-2	KR near Seiad	7/20	mussel	individual	5.09	ND	90.90	5.55	ND	311.00	ND	ND	412.54
L-405-07-2Dup	KR near Seiad	7/20	mussel	individual	6.17	ND	91.40	5.78	ND	280.00	ND	ND	383.35
L-405-07-3A	KR at Big Bar	7/24	mussel	individual	ND	ND	68.40	6.05	ND	432.00	ND	ND	506.45
L-405-07-3B	KR at Big Bar	7/24	mussel	individual	ND	ND	58.10	5.10	ND	138.00	ND	ND	201.20
L-524-07-1	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-2	IronGate	9/6	perch-fillet	individual	ND	ND	ND	63.69	ND	ND	ND	ND	63.69
L-524-07-3	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.23	ND	ND	ND	2.23
L-524-07-4	IronGate	9/6	perch-fillet	individual	ND	ND	ND	57.03	2.01	ND	ND	ND	59.04
L-524-07-5	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	3.09	ND	ND	ND	3.09
L-524-07-6	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.27	ND	ND	ND	2.27
L-524-07-7	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.54	ND	ND	ND	2.54
L-524-07-7Dup	IronGate	9/6 perch-fillet 9/6 perch-fillet		individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-8	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	3.01	ND	ND	ND	3.01
L-524-07-9	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.02	ND	ND	ND	2.02
L-524-07-10	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.68	ND	ND	ND	2.68
L-524-07-11	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.18	ND	ND	ND	2.18
L-524-07-12	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-13	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-14	IronGate	9/6	perch-fillet	individual	ND	ND	ND	227.14	2.23	ND	ND	ND	229.37
L-524-07-15	IronGate	9/6	perch-fillet	individual	ND	ND	ND	106.40	ND	ND	ND	ND	106.40
L-524-07-16	IronGate	9/6	perch-fillet	individual	ND	ND	ND	73.01	ND	ND	ND	ND	73.01
L-524-07-17	IronGate	9/6	perch-fillet	individual	ND	ND	ND	79.79	2.24	ND	ND	ND	82.03
L-524-07-18	IronGate	9/6	perch-fillet	individual	ND	ND	ND	153.10	4.23	ND	ND	ND	157.33

Table 1. Concentration of microcystin (MCYST) congeners in fish (liver and fillets) and whole freshwater mussel samples from the Klamath River in 2007.

Lab		Date				MCYST-	MCYST-	MCYST-	MCYST-	MCYST-	MCYST-	MCYST-	TOTAL-
Sample-Id	Location	cted	Organism	Type	MCYST- RR (na/a)	RR-DM (na/a)	LR (na/a)	LR-DM (ng/g)	YR (na/a)	LA (na/a)	LW (na/a)	LF (na/a)	MCYST (na/a)
L-524-07-19	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	77.67	ND	ND	ND	ND	77.67
L-524-07-20	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	95.17	2.17	ND	ND	ND	97.34
L-524-07-21	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	82.09	ND	ND	ND	ND	82.09
L-524-07-22	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	58.42	3.16	ND	ND	ND	61.59
L-524-07-23	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	181.03	2.47	ND	ND	ND	183.49
L-524-07-24	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	171.03	ND	ND	ND	ND	171.03
L-524-07-25	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	78.82	2.12	ND	ND	ND	80.94
L-524-07-26	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	147.28	ND	ND	ND	ND	147.28
L-524-07-27	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	349.87	ND	ND	ND	ND	349.87
L-524-07-28	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	404.89	ND	ND	ND	ND	404.89
L-524-07-29	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	422.13	ND	ND	ND	ND	422.13
L-524-07-30	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	240.21	ND	ND	ND	ND	240.21
L-524-07-31	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	181.21	ND	ND	ND	ND	181.21
L-524-07-32	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	251.05	ND	ND	ND	ND	251.05
L-524-07-33	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	124.91	ND	ND	ND	ND	124.91
L-524-07-33Dup	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	140.98	ND	ND	ND	ND	140.98
L-524-07-34	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	100.98	ND	ND	ND	ND	100.98
L-524-07-35	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-36	Сорсо	9/7	perch-fillet	individual	ND	ND	ND	86.30	ND	ND	ND	ND	86.30
L-524-07-37	IronGate	9/7	perch-liver	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-38	IronGate	9/7	perch-liver	individual	ND	37.40	ND	ND	ND	12.66	ND	ND	50.06
L-524-07-39	IronGate	9/7	perch-liver	individual	15.69	42.16	ND	ND	ND	12.71	ND	ND	70.57
L-524-07-40	Сорсо	9/7	perch-liver	individual	ND	25.01	ND	137.95	ND	14.67	ND	ND	177.63
L-524-07-41	Сорсо	9/7	perch-liver	individual	ND	33.55	ND	426.16	ND	13.68	ND	ND	473.39
L-524-07-42	Сорсо	9/7	perch-liver	individual	ND	61.64	ND	159.04	ND	7.88	ND	ND	228.55
L-665-07-01	KR at China Flat	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-02	KR at China Flat	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-03	KR at China Flat	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-04	KR at Br. Bear	Krat China Plat 11/3 Induser Induidual KR at Br. Bear 11/5 mussel individual		ND	ND	ND	ND	ND	ND	ND	ND	ND	
L-665-07-05	KR at Br. Bear	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Lab		Date Colle			MCYST-	MCYST- RR-DM	MCYST-	MCYST-	MCYST- YR	MCYST-	MCYST-	MCYST-	TOTAL- MCYST
Sample-Id	Location	cted	Organism	Туре	RR (ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)	(ng/g)		(ng/g)
L-665-07-06	KR at Br. Bear	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-07	KR at Seiad V.	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-08	KR at Seiad V.	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-09	KR at Seiad V.	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-10	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-11	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-11Dup	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-12	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-13	KR at Orleans	11/6	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-14	KR at Orleans	11/6	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-15	KR at Orleans	11/6	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND



Figure 1. Concentration of microcystin congeners (ng/g or ppb) in fish (liver and fillet) and whole freshwater mussel samples from the Klamath River system in 2007.



Figure 2. Concentration of microcystin-LR, LR-DM, and LA (ng/g or ppb) in whole freshwater mussels and yellow perch fillets collected from the Klamath River system in 2007. TDI values are as described in Ibelings and Chorus (2007; Table 2 reproduced above).



Figure 3. Exceedance of Child (a) and Adult (b) Lifetime, Seasonal, and Acute TDI for the sum of microcystin-LR, LR-DM, and LA in whole freshwater mussels and yellow perch fillets collected from the Klamath River system in 2007. TDI values are as described in Ibelings and Chorus (2007; Table 2 reproduced above).

Table 2. Exceedance of Child and Adult Lifetime, Seasonal, and Acute TDI's for the sum of microcystin-LR, LR-DM, and LA in whole freshwater mussels and yellow perch fillets collected from the Klamath River system in 2007. TDI values are as described in Ibelings and Chorus (2007; Table 2 reproduced above). Note that concentration values in Ibelings and Chorus (2007) Table 2 are in µg/kg which is equivalent to the ng/g or ppb reported by the CDFD Fish and Wildlife Water Pollution Control Laboratory (see Appendix I).

	•			1 1 1				Compu	uted for total o	for total of LA+LR+LR_DM				
Sample-Id	Location	Date Collected	Organism	Туре	Total MCYST	Total LA+LR+LR _DM	x greater than lifetime TDI for child	x greater than seasonal TDI for child	x greater than acute TDI for child	x greater than lifetime TDI for adult	x greater than seasonal TDI for adult	x greater than acute TDI for adult		
L-475-07-13	KR	7/20/2007	mussel	composite	57.00	57.00	14.25	1.43	0.23	1.90	0.19	0.03		
L-475-07-13Dup	KR	7/20/2007	mussel	composite	32.30	32.30	8.08	0.81	0.13	1.08	0.11	0.02		
L-475-07-13Trip	KR	7/20/2007	mussel	composite	34.20	34.20	8.55	0.86	0.14	1.14	0.11	0.02		
L-405-07-1	KR near I5	7/11/2007	mussel	individual	2803.10	2652.60	663.15	66.32	10.61	88.42	8.84	1.40		
L-405-07-2	KR near Seiad	7/20/2007	mussel	individual	412.54	407.45	101.86	10.19	1.63	13.58	1.36	0.21		
L-405-07-2Dup	KR near Seiad	7/20/2007	mussel	individual	383.35	377.18	94.30	9.43	1.51	12.57	1.26	0.20		
L-405-07-3A	KR at Big Bar	7/24/2007	mussel	individual	506.45	506.45	126.61	12.66	2.03	16.88	1.69	0.27		
L-405-07-3B	KR at Big Bar	7/24/2007	mussel	individual	201.20	201.20	50.30	5.03	0.80	6.71	0.67	0.11		
L-524-07-1	IronGate	9/6/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-2	IronGate	9/6/2007	perch fillet	individual	63.69	63.69	15.92	1.59	0.25	2.12	0.21	0.03		
L-524-07-3	IronGate	9/6/2007	perch fillet	individual	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-4	IronGate	9/6/2007	perch fillet	individual	59.04	57.03	14.26	1.43	0.23	1.90	0.19	0.03		
L-524-07-5	IronGate	9/6/2007	perch fillet	individual	3.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-6	IronGate	9/6/2007	perch fillet	individual	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-7	IronGate	9/6/2007	perch fillet	individual	2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-7Dup	IronGate	9/6/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-8	IronGate	9/6/2007	perch fillet	individual	3.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-9	IronGate	9/6/2007	perch fillet	individual	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-10	IronGate	9/6/2007	perch fillet	individual	2.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
L-524-07-11	IronGate	9/6/2007	perch fillet	individual	2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

							OM					
Sample-Id	Location	Date Collected	Organism	Туре	Total MCYST	Total LA+LR+LR _DM	x greater than lifetime TDI for child	x greater than seasonal TDI for child	x greater than acute TDI for child	x greater than lifetime TDI for adult	x greater than seasonal TDI for adult	x greater than acute TDI for adult
L-524-07-12	IronGate	9/6/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-524-07-13	IronGate	9/6/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-524-07-14	IronGate	9/6/2007	perch fillet	individual	229.37	227.14	56.79	5.68	0.91	7.57	0.76	0.12
L-524-07-15	IronGate	9/6/2007	perch fillet	individual	106.40	106.40	26.60	2.66	0.43	3.55	0.35	0.06
L-524-07-16	IronGate	9/6/2007	perch fillet	individual	73.01	73.01	18.25	1.83	0.29	2.43	0.24	0.04
L-524-07-17	IronGate	9/6/2007	perch fillet	individual	82.03	79.79	19.95	1.99	0.32	2.66	0.27	0.04
L-524-07-18	IronGate	9/6/2007	perch fillet	individual	157.33	153.10	38.27	3.83	0.61	5.10	0.51	0.08
L-524-07-19	Сорсо	9/7/2007	perch fillet	individual	77.67	77.67	19.42	1.94	0.31	2.59	0.26	0.04
L-524-07-20	Сорсо	9/7/2007	perch fillet	individual	97.34	95.17	23.79	2.38	0.38	3.17	0.32	0.05
L-524-07-21	Сорсо	9/7/2007	perch fillet	individual	82.09	82.09	20.52	2.05	0.33	2.74	0.27	0.04
L-524-07-22	Сорсо	9/7/2007	perch fillet	individual	61.59	58.42	14.61	1.46	0.23	1.95	0.19	0.03
L-524-07-23	Сорсо	9/7/2007	perch fillet	individual	183.49	181.03	45.26	4.53	0.72	6.03	0.60	0.10
L-524-07-24	Сорсо	9/7/2007	perch fillet	individual	171.03	171.03	42.76	4.28	0.68	5.70	0.57	0.09
L-524-07-25	Сорсо	9/7/2007	perch fillet	individual	80.94	78.82	19.70	1.97	0.32	2.63	0.26	0.04
L-524-07-26	Сорсо	9/7/2007	perch fillet	individual	147.28	147.28	36.82	3.68	0.59	4.91	0.49	0.08
L-524-07-27	Сорсо	9/7/2007	perch fillet	individual	349.87	349.87	87.47	8.75	1.40	11.66	1.17	0.18
L-524-07-28	Сорсо	9/7/2007	perch fillet	individual	404.89	404.89	101.22	10.12	1.62	13.50	1.35	0.21
L-524-07-29	Сорсо	9/7/2007	perch fillet	individual	422.13	422.13	105.53	10.55	1.69	14.07	1.41	0.22
L-524-07-30	Сорсо	9/7/2007	perch fillet	individual	240.21	240.21	60.05	6.01	0.96	8.01	0.80	0.13
L-524-07-31	Сорсо	9/7/2007	perch fillet	individual	181.21	181.21	45.30	4.53	0.72	6.04	0.60	0.10
L-524-07-32	Сорсо	9/7/2007	perch fillet	individual	251.05	251.05	62.76	6.28	1.00	8.37	0.84	0.13
L-524-07-33	Сорсо	9/7/2007	perch fillet	individual	124.91	124.91	31.23	3.12	0.50	4.16	0.42	0.07
L-524-07-33Dup	Сорсо	9/7/2007	perch fillet	individual	140.98	140.98	35.24	3.52	0.56	4.70	0.47	0.07
L-524-07-34	Сорсо	9/7/2007	perch fillet	individual	100.98	100.98	25.24	2.52	0.40	3.37	0.34	0.05
L-524-07-35	Сорсо	9/7/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-524-07-36	Сорсо	9/7/2007	perch fillet	individual	86.30	86.30	21.57	2.16	0.35	2.88	0.29	0.05

Appendix I: CDFG Fish and Wildlife Water Pollution Control Laboratory Microcystin Results



DEPARTMENT OF FISH AND GAME STATE WATCH RESOURCES **FISH AND WILDLIFE** WATER POLLUTION CONTROL LABORATORY

2005 NIMBUS ROAD RANCHO CORDOVA, CA 95670

2007 AUG 30 PM 12: 00

FAX (916) 985-4301 PHONE (916) 358-2858 ATSS 8-434-2858

ENTO

LABORATORY REPORT

Name: Russ J. Kanz State Water Resource Control Board Agency: P. O. Box 2000 Address: City: Sacramento, CA 95812-2000

Lab Number:	L-463-07
Other Number:	
Date Sampled:	8/13/07
Date Received:	8/14/07
Date Completed:	8/21/07
Index-PCA Code:	

RE: Microcystin analysis in tissue

RESULTS OF CHEMICAL ANALYSIS:

Three fish sample composites (liver, stomach and fillet) from the Irongate Hatchery were extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

NA	Not Applicable
ND	Not Detected
MDL	Method Detection Limit
RL	Reporting Limit
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate

Cost: To be invoiced per contract.

Lead Pesticide Chemist

<u>27.07</u> Date

Laboratory Director

Date

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WPCL Lab#	Estimated MDL	Reporting Limit	L-463-07-1	L-463-07-2	L-463-07-3		L-405-07-Blank
Sample Identification			fish liver	fish stomach	fish fillet	l	WPCL Oyster
Date Collected			13/Aug/2007	13/Aug/2007	13/Aug/2007	L	
Time Collected							
Date Received			14/Aug/2007	14/Aug/2007	14/Aug/2007	S	
Date Extracted			16/Aug/2007	16/Aug/2007	16/Aug/2007	əlq	07/Aug/2007
Date Analyzed			17/Aug/2007	17/Aug/2007	17/Aug/2007	шe	08/Aug/2007
	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	s po	Fresh Wt.
Microcystin Analytes	(b/bu) qdd	(b/bu) qdd	(b/gu) qdd	(b/gu) qdd	(b/bu) qdd)/ \	(b/ɓu) qdd
MCY-RR	0.500	1.00	Q	Q	QN))	QN
MCY-Demethyl-RR*	0.500	1.00	QN	QN	Q	I	QN
MCY-LR	0.500	1.00	QN	Q	Q	1	QN
MCY-Demethyl-LR*	0.500	1.00	QN	QN	Q	l	Q
MCY-YR	0.500	1.00	QN	QN	Ð		QN
MCY-LA	0.500	1.00	301	QN	Q		Q
MCY-LW	0.500	1.00	Q	QN	Q		Q
MCY-LF	0.500	1.00	Q	Q	Ð		QN
* Demethyl analog quanti	fied as parent com	pound.					

Microcystins Page 2 of 3

SWRCB L-463-07

WPCL Lab#	Estimated MDL	Reporting Limit	Spike Level	L-405-07-LCS	L-405-07-LCS	L-405-07-LCSD	L-405-07-LCSD
Sample Identification				WPCL Oyster	WPCL Ovster	WPCL Ovster	WPCL Ovster
Date Collected				4			
Time Collected						-	
Date Received							
Date Extracted				07/Aug/2007	07/Aug/2007	07/Aua/2007	07/Aug/2007
Date Analyzed				08/Aug/2007	08/Aua/2007	08/Aug/2007	08/Aug/2007
			-			•	3
	Fresh Wt.	Fresh Wt.	Expected value	Recovered		Recovered	
Microcystin Analytes	(g/gu) qdd	ppb (ng/g)	(pdd (pdd)	(pdd (ng/g)	% Recovery	ppb (nq/q)	% Recoverv
MCY-RR	0.500	1.00	25.0	26.5	106	25.8	103
MCY-Demethyl-RR*	0.500	1.00	NA	NA	NA	NA	NA
MCY-LR	0.500	1.00	25.0	19.8	79.1	18.7	74.8
MCY-Demethyl-LR*	0.500	1.00	NA	NA	NA	NA	NA
MCY-YR	0.500	1.00	25.0	20.0	80.1	19.8	79.0
MCY-LA	0.500	1.00	25.0	25.5	102	25.3	101
MCY-LW	0.500	1.00	25.0	29.5	118	29.0	116
MCY-LF	0.500	1.00	25.0	30.0	120	29.5	118
* Demethyl analog quantif	ied as parent comp	ound.					

Microcystins Page 3 of 3

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LAB COPIES: WHITE, CANARY, PINK S		Samples Reliquished By (Signature)		Suspect/Incident Location	Problem Description	G	2	L-463-07-1		22	, analyonal indiv	- 6 Fish to be		For micro	· GFish com	(Draw map on separate sheet if necessary)	Sample Identification/Location	M Routine Analysis	DFG Code Violation:	□ Fish & Wildlife Loss Date:	shipped Via Fradex	Date Required/Reason	Horn Brook in	city of de do		I Par Gali Hatche	Sampler P	DFG R
UBMITTER: GOLDENROD		Print Name		M Ichoryst		HISSUR	stomach	liver			rational 1			hati''	and 1- 19/13/07 -	Date Time	Collection	Analysis Requested >>>		Region:	City	Address	CA. Copies To	City		Address	h # Send Results To	EQUEST FOR ANALYS
		Date		in A	+											Petr Trac (Spe Past (Spe	oleur e Ele icify i icide	n Finge ments Below) Selow)	rprint	ater Temp:			fan (C,		S W		IS AND C
	ALAN HERE V	Received By (Signature)		mary s												U S F Watu		in act		ForC pH: DO:	Zip	9	sate Hatchen	Zip		RCB		CHAIN OF CUSTODY RECOR
	Annan hibrer	Print Name	Hazmat Snipper Requested:	Glove Size: Large Mec	Pollution Action Kit: YesE							£			-6	Filte Soil Tiss Plas Glas	ue tic s	Vater	nple Type Number of Containers	: mg/L Conductivity:	Index-PCASWRC	Suspect	Spill Title 0	Lab Storage CRCZ		1463.0	Lab Number	2D Page_
FG 1000 (Rev. 9/0	tott ita	Date	YesLI NoLI									*			*	Tem Acid	p		Preservation	<i>u</i> mhos/cm	R					7		
зL		Wate 2005 Ranc (916)	r Poliu Nimbu ho Cor 358-28	tion s Ro dova 158	Con oad a, C	trol I A 956	.ab 170	L	<u> </u>			Pe 19 Ra (91	trolei 95 Ni Incho 16) 35	um C mbus Core 8-28	hem. s Roa dova, 03	istry ad , CA	Lab 9567	ro	Ĺ	Pe 17 17 Ri (9	esticide 701 Nimi ancho C 16) 358-	invest bus Ro ordov 2950	igation ad a, CA S	s Lab 95670	L	<u></u>]	1



DEPARTMENT OF FISH AND GAME FISH AND WILDLIFE WATER POLLUTION CONTROL LABORATORY

2005 NIMBUS ROAD RANCHO CORDOVA, CA 95670 PHONE (916) 358-2858

2137 NUG 30. PM 12: 00

TATE WATER RESOURCES

TONIEN BOAND

FAX (916) 985-4301 ATSS 8-434-2858

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LABORATORY REPORT

Russ J. Kanz Name: State Water Resource Control Board Agency: P. O. Box 2000 Address: Sacramento, CA 95812-2000 City:

Lab Number: Other Number: **Date Sampled:** Date Received: Date Completed: Index-PCA Code:

7/20/07 8/20/07 8/22/07

L-475-07

Microcystin analysis in mussels RE:

RESULTS OF CHEMICAL ANALYSIS:

One mussel composite sample from the Copco Reservoir was extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

NA	Not Applicable
ND	Not Detected
MDL	Method Detection Limit
RL	Reporting Limit
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate

Cost: To be invoiced per contract.

358-0317 08,27.07

Laboratory Director

Date

Mekcbri

SWRCB L-475-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-475-07-13	L-475-07-13Dup	L-4/5-0/-131 rip	Т	L-403-07-Blank
Sample Identification			mussels	mussels	mussels		WPCL Oyster
Date Collected			20/Jul/2007	20/Jul/2007	20/Jul/2007	1	
Time Collected					-		
Date Received			20/Aug/2007	20/Aug/2007	20/Aug/2007	S	
Date Extracted			20/Aug/2007	20/Aug/2007	20/Aug/2007	pie	07/Aug/2007
Date Analyzed			21/Aug/2007	21/Aug/2007	21/Aug/2007	am	08/Aug/2007
						s	
	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	/Q(Fresh Wt.
Microcystin Analytes	(g/gn) dqd	(g/gn) qdd	ppb (ng/g)	(p/g/g) dqd	ppb (ng/g)	QA.	(g/gn) dqd
MCY-RR	0.500	1.00	ND	ND	ND	(ND
MCY-Demethyl-RR*	0.500	1.00	ND	ND	ND	1	ND
MCY-LR	0.500	1.00	N	DN	ND	1	ND
MCY-Demethyl-LR*	0.500	1.00	ND	ND	ND	1	ND
MCY-YR	0.500	1.00	ND	ND	ND	-	ND
MCY-LA	0.500	1.00	57.0	32.3	34.2		ND
MCY-LW	0.500	1.00	ND	ND	ND		ND
MCY-LF	0.500	1.00	D	ND	ND		ND
* Demethyl analog guanti	fied as narent com	ound.					

Microcystins Page 2 of 3

SWRCB L-475-07

WPCL Lab#	Estimated MDL	Reporting Limit	Spike Level	L-405-07-LCS	L-405-07-LCS	L-405-07-LCSD	L-405-07-LCSD
Sample Identification			-	WPCL Oyster	WPCL Oyster	WPCL Oyster	WPCL Oyster
Date Collected							
Time Collected							
Date Received							
Date Extracted				07/Aug/2007	07/Aug/2007	07/Aug/2007	07/Aug/2007
Date Analyzed		-		08/Aug/2007	08/Aug/2007	08/Aug/2007	08/Aug/2007
	Fresh Wt.	Fresh Wt.	Expected value	Amount Recovered		Amount Recovered	
Microcystin Analytes	ppb (ng/g)	(pdg (pdg)	ppb (ng/g)	(g/gu) qdd	% Recovery	(g/gn) dqd	% Recovery
MCY-RR	0.500	1.00	25.0	26.5	106	25.8	103
MCY-Demethyl-RR*	0.500	1.00	NA	NA	NA	NA	NA
MCY-LR	0.500	1.00	25.0	19.8	79.1	18.7	74.8
MCY-Demethyl-LR*	0.500	1.00	NA	NA	AN	NA	NA
MCY-YR	0.500	1.00	25.0	20.0	80.1	19.8	79.0
MCY-LA	0.500	1.00	25.0	25.5	102	25.3	101
MCY-LW	0.500	1.00	25.0	29.5	118	29.0	116
MCY-LF	0.500	1.00	25.0	30.0	120	29.5	118
* Demethyl analog quantif	ied as parent comp	ound.					

Microcystins Page 3 of 3

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LAB COPIES: WHITE, CANARY, PINK SU				Samples Reliquished By (Signature)	Comments/Special Instructions	Suspect/Incident Location	Problem Description						MUSSELS		Yellow Perch	(Draw map on separate sheet if necessary)	Sample Identification/Location	Routine Analysis	Suspected or Potential Problem	DFG Code Violation:	Fish & Wildlife Loss Date:1	Shipped Via	Date Required/Reason	CA	City Zip		Address	COPCO RESEVOIR	Sampler Ph	DFG RE
BMITTER: GOLDENROD				Print Name					-				7-20-07			Date Time	Collection	Requested >>>	Analysis		Region:	City	Address	Copies To		Citv	Address	SE P	# Send Results To	EQUEST FOR ANALY
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FG 1000 (Rev. 9/01			4-8-20-0	Date	id: Yes⊟ No⊟	edium 🗖										Tem Acid	 I			Preservation	u mhos/cm			-						
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DEPARTMENT OF FISH AND GAME **FISH AND WILDLIFE** WATER POLLUTION CONTROL LABORATORY

2005 NIMBUS ROAD RANCHO CORDOVA, CA 95670 WIE WEICH RE

2017 AUG 30 PM 12: CU

PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

tielis

LABORATORY REPORT

Name: Russ J. Kanz Agency: State Water Resource Control Board Address: P. O. Box 2000 City: Sacramento, CA 95812-2000

Lab Number: Other Number: **Date Sampled: Date Received:** Date Completed: Index-PCA Code: L-405-07

7/11, 20, 24/07 7/25/07 8/20/07

RE: Microcystin analysis in tissue

RESULTS OF CHEMICAL ANALYSIS:

Four tissue samples from the Klamath River were extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

NA	Not Applicable	
ND	Not Detected	
MDL	Method Detection Limit	
RL	Reporting Limit	
LCS	Laboratory Control Spike	
LCSD	Laboratory Control Spike	Duplicate

Cost: To be invoiced per contract.

CC: Susan Corum P. O. Box 282 Orleans, CA 95556

Chemist

aboratory Director

<u>Accy 27'07</u> Date

27.07

SWRCB L-405-07

WPCL Lab# Sample Identification	Estimated MDL	Reporting Limit	L-405-07-1 Gonedia angulata	L-405-07-2 G. angulata	L-405-07-2Dup G. angulata	L-405-07-3A	L-405-0; Different S
			Klamath R. near 15	Klamath River near	Klamath River near	Klamath River at Big	Klama
Location				Seiad Valley	Selad Valley	Bar River access	Bar F
Date Collected			11/Jul/2007	20/Jul/2007	20/Jul/2007	24/Jul/2007	24
Time Collected			PM	PM	PM	AM	
Date Received			25/Jul/2007	25/Jul/2007	25/Jul/2007	25/Jul/2007	25
Date Extracted			07/Aug/2007	07/Aug/2007	07/Aug/2007	07/Aug/2007	170
Date Analyzed			08/Aug/2007	08/Aug/2007	08/Aug/2007	08/Aug/2007	/80
	Fresh Wt,	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	F
Microcystin Analytes	(0/gn) dqd	(ng/g)	(g/gu) qdd	(pha) (bdd	(g/gu) dqq	(p/gn) dqq	ga
MCY-RR	0.500	1.00	136	5.09	6.17	ND	-
MCY-Demethyl-RR*	0.500	1.00	ND	N	N	DN	
MCY-LR	0.500	1.00	396	90.9	91.4	68.4	
MCY-Demethyl-LR*	0.500	1.00	36.6	5.55	5.78	6.05	
MCY-YR	0.500	1.00	D	ND	ND	ß	
MCY-LA	0.500	1.00	2,220	311	280	432	
MCY-LW	0.500	1.00	ND	ND	D	D	
MCY-LF	0.500	1.00	14.5	ND	dN	ND	
Demethyl analog guantif	fied as parent com	Dollind					
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Microcystins Page 2 of 3

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WPCL Lab#	Estimated MDL	Reporting Limit	1-405-07-Blank	Chika Laval	1 105 07 1 00			
Sample Identification		-			L-403-0/-LCS	L-405-07-LCS	L-405-07-LCSD	L-405-07-LCSD
			WPCL Uyster		WPCL Oyster	WPCL Oyster	WPCL Oyster	WPCL Oyster
Location								ï
Date Collected								
Time Collected								
Date Received		les						
Date Extracted		np	07/4					
Date Analyzed		Bar	1002/Bn4/10		07/Aug/2007	07/Aug/2007	07/Aug/2007	07/Aug/2007
Care mini yeeu		CS	08/Aug/2007		08/Aug/2007	08/Aug/2007	08/Aug/2007	08/Aug/2007
			1					
			FIESH WL	Expected Value	Amount Recovered		Amount Recovered	
WICrocystin Analytes	(D/Du) add	(g/gu) ddd	(ppb (ng/g)	ppb (ng/g)	(pygn) dqq	% Recoverv	(na/a)	% Recovery
MCY-HH	0.500	1.00	ND	25.0	26.5	106	8 26	102
MCY-Demethyl-RR*	0.500	1.00	ND	NA	NA	NA	NA	NIA
MCY-LR	0.500	1.00	ND	25.0	19.8	70 1	19.7	740
MCY-Demethyl-LR*	0.500	1.00	ND	NA	NA	NA	NIA	0.11
MCY-YR	0.500	1.00	ND	25.0	20.0	80 1	10.0	100
MCY-LA	0.500	1.00	ND	25.0	27.7	103		13.0
MCY-LW	0.500	1.00	ND	25.0	295	110		
MCY-LF	0.500	1.00	5	0	3		-82U	116
			ē	20.0	30.0	120	29.5	118
* Demethyl analog guantit	ied as narent comp							

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LAB COPIES: WHITE, CANARY, PINK SUBMITTER	2		1 Maria Martin Maria	Kan Mary KACI	Samples Reliquished By (Signature)		Suspect/incident Location	Problem Description					as #3	Different Species - Same location	5. angulatu Lamate liver bot	G. angulata Clampto Ever here	Conedia angulata her 15 K.	(Draw map on separate sheet if necessary)	Sample Identification/Location	Routine Analysis	Suspected or Potential Problem	DFG Code Violation:	G Fish & Wildlife Loss Date: Region:	Shipped Via	Mate Required/Reason	7 95.42 FIN	City has had all a zip	Address 5/1 Bryant Ave	NORGADARD 9351 85	DFG REQUE
t: GOLDENROD			la Mantin	NORGANDED	Print Name									WH Where	, 7-24-07 AM	~ 7-20-07 pm	7-11-07 PM	Date Time	Collection	Requested >>>	Analysis			city Orleans	Address DOBX 2	SUSUN CO	Sacrappen	Address PO BOX 20	Send Results To RUSS J. KA	ST FOR ANALY
,			7-25-07 K	7-24-07 M	Date									×	×	7	×	Petr Trac (Spe (Spe ///	ticlde	m Fin emen Belov Belov Belov	ngerpr ts w) w)	rint	Water Temp:	\$	72	rung	12 CA	60	N2 State U	ISIS AND CHA
			Frinc	land marti	Received By (Signature																		ForC pH:	92556 diz			-12/27 ar		Vater Lesonger Control bear of	IN OF CUSTODY F
					•													Wate Filte	er red V	Water		Sample	DÖ:				2020			RECORD
			D13 CRANE	Maricle Mentin	Print Name	Hazmat Shipper Requester	Glove Size: Large Me	Pollution Action Kit: Yes						×	7	*	メ	Soil Tiss Plas Glas	ue tic s Vial			Type Number of Containers	mg/L Conductivity:	ndex-PCA	Suspect	Spill Title	.ab Storage TSMR1	Field Number	-ab Number 2-405-	Page
FG 1000 (Rev. 9/01)			7-25-07	7-2407	Date	d: Yes⊡ No⊡	edium 🗆	S□ No□						×	X 	×	×	D∕ Tem Acid	7-	Гс.	2	Preservation	u mhos/cm				Freezer		Г <i>о</i> -	of
~			X	W 20 Ra (9	ater 05 N ancho 16) 3	Pollut Imbus Core 58-28	ion Ro Iova 58	Con ad , CA	trol 1 A 956	.ab 70	4 ,	[Pe 19: Ra (91	trolei 95 Ni ncho 16) 35	um C mbus Core 8-28	hemi Roa lova, 13	stry d CA	Lab 956;	70	[Pe 17(Ra (91	sticide D1 Nimi ncho C 6) 358-	Investi bus Ro ordova 2950	gation ad I, CA 9	s Lab 5670			



DEPARTMENT OF FISH AND GAME FISH AND WILDLIFE WATER POLLUTION CONTROL LABORATORY

2005 NIMBUS ROAD RANCHO CORDOVA, CA 95670 FAX (916) 985-4301 ATSS 8-434-2858 PHONE (916) 358-2858

LABORATORY REPORT

Russ J. Kanz Name: State Water Resource Control Board Agency: P. O. Box 2000 Address: Sacramento, CA 95812-2000 City:

Lab Number: Other Number: **Date Sampled:** Date Received: Date Completed: Index-PCA Code: L-524-07

09/06-07/07 09/11/07 11/14/07

Microcystin analysis RE:

RESULTS OF CHEMICAL ANALYSIS:

Forty-two tissue samples from the Copco and Irongate Reservoirs was extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

Not Applicable NA Not Detected ND Method Detection Limit MDL Reporting Limit RL Method Blank **MBIk** Laboratory Control Spike LCS Laboratory Control Spike Duplicate LCSD Matrix Spike MS Matrix Spike Duplicate MSD

Cost: To be invoiced per contract.

ject Chemist

Laboratory Director

Nov-15'07

11-15-07 Date

Date

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					1 EDV-07-3	1 -524-07-4	L-524-07-5
NPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-1	L-524-07-2	L-024-07-0		5
			IG-1	IG-2	G -3	IG-4	6-5
Sample Identification					09/06-07/07	09/06-07/07	09/06-07/07
Date Collected			10/10-01/01			all dav	all day
			all day	all day	all uay		
Time Collected			11/200/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Received				00/0~t/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007
Data Extracted			08/Oci/200/	00/00/2001		200/1-0-1000	09/Oct/2007
			09/Oct/2007	09/Oct/2007	VOC/200/60	001004100	
Date Analyzed			Ticcuo	Tissue	Tissue	Tissue	anssi
Matrix			10000				
			I meh Wt	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.
				ant (nala)	nnh (na/a)	(g/gn) dag	
Microcystin Analytes	ddd	ddd	(6/6u) add	(E.R.) AAA		ND	ND
	000	5.00	ND				
MCY-HH		л 00	ND	ND	NC		5
MCY-Demethyl-HH	2.00	500	ND	ND	ZD	NU	
MCY-LR	2.00			63.7	ND	57.0	N
MCY-Demethyl-LR*	2.00	0.00			2 23	2.01	3.09
MCA-AB	2.00	5.00	N				ND
	2.00	5.00	ND	NC			5
	۰ ۵	5.00	ND	ZD			
MCY-LW	<u> </u>		Z	ND	ND	ND	
MCY-LF	2.00	0.00					
* Demethyl analog quant	lified as parent cor	npound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-6	L-524-07-7	L-524-07-7Dup	L-524-07-8	L-524-07-9
			IG-6	IG-7	IG-7	IG-8	IG-9
Date Collected			09/06-07/07	70/70-90/60	09/06-07/07	09/06-07/07	09/06-07/07
Time Collected	3		all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted		1 - 2	08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
			Freeh Wt	Freeh Wt	Fresh Wt	Fresh Wt	Fresh Wt.
Microcvstin Analytes	dđđ	ddd	(b/bu) qdd	(b/gu) qdd	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	2.27	2.54	ND	3.01	2.02
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quanti	fied as parent com	pound.				2	

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-10	L-524-07-11	L-524-07-12	L-524-07-13	L-524-07-14
Sample Identification			IG-10	IG-11	IG-12	IG-13	IG-14
Date Collected			09/06-07/07	09/06-07/07	09/06-07/07	09/06-07/07	09/06-07/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
			Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.
Microcystin Analytes	ppb	ppb	ppb (ng/g)	(ng/g)	(g/gu) qdd	(pyb) (ng/g)	(g/gu) qdd
MCY-RR	2.00	5.00	ND	ND	ND	ND	AN
MCY-Demethyl-RR*	2.00	5.00	ND	DN	ND	ND	D
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	227
MCY-YR	2.00	5.00	<u>2.68</u>	2.18	ND	ND	2.23
MCY-LA	2.00	5.00	ND	ND	ND	ND	D
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantif	fied as parent comp	ound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-15	L-524-07-16	L-524-07-17	L-524-07-18	L-524-07-19
Sample Identification			IG-15	IG-16	IG-17	IG-18	CP-1
Date Collected			09/06-07/07	09/06-07/07	09/06-07/07	09/06-07/07	09/07-08/07
Time Collected			all day				
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
			Fresh Wt.				
Microcystin Analytes	ddd	ddd	(ng/g) dqd	(ng/g) dqq	ppb (ng/g)	(p/gn) dqq	(g/gu) qdd
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	P
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	106	73.0	79.8	153	77.7
MCY-YR	2.00	5.00	ND	ND	2.24	4.23	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
		-					
* Demethyl analog quant	ified as parent comp	bound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-20	L-524-07-21	L-524-07-22	L-524-07-23	L-524-07-24
Sample Identification			CP-2	CP-3	CP-4	CP-5	CP-6
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07
Time Collected			all day				
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
			Fresh Wt.				
Microcystin Analytes	ddd	ddd	(ng/g) dqd	(ng/g) dqd	(p/gn) dqq	ppb (ng/g)	ppb (na/a)
MCY-RR	2.00	5.00	ND	D	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5,00	95.2	82.1	58.4	181	171
MCY-YR	2.00	5.00	2.17	ND	3.16	2.47	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	D	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	D
-							
* Demethyl analog quantii	fied as parent comp	ound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-25	L-524-07-26	L-524-07-27	L-524-07-28	L-524-07-29
Sample Identification			CP-7	CP-8	CP-9	CP-10	CP-11
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07	00/07_08/07
Time Collected			all day	all dav	all dav	alldav	
Date Received			11/Sen/2007	11/Sen/2007	11/200/0007	11/Conjono7	
Date Extracted					1007/dac/11	11/Seb/2007	11/Sep/2007
			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
				,			
			Fresh Wt.				
Microcystin Analytes	ddd	qdd	(g/gu) dqd	ppb (ng/g)	ppb (na/a)	ppb (ng/g)	nnh (nn/n)
MCY-RR	2.00	5.00	ND	ND	ND		
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	S	S
MCY-LR	2.00	5.00	ND	ND	ND		
MCY-Demethyl-LR*	2.00	5.00	78.8	147	350	405	433
MCY-YR	2.00	5.00	2.12	Ŋ	ND	5	5
MCY-LA	2.00	5.00	ND	B	ND		3
MCY-LW	2.00	5.00					
					NC	ND	ND
	2.00	5.00	ND	ND	ND	ND	ND
* Demothyl applace month							
Demenyi analog quanti	led as parent comp	ound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-30	L-524-07-31	L-524-07-32	L-524-07-33	L-524-07-33Dup
Sample Identification			CP-12	CP-13	CP-14	CP-15	CP-16
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	00/07-08/07	
Time Collected			all dav	all dav	veb lle		
Date Received	3	-			ui uuy	all uay	all uay
			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Uate Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
			Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt
Microcystin Analytes	ppb	ddd	(g/gn) dqd	ppb (na/a)	oob (na/a)	pph (na/a)	nnh (nn/n)
MCY-RR	2.00	5.00	ND	N	ND		
MCY-Demethyl-RR*	2.00	5.00	ND	Ŋ	ND	P	3
MCY-LR	2.00	5.00	D	ND	ND	D	
MCY-Demethyl-LR*	2.00	5.00	240	181	251	125	141
MCY-YR	2.00	5.00	N	ND	ND	Ŋ	ZD
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	Ŋ	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
Demetry analog quantit	led as parent comp	ound.	:		-		

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-34	L-524-07-35	L-524-07-36	L-524-07-37	L-524-07-38
Sample Identification			CP-17	CP-18	CP-19	IG-37	IG-38
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/06-08/07	09/06-08/07
Time Collected			all day	all day	all day	all dav	ali dav
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Liver	Liver
			Fresh Wt.	Fresh Wt	Fresh Wt	Freeh Wt	Freeh W/t
Microcystin Analytes	ddd	ddd	(g/gu) qdd	(pd/g)	ppb (ng/g)	ppb (na/a)	ppb (na/a)
MCY-RR	2.00	5.00	ND	D	ND	ND	
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	N	37.4
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	101	ND	86.3	ND	ND
MCY-YR	2.00	5.00	ND	D	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	12.7
MCY-LW	2.00	5.00	ND	ND	ND	Ŋ	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
	•	•					
Demethyl analog quantif	ied as parent comp	ound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-39	L-524-07-40	L-524-07-41	L-524-07-42	
Sample Identification			IG-39	CP-40	CP-41	CP-42	
Date Collected			09/06-08/07	09/06-08/07	09/06-08/07	09/06-08/07	
Time Collected			all day	all dav	all dav	all day	
Date Received			11/Sen/2007	11/Sen/2007	11/Con/007	11/0 m / 007	
Dato Extranta				/002/dac/11	//////////////////////////////////////	11/Sep/2007	
			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	es
Matrix	2		Liver	Liver	Liver	Liver	nple
							San
			Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	c s
Microcystin Analytes	ddd	qdd	(ppb (ng/g)	ppb (ng/g)	ppb (na/a)	ppb (na/a)	/Q
MCY-RR	2.00	5.00	15.7	ND	ND		QA
MCY-Demethyl-RR*	2.00	5.00	42.2	25.0	33.5	61 A	
MCY-LR	2.00	5.00	ND	ND	ND		
MCY-Demethyl-LR*	2.00	5.00	ND	138	426	159	
MCY-YR	2.00	5.00	ND	dN	ND	ND	
MCY-LA	2.00	5.00	12.7	14.7	13.7	7.88	
MCY-LW	2.00	5.00	ND	S	ND		
MCY-LF	2.00	5.00	ND	D	ND	B	-
* Demethyl analog quantif	led as parent compo	ound.	,				

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WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-MBlank	L-524-07-LCS	L-524-07-3MS	L-524-07-3MSD
Sample Identification			Solvent Blank	American River	lG-3	IG-3
Date Collected					00/02 07/07	
Time Collected						
Data Danaiwad					all day	all day
					11/Sep/2007	11/Sep/2007
Date Extracted			09/09/07	09/08/07	09/08/07	09/08/07
Uate Analyzed			70/09/07	70/09/07	09/09/07	70/09/07
Matrix				Tissue	Tissue	Tissue
Microcystin Analytes	ddd	ddd	ppb (ug/L)	Recoverv (%)	Recovery (%)	Recovery (%)
MCY-RR	2.00	5.00	ND	105	112	115
MCY-Demethyl-RR*	2.00	5.00	ND	AN	NA	NA
MCY-LR	2.00	5.00	ND	107	82.9	77.5
MCY-Demethyl-LR*	2.00	5.00	ND	NA	NA	NA
MCY-YR	2.00	5.00	ND	115	72.0	87.3
MCY-LA	2.00	5.00	ND	103	73.5	72.9
MCY-LW	2.00	5.00	ND	101	75.4	74.3
MCY-LF	2.00	5.00	ND	103	82.8	80.7
* Domothul onology						
Demenyi analog quantif	led as parent comp	ound.				

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WPCL Lab#	Estimated MDL	Reporting Limit	I _SOA_NZ_SEMC	1 534 37 30400
		5		L-724-01-20M92D
Sample Identification		_	CP-8	CP-8
Date Collected			09/07-08/07	09/07-08/07
Time Collected			all day	all day
Date Received			11/Sep/2007	11/Sep/2007
Date Extracted			70/60/60	70/60/60
Date Analyzed	Í		09/09/07	70/60/60
Matrix			Tissue	Tissue
			Fresh Wt.	Fresh Wt
Microcystin Analytes	ddd	ddd	Recovery (%)	Recoverv (%)
MCY-RR	2.00	5.00	125	118
MCY-Demethyl-RR*	2.00	5.00	AN	NA
MCY-LR	2.00	5.00	81.8	114
MCY-Demethyl-LR*	2.00	5.00	NA	NA
MCY-YR	2.00	5.00	97.9	116
MCY-LA	2.00	5.00	73.6	80.3
MCY-LW	2.00	5.00	83.8	92.0
MCY-LF	2.00	5.00	89.1	96.1
 Demethyl analog quantifi 	ed as parent comp	ound.	÷	

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			Samples Reliquished By (signature) Print Na		Comments/Special Instructions	Suspect/Incident Location	Problem Description	A state a tout	- to clock perce of theme and	1 Acell attached	Jush Millertory	Love Concerned		Tion Gate Res 18 YP 9/1	Coprokes 18 47 Th	(Draw map on separate sheet if necessary) Dat	Sample Identification/Location C	Routine Analysis Req	Suspected or Potential Problem Anal	DFG Code Violation:	Fish & Wildlife Loss Date: Region:	Shipped Via	Date Required/Reason Addre	CA	City Zip Conte	City	Address	Alma Artard	Sampler Ph # Send	
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DEPARTMENT OF FISH AND GAME **FISH AND WILDLIFE** WATER POLLUTION CONTROL LABORATORY

2005 NIMBUS ROAD RANCHO CORDOVA, CA 95670

PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

LABORATORY REPORT

Name: Russ J. Kanz State Water Resource Control Board Agency: P.O. Box 2000 Address: City: Sacramento, CA 95812-2000

Lab Number:	L-665-07
Other Number:	
Date Sampled:	11/05/07
Date Received:	11/15/07
Date Completed:	02/14/08
Index-PCA Code:	

KK

RE: Microcystin analysis in mussels

RESULTS OF CHEMICAL ANALYSIS:

Fifteen mussel samples from the Klamath River Reservoir was extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

		5. 197		- 41 - 14
NA	Not Applicable	- 2 - k	·	
ND	Not Detected		1.3 85 19	
MDL.	Method Detection Limit			i an t
RL	Reporting Limit		25-	
LCS	Laboratory Control Spike	in the second	Ban () 8 () 19	
LCSD	Laboratory Control Spike Duplicate		•••	÷
		171	C^{r_1}	5

Cost: To be invoiced per contract.

Cc: Susan Corum Department of Natural Resources P. O. Box 282 Orleans, CA 95556

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<u>e2/15/08</u>

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Laboratory Director

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WDCI 1 35#	Estimated MDI	Donorting imit	1_665_07_1	1-665-07-0	2 20 233 1	1_665_07_1	1 665 07 5
			CH110507-A	CH110507-B	CH110507-C	BR110507-A	BR110507-B
Sample Identification							
Date Collected			05/Nov/2007	05/Nov/2007	05/Nov/2007	05/Nov/2007	05/Nov/2007
Time Collected			16:00	16:00	16:00	13:00	13:00
Date Received			15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
			Fresh Wt.				
Microcystin Analytes	qdd	qdd	(g/gu) qdd	(b/bu) qdd	(g/gn) dqq	(ng/g) dqd	(g/gu) qdd
MCY-RR	2.00	5.00	Ŋ	ND	ND	ND	Ŋ
MCY-Demethyl-RR*	2.00	5.00	ND	ND	Ŋ	ND	ND
MCY-LR	2.00	5.00	Ŋ	ND	ND	ND	B
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ß	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	D	ND	ND	ND	ND
MCY-LW	2.00	5.00	ß	P	ND	ND	N
MCY-LF	2.00	5.00	ND	N	ND	ND	N
* Demethyl analog quanti	ified as parent comp	oound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-665-07-6	L-665-07-7	L-665-07-8	L-665-07-9	L-665-07-10
Sample Identification			BR110507-C	SV110507-A	SV110507-B	SV110507-C	I5110507-A
Date Collected			05/Nov/2007	05/Nov/2007	05/Nov/2007	05/Nov/2007	05/Nov/2007
Time Collected			13:00	15:00	15:00	15:00	12:00
Date Received			15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
			Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.
Microcystin Analytes	ddd	ddd	(php (ng/g)	(g/gn) dqq	(pyb) (ng/g)	ppb (ng/g)	ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	R	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	Ŋ	ND	ND
MCY-LR	2.00	5.00	ND	ND	P	ND	Ð
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	B
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	DN	ND
MCY-LF	2.00	5.00	D	ND	N	ND	ND
* Demethyl analog quanti	fied as parent comp	ound.					

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WDCI 1 2h#	Ectimated MDI	Deporting 1 imit	1_885_07_11	1_665_07-11Dim	1 665 07-12	1 22E 07 13	1 665 07 44
		L				00110607 4	00140007 0
Sample Identification			G-/0C011C1	G-/0001101			OR110607-B
Date Collected			05/Nov/2007	05/Nov/2007	05/Nov/2007	06/Nov/2007	06/Nov/2007
Time Collected			12:00	12:00	12:00		
Date Received			15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
Microcystin Analytes	add	add	(@/@n) add	(g/gu) add	(g/gu) add	(b/bu) add	(g/gu) add
MCY-RR	2.00	5.00	ND	S	S	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	DN	ND	N	N	N
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	N
MCY-LA	2.00	5.00	ND	N	N	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	DN	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quanti	fied as parent comp	ound.					

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WPCL Lab#	Estimated MDL	Reporting Limit	L-665-07-15		L-665-07-MBIK	L-665-07-LCS	L-665-07-10MS	L-665-07-10MSD
Sample Identification			OR110607-C		Solvent Blank	WPCL mussel	I5110507-A	I5110507-A
Date Collected			06/Nov/2007				05/Nov/2007	05/Nov/2007
Time Collected	-						12:00	12:00
Date Received			15/Nov/2007				15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007		06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	es	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	mpl		Mussel	Mussel	Mussel
			Fresh Wt.	C Sa		Fresh Wt.	Fresh Wt.	Fresh Wt.
Microcystin Analytes	qdd	qdd	(b/ɓu) qdd	∿/Q	ppb (ug/L)	Recovery (%)	Recovery (%)	Recovery (%)
MCY-RR	2.00	5.00	ND	Q/	ND	85.4	92.5	94.0
MCY-Demethyl-RR*	2.00	5.00	R		ND	NA	NA	NA
MCY-LR	2.00	5.00	ND		ND	114	107	115
MCY-Demethyl-LR*	2.00	5.00	ND		N	NA	NA	NA
MCY-YR	2.00	5.00	ND		ND	109	117	121
MCY-LA	2.00	5.00	ND		N	82.5	74.5	75.6
MCY-LW	2.00	5.00	N		ß	81.9	74.3	79.0
MCY-LF	2.00	5.00	ND		ND	85.9	71.5	78.1
* Demethyl analog quantii	lied as parent com	pound.						

Microcystins Page 5 of 5

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L-665-07

	L-665-07
Chain of Custody for Klama	th River Reservoir Nutrient Londing Student
Karuk DNR	39051 Hwy 96
PHONE 530-469-3456	Orleans, CA 95556
CONTACT Susan Corum	EMAIL scorum@karuk.us
Collected By	SIGNATURE CALL
Sampicate Pate Time Tability	A CARLE STUDICE DESCRIPTION OF THE PARTY OF THE DESCRIPTION OF
1	Air-Tlot Klemeth Payme
CHILDSOF A UK HAMOD	Right accoss from Y Tissal
SHROSO7-B	
3 CH110507-C	
BR110507-A-11/5/07 1300 - Bo	Non Berry DW SLOHF Shristan
5 BR110507-B	
BRIIDGOT-C	
7 SV110507-A 15W A	have 's mile yestrem Seind Velley D
St INDSUFFE	
SVOLIOSO7-C	
ESIIOSCI-A 1200 B	Low I-5 Budge Klam the River
11 15110507-5	
Date Shinned:	
Date Received	Received-Grean Baltzel
Received by	Sample until 10, to 1/ to Puss Pan 7/11-15-
Ship to:	Bill and Send Results To: All SD, Please
Dave Crane CDFG Water Pollution Control Laboratory 2005 Nimbus Road Rancho Cordova, CA 95670 (916) 358-2858 fax: (916) 985-4301	Russ J. Kanz State Water Resources Control Board PO Box 2000 Sacramento, CA 95812-2000 (916) 341-5341 individual Hid Confirmation
Please put mussel sh ± return to Chain of Custody Karuk Tribe Department of Natural Resources	Susan Corum 39051 Huygle Page lof Z Driegns CA 95556

L-665-0-Chain of Custody for Klamath River Reservoir Nutrient Loading Study **Karuk DNR** 39051 Hwy 96 PHONE 530-469-3456 Orleans, CA 95556 **CONTACT Susan Corum** EMAIL scorum@karuk.us Collected By SIGNATURE និត្តតារិទី-Destinati 1 Under Orleans Bridge 0R110407-A 11/10/17 ASSU Klamath River tissue P OPUCOUT-B **•¶{ 3 OF-110407-C 5 6 7 9 10 11 12 Date Shipped: Carrier/ Shipping # 11 110101 Date Received Received by mussel appropriate ba Notes 9SP WE can Bill and Send Results To: Ship to: Dave Crane Russ J. Kanz CDFG Water Pollution Control Laboratory State Water Resources Control Board 2005 Nimbus Road PO Box 2000 Rancho Cordova, CA 95670 Sacramento, CA 95812-2000 (916) 358-2858 (916) 341-5341 fax: (916) 985-4301 Received Gregor Baltzell 11-15-07 PageZofZ Chain of Custody Karuk Tribe Department of Natural Resources