STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

AQUATIC TOXICOLOGY LABORATORY REPORT

9300 Elk Grove-Florin Road
Elk Grove, CA 95624

Lab No: P-2376 Report Date: 07/28/2003

E.P. No:_____ ATL: S042203-1→3

Index: K112 PCA: E2791 S042903-1→2

S050603-1→2

S061803-1

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Remarks

Dilutions of herbicides were prepared by Department of Fish and Game staff April through June, 2003. Water quality and toxicity were determined by Department of Fish and Game's Aquatic Toxicology Laboratory staff. Static definitive chronic toxicity tests (7-d) with daily renewal of diluted solutions were performed using *Ceriodaphnia dubia* neonates following ATL-SOP-010 and EPA/600/4-91/002.

RESULTS OF EXAMINATION

Conclusion (Statistics are based on Empirical Data)

S042203-1 (T81-03, R-11; CA Reg. No. 2935-50142AA)
The 7-d LC50 value for *C. dubia* was 5.7 mg/L nonylphenol and nonylphenolethoxylate (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 0.91 mg/L nonylphenol and nonylphenolethoxylate (Table 2).

S042203-2 (T82-03, Rodeo + R-11 (2:1 Mixture); EPA Reg. No. 524-343/ CA Reg. No. 2935-50142AA)
The 7-d LC50 value for *C. dubia* was 3.1 mg/L glyphosate and 2.8 mg/L nonylphenol and nonylphenolethoxylate (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 2.2 mg/L glyphosate and ≥ 1.6 mg/L nonylphenol and nonylphenolethoxylate (Table 3).

S042203-3 (T83-03, Weedar 64 + R-11 (2:1 Mixture); EPA Reg. No. 71368-1-264/ CA Reg. No. 2935-50142AA)
The 7-d LC50 value for *C. dubia* was 11.2 mg/L 2,4-D and 7.4 mg/L nonylphenol and nonylphenolethoxylate (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 1.4 mg/L 2,4-D and ≥ 1.2 mg/L nonylphenol and nonylphenolethoxylate (Table 4).

S042903-1 (T84-03, Rodeo; EPA Reg. No. 524-343)
The 7-d LC50 value for *C. dubia* was 586 mg/L glyphosate (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 104 mg/L glyphosate (Table 5).

S042903-2 (T85-03, Weedar 64; EPA Reg. No. 71368-1-264)
The 7-d LC50 value for *C. dubia* was 96.9 mg/L 2,4-D (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 40.5 mg/L 2,4-D (Table 6).

S050603-1 (T86-03, Reward; EPA Reg. No. 10182-353)
The 7-d LC50 value for *C. dubia* was 0.078 mg/L diquat (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 0.019 mg/L diquat (Table 7).

S050603-2 (T87-03, Sonar; EPA Reg. No. 67690-4)
The 7-d LC50 value for *C. dubia* was 6.9 mg/L fluridone (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 4.6 mg/L fluridone (Table 8).

S061803-1 (T144-03, Komeen; EPA Reg. No. 1812-312)
The 7-d LC50 value for *C. dubia* was 0.08 mg/L copper (Table 1). There was statistically significant difference between the individual total average reproduction in the control and ≥ 0.04 mg/L copper (Table 9).

PESTICIDE INVESTIGATIONS UNIT
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BY_____
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APPROVED_____
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Table 1 *Ceriodaphnia dubia* sensitivities to various herbicides and herbicide mixtures (in mg/L)

Herbicide (Test No.)	96-h LC50 (95% CL)	7-d LC50 (95% CL)	7-d NOEC	7-d LOEC
R-11 (T81-03)	>7.1	5.7 (2.9-7.1)	0.42	0.91
Rodeo:R-11 [2:1] (T82-03)				
Rodeo	>3.6	3.1 (2.7-3.6)	1.3	2.2
R-11	>3.2	2.8 (2.3-3.2)	0.81	1.62
Weedar-64:R-11 [2:1] (T83-03)				
Weedar-64	14.5 (9.5->14.5)	11.2 (6.2-14.5)	0.70	1.4
R-11	9.5 (6.3->9.5)	7.4 (4.3-9.5)	0.51	1.197
Rodeo (T84-03)	608 (410-806)	586 (523-608)	<104	104
Weedar-64 (T85-03)	116.2 (71.3-161)	96.9 (66.2-111)	<40.5	40.5
Reward (T86-03)	0.14 (0.10-0.15)	0.078 (0.06-0.09)	0.012	0.019
Sonar (T87-03)	7.2 (4.6-9.8)	6.9 (6.1-7.2)	2.43	4.6
Komeen (T144-03)	0.11 (0.08-0.13)	0.08 (0.07-0.11)	0.02	0.04

Weedar-64 expressed as 2,4-D, Rodeo as glyphosate, Reward as diquat, Sonar as fluridone, R-11 as nonylphenol and nonylphenolethoxylate, and Komeen as copper

Table 2 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on R-11

ATL Test Number (Chemical)	Concentration (mg/L)	Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Total Alkalinity (mg/L)	Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
		in	out	in	out	in	out	in	out				
CONTROL T81-03	ATL Water	24.4	24.6	213	219	8.2	8.2	7.8	7.3	85	66	28.2	90
S042203-1 (T81-03) 08-1905-1073 nonylphenol / nonylphenolethoxylate	0.42	24.3	24.3	194	198	8.1	8.2	8.1	7.2	80	64	24.0	100
	0.91	24.4	24.4	203	201	8.1	8.2	8.2	7.2	82	62	22.6*	90
	1.63	24.4	24.4	189	198	8.1	8.1	8.1	7.2	82	64	21.2*	100
	3.34	24.4	24.3	189	198	8.1	8.1	8.2	7.1	84	64	11.9*	60
	7.07	24.3	24.3	189	196	8.2	8.1	8.1	7.2	80	62	0*	40*

* Indicates survival and average weight significantly less than the control group ($P<0.05$)

Table 3 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Rodeo and R-11

ATL Test Number (Chemical)	Concentration (mg/L)		Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Total Alkalinity (mg/L)	Total Hardness (mg/L)	Average Reprod-duction	Percent Survival (%)
			in	out	in	out	in	out	in	out				
CONTROL T82-03	ATL Water		24.4	24.6	213	219	8.2	8.2	7.8	7.3	85	66	28.2	90
S042203-2 (T82-03) 12-4453-3134 Glyphosate and R-11 as Nonylphenol and Nonylphenolethoxylate	glyph	R-11												
	0.3	0.2	24.5	24.4	193	191	8.1	8.1	8.1	7.2	82	62	27.3	100
	0.7	0.404	24.5	24.4	191	196	8.1	8.1	8.2	7.2	80	62	26	90
	1.3	0.81	24.4	24.4	187	195	8.2	8.2	8.1	7.2	80	64	24.8	90
	2.2	1.62	24.4	24.4	189	194	8.2	8.1	8.2	7.1	82	62	22.4*	90
	3.5	3.24	24.5	24.4	190	196	8.2	8.1	8.1	7.1	80	62	1.7*	30*

*Indicates survival and average weight significantly less than the control group ($P<0.05$)

Table 4 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Weedar-64 and R-11

ATL Test Number (Chemical)	Concentration (mg/L)		Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Average Total Alkalinity (mg/L)	Average Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
			in	out	in	out	in	out	in	out				
CONTROL T83-03	ATL Water		24.4	24.6	213	219	8.2	8.2	7.8	7.3	85	66	28.2	90
S042203-3 (T83-03) 08-7076-4171 2,4-D and R-11 as Nonylphenol and Nonylphenolethoxylate	2,4-D	R-11												
	0.7	0.51	24.4	24.3	189	195	8.2	8.1	8.0	7.3	82	62	25.1	100
	1.4	1.197	24.4	24.3	192	197	8.2	8.1	8.0	7.2	80	62	22.8*	90
	2.9	2.31	24.4	24.4	187	190	8.2	8.1	8.0	7.2	80	60	17.7*	100
	6.0	5.13	24.4	24.4	190	193	8.2	8.1	8.1	7.1	82	60	0*	70
	15.0	9.34	24.3	24.3	191	194	8.2	8.1	8.1	7.1	82	62	0*	30*

*Indicates survival and average weight significantly less than the control group ($P<0.05$)

Table 5 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Rodeo

ATL Test Number (Chemical)	Concentration (mg/L)	Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Average Total Alkalinity (mg/L)	Average Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
		in	out	in	out	in	out	in	out				
CONTROL T84-03	ATL Water	24.1	24.0	207	211	8.2	8.2	8.0	7.5	84	64	37.6	100
S042903-1 (T84-03) 08-7076-4171 glyphosate	104	24.1	24.0	229	234	7.7	8.0	8.5	7.5	82	62	17.1*	90
	205	24.0	24.0	272	281	7.4	7.8	8.4	7.5	80	62	10.4*	100
	410	24.0	24.0	359	365	6.5	6.8	8.5	7.6	82	60	4.8*	90
	806	24.1	24.0	516	531	5.8	5.9	7.9	7.6	76	58	0*	0*
	1570	24.1	24.0	813	823	5.4	5.5	7.3	7.6	64	48	0*	0*

* Indicates survival and average weight significantly less than the control group ($P<0.05$).

Table 6 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Weedar-64

ATL Test Number (Chemical)	Concentration (mg/L)	Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Average Total Alkalinity (mg/L)	Average Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
		in	out	in	out	in	out	in	out				
CONTROL T85-03	ATL Water	24.1	24.0	207	211	8.2	8.2	8.0	7.5	84	64	37.6	100
S042903-2 (T85-03) 08-7076-4171 2,4-D	40.5	24.1	24.1	192	199	8.1	8.1	8.6	7.5	82	60	30.4*	100
	71.3	24.1	24.2	220	219	8.1	8.1	8.7	7.4	84	62	13.7*	70
	161	24.0	24.0	229	236	8.2	8.2	8.4	7.6	82	60	0*	0*
	265	24.1	24.2	269	276	8.2	8.2	7.3	6.7	82	62	0*	0*
	604	24.2	24.0	344	343	8.1	8.1	7.3	6.6	82	60	0*	0*

* Indicates survival and average weight significantly less than the control group ($P<0.05$)

Table 7 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Reward

ATL Test Number (Chemical)	Concentration (mg/L)	Average Temp (°C)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Average Total Alkalinity (mg/L)	Average Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
		in	out	in	out	in	out	in	out				
CONTROL T86-03	ATL Water	24.2	24.5	182	191	8.2	8.0	7.8	7.1	89	61	31.8	100
S050603-1 (T86-03) 10-4990-5147 diquat	0.012	24.2	24.3	180	185	8.1	7.9	8.3	7.1	88	62	29.8	80
	0.019	24.2	24.3	182	185	8.1	8.0	8.4	7.1	88	62	23.1*	100
	0.055	24.2	24.3	185	189	8.2	8.1	8.3	7.1	88	62	22.9*	80
	0.108	24.2	24.2	185	189	8.2	8.1	8.4	7.1	88	62	3.4*	10*
	0.204	24.0	24.0	187	188	8.2	8.1	8.1	6.8	88	62	0.2*	0*

* Indicates survival and average weight significantly less than the control group (P<0.05)

Table 8 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Sonar

ATL Test Number (Chemical)	Concentration (mg/L)	Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Average Total Alkalinity (mg/L)	Average Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
		in	out	in	out	in	out	in	out				
CONTROL T87-03	ATL Water	24.2	24.5	196	191	8.2	8.0	7.8	7.1	89	61	30.8	100
S050603-2 (T87-03) 08-0515-9183 fluridone	0.65	24.1	24.3	180	184	8.1	8.0	8.3	7.0	88	60	30.1	100
	1.28	24.0	24.3	184	191	8.1	8.1	8.2	7.0	86	60	29.1	100
	2.43	24.0	24.3	184	189	8.2	8.1	8.2	7.1	88	60	27.2	90
	4.6	24.0	24.2	182	187	8.1	8.1	8.3	7.1	88	60	0*	90
	9.76	24.0	24.0	184	186	8.2	8.1	8.3	6.7	88	60	0*	0*

* Indicates survival and average weight significantly less than the control group ($P<0.05$)

Table 9 Mean characteristics of chemical dilutions, survival and reproduction of *Ceriodaphnia dubia* in a 7-d definitive chronic test on Komeen

ATL Test Number (Chemical)	Concentration (mg/L)	Average Temp (°c)		Average Specific Cond (µmho/cm)		Average pH		Average D.O. (mg/L)		Average Total Alkalinity (mg/L)	Total Hardness (mg/L)	Average Reprod-tion	Percent Survival (%)
		in	out	in	out	in	out	in	out				
CONTROL T144-03	ATL Water	24.7	24.9	287	291	8.6	8.4	7.7	7.0	141	102	29.5	100
S061803-1 (T144-03) 14-6775-0234 copper	0.012	24.2	24.4	292	300	8.5	8.4	8.2	6.8	146	110	29.4	100
	0.021	24.4	24.3	295	301	8.5	8.4	8.3	6.7	146	110	26.9	100
	0.0416	24.3	24.2	298	304	8.5	8.3	8.2	6.6	148	110	20*	90
	0.0876	24.5	24.0	281	292	8.4	8.3	8.1	7.2	142	102	8.1*	40*
	0.17	24.5	24.0	289	293	8.2	8.3	7.9	6.6	142	104	0*	0*

* Indicates survival and average weight significantly less than the control group (P<0.05)