

Diuron Criteria Derivation
DRAFT

Appendix

Data summary sheets for data rated relevant and reliable

Abbreviations used in this appendix:

NR = Not Reported

RR = Relevant, Reliable study

Unused lines deleted from tables

Summary sheets are in alphabetical order according to species.

Toxicity Data Summary

Chironomus tentans

Study: Nebeker AV, Schuyttema GS. 1998. Chronic effects of the herbicide diuron on freshwater cladocerans, amphipods, midges, minnows, worms, and snails. *Archives of Environmental Contamination and Toxicology* 35:441-446.

Relevance

Score: 100

Rating: R

Reliability

Score: 97

Rating: R

Reference	Nebeker and Schuyttema 1998	<i>C. tentans</i>
Parameter	Value	Comment
Test method cited	ASTM 1997	
Phylum	Arthropoda	
Class	Insecta	
Order	Diptera	
Family	Chironimidae	
Genus	<i>Chironomus</i>	
Species	<i>Tentans</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	2-day first instar larvae	
Source of organisms	ARS, Hampton NH	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	Yes	
Test duration	10-d	
Data for multiple times?	No	
Effect 1	Survival	
Control response 1	9.0 ± 0.2 of 10 organisms	From 3 reps
Effect 2	Larval weight at end	
Control response 2	0.5 ± 0 mg	From 3 reps with 10 animals/rep
Temperature	24° C	
Test type	10-d Static renewal	
Photoperiod/light intensity	NR	
Dilution water	Well water	
pH	6.9 ± 0.1	
Hardness	24 ± 1 mg/L	
Alkalinity	26 ± 1 mg/L	
Conductivity	78 ± 1 µs/cm	
Dissolved Oxygen	6.6-7.2 mg/L	

Reference	Nebeker and Schuytema 1998	<i>C. tentans</i>
Parameter	Value	Comment
Feeding	1 st day: Algal culture, fed daphnia food starting on Day 3	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	NR	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	12.2 ± 1.5 mg/L	3 reps, 10 per rep
Concentration 2 Meas	7.1 mg/L	3 reps, 10 per rep
Concentration 3 Meas	3.4 mg/L	3 reps, 10 per rep
Concentration 4 Meas	1.9 ± 0.4 mg/L	3 reps, 10 per rep
Control	0	3 reps, 10 per rep
LC50; calculation method	10-d LC50: 3.3mg/L (2.4-4.5)	Method: Trimmed Spearman-Kärber
NOEL; calculation method, significance level (p-value) and minimum significant difference (MSD)	1.9 mg/L – based on mortality 3.4 mg/L – based on reduced weight	Method: Dunnett's Multiple Comparison, EPA p ≤0.05 MSD: NR
LOAEL	3.4 mg/L – based on mortality 7.1 mg/L – based on reduced weight	Method: Dunnett's Multiple Comparison, EPA p ≤0.05
MATC (GeoMean NOEC, LOEC)	2.54 mg/L – based on mortality 4.91 mg/L – based on reduced weight	

Notes:

Reliability Point Losses Table 3.7: -3 Photoperiod not actually reported, but likely followed that of ASTM method

Reliability Point Losses Table 3.8: -1 MSD not reported, -2 Photoperiod not reported

Toxicity Data Summary

Chlamydomonas moewusii

Study: Cain JR and Cain RK. 1983. The Effects of Selected Herbicides on Zygospor Germination and Growth of *Chlamydomonas moewusii* (Chlorophyceae, Volvocales). *Journal of Phycology* 19:301-305.

Relevance

Score: 90*

Rating: R

Reliability

Score: 80.5

Rating: R

* No standard method

Reference	Cain & Cain 1983	<i>C. moewusii</i>
Parameter	Value	Comment
Test method cited	NR	
Phylum	Chlorophyta	
Class	Chlorophyceae	
Order	Chlamydomonadales	
Family	Chlamydomonadaceae	
Genus	<i>Chlamydomonas</i>	
Species	<i>moewusii</i> Gerloff	UTEX strain 97
Family in North America?	Unsure	
Age/size at start of test/growth phase	Cells from stock incubated for 7d; 2.0 x 10 ⁶ cells/plate	stock cultures 1 week old
Source of organisms	University of Texas, Austin	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	Yes	
Test vessels randomized?	No	
Test duration	7 d	
Data for multiple times?	No	
Effect 1	Growth Inhibition	Meas. by absorbance at 565 nm
Control response 1	Not reported, but growth reported as % of controls	
Effect 2	Inhibition of zygospor germination	
Control response 2	Not reported, but germination reported as % of controls	
Temperature	21° C	+/- 1° C
Test type	Static	In media
Photoperiod/light intensity	Continuous 15.3 W/m ²	Band width 430-668 nm
Dilution water	Liquid medium A (1.5% agar)	Ref. Trainor FR 1969. <i>J. Phycol.</i> 5:185-190.
pH	NR	

Reference	Cain & Cain 1983	<i>C. moewusii</i>
Parameter	Value	Comment
Hardness	NR	
Alkalinity	NR	
Conductivity	NR	
Dissolved Oxygen	NR	
Feeding	Incorporated in liquid medium A	
Purity of test substance	80%	Karmex
Concentrations measured?	No	
Measured is what % of nominal?	NR	
Chemical method documented?	No	
Concentration of carrier (if any) in test solutions	0	
Concentration 1 Nom (μM ; $\mu\text{g/L}$)	1.0; 233.1	2 reps w/ triplicates
Concentration 2 Nom (μM ; $\mu\text{g/L}$)	2.5; 582.75	2 reps w/ triplicates
Concentration 3 Nom (μM ; $\mu\text{g/L}$)	5.0; 1165.5	2 reps w/ triplicates
Concentration 4 Nom (μM ; $\mu\text{g/L}$)	7.5; 1748.25	2 reps w/ triplicates
Concentration 5 Nom (μM ; $\mu\text{g/L}$)	10.0; 2331	2 reps w/ triplicates
Concentration 6 Nom (μM ; $\mu\text{g/L}$)	15.0; 3496.5	2 reps w/ triplicates
Concentration 7 Nom (μM ; $\mu\text{g/L}$)	20.0; 4662	2 reps w/ triplicates
Concentration 8 Nom (μM ; $\mu\text{g/L}$)	30.0; 6993	2 reps w/ triplicates
Concentration 9 Nom (μM ; $\mu\text{g/L}$)	40.0; 9324	2 reps w/ triplicates
Concentration 10 Nom (μM ; $\mu\text{g/L}$)	50.0; 11655	2 reps w/ triplicates
Concentration 11 Nom (μM ; $\mu\text{g/L}$)	60.0; 13986	2 reps w/ triplicates
Concentration 12 Nom (μM ; $\mu\text{g/L}$)	80.0; 18648	2 reps w/ triplicates
Control	0	2 reps w/ triplicates
EC50; indicate calculation method (95% CI)	7d EC50 = 2.4 μM = 559.44 $\mu\text{g/L}$	Based on growth inhibition Method: NR $p < 0.05$

Other notes:

- When there was an absence of visible growth, the subculture technique was modified to determine if the treatment was algicidal or algistatic.
- EC50 concentrations are reported as active ingredient, not the concentration of the total formulation.
- Concentrations 1.0- 10.0 μM showed decreased growth that was significantly different from the control ($p < 0.05$).
- Concentrations 15.0-80.0 μM showed absence of visible growth for diuron, 15.0-30.0 μM were algistatic and 40.0- 80.0 μM were algicidal for diuron.
- Zygospor germination was not inhibited significantly by diuron at any concentrations tested. Zygospor are known to be more resistant than vegetative cells to herbicides.

Reliability Point Losses Table 3.7: -4 analytical method NR, -3 measured conc NR, -5 statistical methods NR, -6 hypothesis test statistics NR. Hardness, alkalinity, DO, conductivity, and pH NR, but is OK because it's a plant study.

Reliability Point Losses Table 3.8: -5 no std method, -4 measured conc NR, -2 random design NR, - statistical method NR, -3 hypothesis test info. Hardness, alkalinity, DO, conductivity, and pH NR, but is OK because it's a plant study.

Toxicity Data Summary

Daphnia magna

Study: Baer, KN. 1991. Static, Acute 48-hour EC50 of DPX-14740-165 (Karmex DF) to *Daphnia magna*. EPA MRID 420460-03. DuPont Haskell Laboratory for Toxicology and Industrial Medicine. Newark, DE.

Relevance
Score: 100
Rating: R

Reliability
Score: 91.5
Rating: R

Reference	Baer 1991	<i>D. magna</i>
Parameter	Value	Comment
Test method cited	EPA GLP for FIFRA	40 CFR 160
Phylum	Arthropoda	
Class	Branchiopoda	
Order	Diplostraca	
Family	Daphniidae	
Genus	<i>Daphnia</i>	
Species	<i>magna</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	Neonates (<24h old) from 28d old parents	
Source of organisms	Lab culture	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	Yes	
Test vessels randomized?	Not Reported	
Test duration	48h	
Data for multiple times?	Yes	
Effect 1	Immobility	
Control response 1	10% immobile at 48h	
Temperature (°C)	19.9 (mean)	
Test type	Static	Un aerated
Photoperiod/light intensity	16h light	
Dilution water	Lab well water	
pH	8.0-8.3	Meas. at 0 and 48h in 1 rep of each conc.
Hardness	78 mg/L as CaCO ₃	
Alkalinity	80 mg/L as CaCO ₃	
Conductivity	170 µmhos/cm	
Dissolved Oxygen	8.2-8.7 mg/L	Meas. at 0 and 48h in 1 rep of each conc.
Feeding	None during test	

Reference	Baer 1991	<i>D. magna</i>
Parameter	Value	Comment
Purity of test substance	80% of formulation	20% inert ingredients
Concentrations measured?	Yes	
Measured is what % of nominal?	10-95%	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	0%	
Concentration 1 Nom*/Meas (mg/L)	5.0/3.8	4 reps with 5 daphnids each
Concentration 2 Nom*/Meas (mg/L)	8.4/6.3	4 reps with 5 daphnids each
Concentration 3 Nom*/Meas (mg/L)	14/9.7	4 reps with 5 daphnids each
Concentration 4 Nom*/Meas (mg/L)	23/13	4 reps with 5 daphnids each
Concentration 5 Nom*/Meas (mg/L)	39/16	4 reps with 5 daphnids each
Concentration 6 Nom*/Meas (mg/L)	65/17	4 reps with 5 daphnids each
Concentration 7 Nom*/Meas (mg/L)	108/19	4 reps with 5 daphnids each
Concentration 8 Nom*/Meas (mg/L)	180/20	4 reps with 5 daphnids each
Concentration 9 Nom*/Meas (mg/L)	300/24	4 reps with 5 daphnids each
Control	Dilution water	4 reps with 5 daphnids each
EC50 (24 h); calculation method	EC50=68 mg/L 95% fiducial interval: 55-86 mg/L, slope: 2.8, y-int: -0.19	Based on nominal total formulation conc. Method:
EC50 (48 h); calculation method	EC50=12 mg/L 95% fiducial interval: 10-13 mg/L, slope: 7.0, y-int: -2.5	Based on nominal total formulation conc.

Other notes:

*Nominal concentrations are of the total formulation, whereas the measured concentrations are of only the active ingredient, which is 80% of the total formulation.

All test concentrations (excluding controls) were cloudy with undissolved test substance slowly settling to the bottom of the test vessels during the exposure period. Undissolved solids are present in the formulation (inert ingredients). Measured concentrations are based on analysis of settled test solutions where the active ingredient sorbs to the settled undissolved solids present in the formulation, particularly at concentrations near or above the approximately 40 ppm solubility.

Daphnids were considered immobile if they were unable to swim within 15 s after gentle prodding with a glass rod.

Reliability Point Losses Table 3.7: -8 hypothesis tests

Reliability Point Losses Table 3.8: -4 meas conc NR, -4 water solubility, -3 hypothesis tests

Toxicity Data Summary

Daphnia pulex

Study: Nebeker AV, Schuytema GS. 1998. Chronic effects of the herbicide diuron on freshwater cladocerans, amphipods, midges, minnows, worms, and snails. *Archives of Environmental Contamination and Toxicology* 35:441-446.

Relevance
Score: 100
Rating: R

Reliability
Score: 93
Rating: R

Reference	Nebeker and Schuytema 1998	<i>D. pulex</i>
Parameter	Value	Comment
Test method cited	ASTM 1997	
Phylum	Arthropoda	
Class	Branchiopoda	
Order	Cladocera	
Family	Daphniidae	
Genus	<i>Daphnia</i>	
Species	<i>pulex</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	5-day	
Source of organisms	Small ponds in Corvallis Oregon	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	Yes	
Test duration	7-d chronic, 96-h acute	
Data for multiple times?	No	
Effect 1	Survival	
Control response 1	100%	
Effect 2	# young produced	
Control response 2	36.7 ± 1.3	
Temperature	NR	
Test type	7-d Static	
Photoperiod/light intensity	NR	
Dilution water	Well water	
pH	6.9 ± 0.1	
Hardness	24 ± 1 mg/L	
Alkalinity	26 ± 1 mg/L	
Conductivity	78 ± 1 µs/cm	
Dissolved Oxygen	7.4-8.0 mg/L	
Feeding	100-150µl fish food and yeast slurry	

Reference	Nebeker and Schuytema 1998	<i>D. pulex</i>
Parameter	Value	Comment
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	NR	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	Not Reported	
Concentration 1 Meas	17.8 mg/L	3 reps, 5 per rep
Concentration 2 Meas	7.7 ± 0.6mg/L	3 reps, 5 per rep
Concentration 3 Meas	4.0 mg/L	3 reps, 5 per rep
Concentration 4 Meas	1.9 ± 0.1 mg/L	3 reps, 5 per rep
Concentration 5 Meas	0.9 mg/L	3 reps, 5 per rep
Concentration 6 Meas	0.4 mg/L	3 reps, 5 per rep
Control	0	3 reps, 5 per rep
LC50; indicate calculation method	96-h: 17.9 (14.2-22.6) 7-d: 7.1 (5.8-8.8) mg/L	Trimmed Spearman-Kärber
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	7-d: 4.0 mg/L	Method: Dunnett's Multiple Comparison, EPA p ≤0.05 Based on mortality and reduced # of young
LOAEL; indicate calculation method	7-d: 7.7 mg/L	Method: Dunnett's Multiple Comparison, EPA p ≤0.05 Based on mortality and reduced # of young
MATC (GeoMean NOEC, LOEC)	5.55 mg/L	

Notes:

Reliability Point Losses Table 3.7: -4 Temperature not reported, -3 Photoperiod not actually reported, but likely followed that of ASTM method

Reliability Point Losses Table 3.8: -6 Temperature not reported, -1 MSD not reported, -2 Photoperiod not reported

Toxicity Data Summary

Hyaella azteca

Study: Nebeker AV, Schuytema GS. 1998. Chronic effects of the herbicide diuron on freshwater cladocerans, amphipods, midges, minnows, worms, and snails. *Archives of Environmental Contamination and Toxicology* 35:441-446.

Relevance

Score: 100

Rating: R

Reliability

Score: 97

Rating: R

Reference	Nebeker & Schuytema 1998	<i>H. azteca</i>
Parameter	Value	Comment
Test method cited	ASTM 1997	
Phylum	Arthropoda	
Class	Malacostraca	
Order	Amphipoda	
Family	Hyaellidae	
Genus	<i>Hyaella</i>	
Species	<i>Azteca</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	2-day neonates	
Source of organisms	Wetlands at Oregon Dept. Fish and Wildlife Refuge	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	Yes	
Test duration	10-d chronic, 96-h acute	
Data for multiple times?	No	
Effect 1	Survival	
Control response 1	100%	
Effect 2	Growth	
Control response 2	Length 2.3 mm, Wet weight 0.2 ± 0.1	
Temperature	22° C	
Test type	10-d Static renewal	
Photoperiod/light intensity	NR	
Dilution water	Well water	
pH	6.9 ± 0.1	
Hardness	24 ± 1 mg/L	
Alkalinity	26 ± 1 mg/L	
Conductivity	78 ± 1 µs/cm	
Dissolved Oxygen	6.6-7.2 mg/L	

Reference	Nebeker & Schuytema 1998	<i>H. azteca</i>
Parameter	Value	Comment
Feeding	Brine shrimp, daphnia food, rabbit food	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	NR	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	28.5 ± 1.0 mg/L	3 reps, 5 per rep
Concentration 2 Meas	22.9 mg/L	3 reps, 5 per rep
Concentration 3 Meas	15.7 ± 0.3 mg/L	3 reps, 5 per rep
Concentration 4 Meas	7.9 mg/L	3 reps, 5 per rep
Concentration 5 Meas	4.2 ± 0.1 mg/L	3 reps, 5 per rep
Control	0	3 reps, 5 per rep
LC50; indicate calculation method	96-h: 19.4 (17.7-21.3) 10-d: 18.4 (16.5-20.5)	Trimmed Spearman-Kärber
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	10-d : 7.9 mg/L	Method: Dunnett's Multiple Comparison, EPA p: ≤0.05 Based on mortality and reduced weight
LOAEL; indicate calculation method	10-d: 15.7 mg/L	Method: Dunnett's Multiple Comparison, EPA p: ≤0.05 Based on mortality and reduced weight
MATC (GeoMean NOEC, LOEC)	11.14 mg/L	

Notes:

Reliability Point Losses Table 3.7: -3 Photoperiod not actually reported, but likely followed that of ASTM method

Reliability Point Losses Table 3.8: -1 MSD not reported, -2 Photoperiod not reported

Toxicity Data Summary

Lemna minor

Study: Teisseire H, Couderchet M, Vernet G. 1999. Phytotoxicity of diuron alone and in combination with copper or folpet on duckweed (*Lemna minor*). *Environmental Pollution*. 106:39-45.

Relevance

Score: 90*

Rating: R

Reliability

Score: 76.5

Rating: R

*No std method

Reference	Teisseire <i>et al.</i> 1999	<i>L. minor</i>
Parameter	Value	Comment
Test method cited	None	
Phylum	Magnoliophyta	Division
Class	Liliopsida	
Order	Arales	
Family	Lemnaceae	
Genus	<i>Lemna</i>	
Species	<i>minor</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	NR	
Source of organisms	Artificial pond at Universite de Reims Champagne-Ardenne, France	
Have organisms been exposed to contaminants?	No	
Organisms acclimated and disease-free?	Yes	
Organisms randomized?	No	
Test vessels randomized?	Yes	
Test duration	7-d	
Data for multiple times?	No	
Effect 1	Growth inhibition	Procedure in Teisseire <i>et al.</i> 1998 <i>Ecotoxicol. Env. Safety</i> . 41:194-200.
Control response 1	Reported as % control	
Effect 2	Total chlorophyll content	
Control response 2	21.06 µg/mg dry wt	
Temperature	25° C	
Test type	Static renewal	Renewal on day 4
Photoperiod/light intensity	Constant 2500 ± 150 lux	Equiv. to 40 µmol PAR m ⁻² s ⁻¹
Dilution water	Mineral medium	Teisseire <i>et al.</i> 1998. <i>Ecotoxicol. Env. Safety</i> . 41:194-200.
pH	NR	

Reference	Teisseire <i>et al.</i> 1999	<i>L. minor</i>
Parameter	Value	Comment
Hardness	NR	
Alkalinity	NR	
Conductivity	NR	
Dissolved Oxygen	NR	
Feeding	Incorporated in media	
Purity of test substance	98%	
Concentrations measured?	No	
Measured is what % of nominal?	n/a	
Chemical method documented?	No	
Concentration of carrier (if any) in test solutions	None	
Concentration 1 Nom ($\mu\text{g/L}$)	5	3 reps, triplicates
Concentration 2 Nom ($\mu\text{g/L}$)	10	3 reps, triplicates
Concentration 3 Nom ($\mu\text{g/L}$)	20	3 reps, triplicates
Concentration 4 Nom ($\mu\text{g/L}$)	30	3 reps, triplicates
Concentration 5 Nom ($\mu\text{g/L}$)	40	3 reps, triplicates
Concentration 6 Nom ($\mu\text{g/L}$)	60	3 reps, triplicates
Concentration 7 Nom ($\mu\text{g/L}$)	100	3 reps, triplicates
Control	0	3 reps, triplicates
LCx; indicate calculation method	n/a	
ECx; indicate calculation method	7d EC50 = $25 \pm 3 \mu\text{g/L}$ 7d EC90 = $60 \pm 2 \mu\text{g/L}$	Based on growth
NOEC; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	NR	Method: NR
LOEC; indicate calculation method	5 $\mu\text{g/L}$	

Other notes:

Concentrations given as active ingredient.

Chlorophyll content remained higher than the control after 7d exposure at the EC90 concentration (growth), which suggests that in spite of growth inhibition the integrity of the cell is maintained.

Reliability Point Losses Table 3.7: -5 size of organism NR, -4 analytical method NR, -3 measured concentrations NR, -5 statistical methods NR, -6 hypothesis tests. Hardness, alkalinity, DO, conductivity, and pH NR but OK because plant study.

Reliability Point Losses Table 3.8: -5 No std method, -4 measured conc NR, -3 growth phase NR, -2 random design NR, -2 statistical method NR, -2 hypothesis tests. Hardness, alkalinity, DO, conductivity, and pH NR but OK because plant study.

Toxicity Data Summary

Lumbriculus variegatus

Study: Nebeker AV, Schuytema GS. 1998. Chronic effects of the herbicide diuron on freshwater cladocerans, amphipods, midges, minnows, worms, and snails. *Archives of Environmental Contamination and Toxicology* 35:441-446.

Relevance
Score: 100
Rating: R

Reliability
Score: 97
Rating: R

Reference	Nebeker & Schuytema 1998	<i>L. variegatus</i>
Parameter	Value	Comment
Test method cited	ASTM 1997	
Phylum	Annelida	
Class	Clitellata	
Order	Lumbriculida	
Family	Lumbriculidae	
Genus	<i>Lumbriculus</i>	
Species	<i>Variegates</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	“small, short adults”	
Source of organisms	Collected @ ponds from EPA, Corvallis OR	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	Yes	
Test duration	10-d	
Data for multiple times?	No	
Effect 1	Survival	
Control response 1	100%	
Effect 2	Blotted wet weight	
Control response 2	8.8 ± 0.3 mg	
Temperature	23° C	
Test type	Static 10-d renewal	
Photoperiod/light intensity	NR	
Dilution water	Well water	
pH	6.8 ± 0.1	
Hardness	23 ± 2 mg/L	
Alkalinity	25 ± 1 mg/L	
Conductivity	75 ± 5 µs/cm	
Dissolved Oxygen	NR	
Feeding	Frozen fish food ad lib.	

Reference	Nebeker & Schuytema 1998	<i>L. variegatus</i>
Parameter	Value	Comment
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	NR	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	29.1 mg/L	3 reps, 10 per rep
Concentration 2 Meas	22.8 ± 3.2 mg/L	3 reps, 10 per rep
Concentration 3 Meas	13.0 ± 1.0 mg/L	3 reps, 10 per rep
Concentration 4 Meas	7.1 mg/L	3 reps, 10 per rep
Concentration 5 Meas	3.5 ± 0.1 mg/L	3 reps, 10 per rep
Concentration 6 Meas	1.8 ± 0.3 mg/L	3 reps, 10 per rep
Concentration 7 Meas	0.4 mg/L	3 reps, 10 per rep
Control	0	3 reps, 10 per rep
LCx; indicate calculation method	No LC50 b/c 100% survival	But effects on weight occurred at >3.5 mg/L
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	1.8 mg/L	Method: Dunnett's p: ≤0.05 Based on reduced weight
LOAEL; indicate calculation method	3.5 mg/L	Method: Dunnett's p: ≤0.05 Based on reduced weight
MATC (GeoMean NOEC, LOEC)	2.51 mg/L	

Notes:

Reliability Point Losses Table 3.7: -3 Photoperiod not actually reported, but likely followed that of ASTM method

Reliability Point Losses Table 3.8: -1 MSD not reported, -2 Photoperiod not reported

Toxicity Data Summary

Physa gyrina

Study: Nebeker AV, Schuytema GS. 1998. Chronic effects of the herbicide diuron on freshwater cladocerans, amphipods, midges, minnows, worms, and snails. *Archives of Environmental Contamination and Toxicology* 35:441-446.

Relevance

Score: 100

Rating: R

Reliability

Score: 97

Rating: R

Reference	Nebeker & Schuytema 1998	<i>P. gyrina</i>
Parameter	Value	Comment
Test method cited	ASTM 1997	
Phylum	Mollusca	
Class	Gastropoda	
Order	Basommatophora	
Family	Physidae	
Genus	<i>Physa</i>	
Species	<i>gyrina</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	15-day old snails, 1-1.5 mm diameter	
Source of organisms	ARS, Hampton NH	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	Yes	
Test duration	10-d	
Data for multiple times?	No	
Effect 1	Survival	
Control response 1	9.0 ± 0.2 of 10 snails	Ranged 8.7-10 for 6 exposure levels
Effect 2	Wet weight at end	
Control response 2	5.3 ± 0.1 mg	Ranged 0.4-3.7 mg for 6 exposures
Temperature	23° C	
Test type	10-d Static renewal	
Photoperiod/light intensity	NR	
Dilution water	Well water	
pH	6.9 ± 0.1	
Hardness	24 ± 1 mg/L	
Alkalinity	26 ± 1 mg/L	
Conductivity	78 ± 1 µs/cm	
Dissolved Oxygen	6.6-7.2 mg/L	

Reference	Nebeker & Schuytema 1998	<i>P. gyrina</i>
Parameter	Value	Comment
Feeding	1 st day: Algal culture, fed daphnia food starting on Day 3	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	NR	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	29.1 mg/L	3 reps, 10 per rep
Concentration 2 Meas	22.8 ± 3.1 mg/L	3 reps, 10 per rep
Concentration 3 Meas	13.4 ± 1.1 mg/L	3 reps, 10 per rep
Concentration 4 Meas	7.6 mg/L	3 reps, 10 per rep
Concentration 5 Meas	3.5 ± 0.1 mg/L	3 reps, 10 per rep
Concentration 5 Meas	1.8 ± 0.3 mg/L	3 reps, 10 per rep
Control	0	3 reps, 10 per rep
LC50; indicate calculation method	Not calculable	Trimmed Spearman-Kärber
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	13.4 mg/L	Method: Dunnett's Multiple Comparison, EPA p ≤ 0.05 based on reduced weight
LOAEL; indicate calculation method	22.8 mg/L	Method: Dunnett's Multiple Comparison, EPA p ≤ 0.05 Based on reduced weight
MATC (GeoMean NOEC, LOEC)	17.5 mg/L	

Notes:

Reliability Point Losses Table 3.7: -3 Photoperiod not actually reported, but likely followed that of ASTM method

Reliability Point Losses Table 3.8: -1 MSD not reported, -2 Photoperiod not reported

Toxicity Data Summary

Pimephales promelas

Study: Call DJ, Brooke LT, and Kent RJ. 1983. Toxicity, Bioconcentration and Metabolism of 5 Herbicides in Freshwater Fish, EPA # 452601029. Environmental Research Laboratory-Duluth. *Same as Call *et al.* 1987.

Relevance

Score: 82.5 (acute), 90 (chronic)*
 Rating: L (acute), R (chronic)

Reliability

Score: 82
 Rating: R

*Acute: no standard method, no control response, Chronic: no standard method

Note: Report page numbers cited refer to upper right hand corner page number

Reference	Call <i>et al.</i> 1983	<i>P. promelas</i>
Parameter	Value	Comment
Test method cited	NR	
Phylum	Chordata	
Class	Actinopterygii	
Order	Cypriniformes	
Family	Cyprinidae	
Genus	<i>Pimephales</i>	
Species	<i>promelas</i>	Fathead minnow
Family in North America?	Yes	
Age/size at start of test/growth phase	Acute: 30-d Chronic: eggs >24-h	
Source of organisms	US EPA Environmental Research Laboratory in Duluth	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	NR	
Test vessels randomized?	NR	
Test duration	Acute: 192-h Chronic: 54-60 days	
Data for multiple times?	Yes, 96-h acute data and others reported	
Effect 1	Acute Mortality	
Control response 1	NR	
Effect 2	Egg Hatchability	
Control response 2	67.9%	Ranged 66.1-77.9% for 5 exposure levels, no effect from Diuron
Effect 3	Mean # survivors after 64-d exposure (60 d post-hatch)	30 fry total in each rep
Control response 3	24.5	Ranged 7.5-28 for 5 exposure levels

Reference	Call <i>et al.</i> 1983	<i>P. promelas</i>
Parameter	Value	Comment
Effect 4	Mean % Abnormal and dead fry after 5-d exposure	
Control response 4	2.2%	Ranged 0.6-15% for 5 exposure levels
Effect 5	Mean wet weight after 64-d exposure (60-d post-hatch)	
Control response 5	0.568 g	Ranged 0.496-0.619 g for 5 exposure levels, no effect from diuron
Effect 6	Mean length after 64-d exposure (60-d post-hatch)	
Control response 6	32.2 mm	Ranged 29.1-32.4 mm for 5 exposure levels, no effect from diuron
Temperature	25°C	
Test type	Flow-through	Proportional diluter system
Photoperiod/light intensity	“normal lab lighting conditions”, 2x40 watts fluorescent bulbs	
Dilution water	Lake Superior water	
pH	75 ± 0.1	
Hardness (mg/L as CaCO ₃)	46.4 ± 2.2 (acute), 48.4 ± 4.3 (chronic)	
Alkalinity (mg/L as CaCO ₃)	42.1 ± 2.0 (acute), 46.9 ± 2.9 (chronic)	
Conductivity	NR	
Dissolved Oxygen	Acute: 89.6-94.5% saturation Chronic: 89.9 – 92.9% saturation	
Feeding	Acute: No Chronic: tetramin and brine shrimp	
Purity of test substance	Technical grade 98.6%	
Concentrations measured?	Yes	
Measured is what % of nominal?	88.9% ± 6.0%	
Chemical method documented?	Extraction w/ methylene chloride and analysis by HPLC, Farrington et al (1977)	
Concentration of carrier (if any) in test solutions	0%	Generated from a sand column
Concentration 1 Meas	Acute: 5.54 mg/L Chronic: 2.6 µg/L	Acute: 20 per aquarium in duplicate reps Chronic: 30 per aquarium in duplicate reps

Reference	Call <i>et al.</i> 1983	<i>P. promelas</i>
Parameter	Value	Comment
Concentration 2 Meas	Acute: 7.94 mg/L Chronic: 6.1 µg/L	Same as above
Concentration 3 Meas	Acute: 11.14 mg/L Chronic: 14.5 µg/L	Same as above
Concentration 4 Meas	Acute: 15.42 mg/L Chronic: 33.4 µg/L	Same as above
Concentration 5 Meas	Acute: 24.20 mg/L Chronic: 78.0 µg/L	Same as above
Control	0	Duplicates
LC50 (95% Confidence interval)	24 h: 23.3 (21.0-25.9) mg/L 48 h: 19.9 (19.5-20.4) mg/L 96-h: 14.2 (13.4-15.0) mg/L 192-h: 7.7 (6.0-9.9) mg/L	Method: NR p: 0.05
NOEC	33.4 µg/L	Method: NR
LOEC	78.0 µg/L	p < 0.01 for abnormal/dead after 5-d exposure p < 0.05 for survival after 64-d exposure (60-d post-hatch)

Reliability Point Losses Table 3.7: -3 measured conc NR, -2 conductivity NR, -3 photoperiod NR, -5 statistical methods NR, -4 hypothesis tests

Reliability Point Losses Table 3.8: -5 no std method, -4 measured conc NR, -1 random assignment NR, -3 temperature not +/- 1 deg C, -1 conductivity NR, -2 photoperiod NR, -2 random design NR, -2 statistical method NR, -2 hypothesis tests

Toxicity Data Summary

Pimephales promelas

Study: Call, DJ, Brooke, LT, Kent, RJ, Knuth, ML, Poirier, SH, Huot, JM, Lima, AR. 1987. Bromacil and Diuron Herbicides: Toxicity, Uptake, and Elimination in Freshwater Fish. *Archives of Environmental Contamination and Toxicology* 16:607-613. *Same as Call *et al.* 1983.

Relevance

Score: 82.5 (acute), 90 (chronic)
 Rating: L (acute), R (chronic)

Reliability

Score: 84.5
 Rating: R

*Acute: no standard method, no control response, Chronic: no standard method

Reference	Call <i>et al.</i> 1987	<i>P. promelas</i>
Parameter	Value	Comment
Test method cited	EPA	
Phylum	Chordata	
Class	Actinopterygii	
Order	Cypriniformes	
Family	Cyprinidae	
Genus	<i>Pimephales</i>	
Species	<i>promelas</i>	Fathead minnow
Family in North America?	Yes	
Age/size at start of test/growth phase	Acute: 30-d old Chronic: Eggs < 24-h, hatched fry	
Source of organisms	Lab culture	Environmental Research Laboratory-Duluth (USEPA)
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	NR	
Test vessels randomized?	NR	
Test duration	Acute: 24-192 h Chronic: 64-d	
Data for multiple times?	Yes	
Effect 1	Mortality	
Control response 1	NR	
Effect 2	Egg Hatchability	
Control response 2	67.9%	
Effect 3	Fish growth (length and wet weight) at 60-d post-hatch	
Control response 3	32.2 mm, 0.568 g	
Effect 4	Mortality and deformity	
Control response 4	2.2%	
Effect 5	Survival at 60-d post-hatch	
Control response 5	24.5 fish of 30	

Reference	Call <i>et al.</i> 1987	<i>P. promelas</i>
Parameter	Value	Comment
Temperature (°C)	Acute: 24.3 Chronic: 25	
Test type	FT	
Photoperiod/light intensity	NR	
Dilution water	Lake Superior water	
pH	7.4	
Hardness	47.4 ± 2.8 mg/L as CaCO ₃	
Alkalinity	43 ± 2.3 mg/L as CaCO ₃	
Conductivity	NR	
Dissolved Oxygen	Acute: 88.6-94.5% saturation Chronic: 91.2 ± 1.5% sat.	
Feeding	Acute: none Chronic: tetramin/brine shrimp	
Purity of test substance	96.8%	
Concentrations measured?	Yes	At 0 and 120 h
Measured is what % of nominal?	88.9% ± 6.0%	
Chemical method documented?	Yes	Spectrophotometric
Concentration of carrier (if any) in test solutions	0.01% acetone or less	
Concentration 1 Meas	Acute: 5.54 ± 0.47 mg/L Chronic: 2.6 ± 0.7 µg/L	
Concentration 2 Meas	Acute: 7.94 ± 0.43 mg/L Chronic: 6.1 ± 1.6 µg/L	
Concentration 3 Meas	Acute: 11.1 ± 0.88 mg/L Chronic: 14.5 ± 2.0 µg/L	
Concentration 4 Meas	Acute: 16.4 ± 0.76 mg/L Chronic: 33.4 ± 4.8 µg/L	
Concentration 5 Meas	Acute: 24.2 ± 0.23 mg/L Chronic: 78.0 ± 8.1 µg/L	
Control	Dilution water control, Solvent control (acetone)	
LC50; indicate calculation method	24 h: 23.3 mg/L 48 h: 19.9 mg/L 96 h: 14.2 mg/L 192 h: 7.7 mg/L	Method; NR
NOEC	33.4 µg/L	Method: NR
LOEC	78.0 µg/L	Method: NR
MATC (geomean of NOEC, LOEC)	51.0 µg/L	

Reliability Point Losses Table 3.7: -5 organism source NR, -3 nominal conc NR, -2 conductivity NR, -3 photoperiod NR, - MSD NR

Reliability Point Losses Table 3.8: -4 measured conc NR, -1 random assignment NR, -2 #/rep NR, -3 temperature not +/- 1 deg C, -1 conductivity NR, -2 photoperiod NR, -2 random design NR, -1 MSD NR

Toxicity Data Summary

Pimephales promelas

Study: Nebeker AV, Schuytema GS. 1998. Chronic effects of the herbicide diuron on freshwater cladocerans, amphipods, midges, minnows, worms, and snails. *Archives of Environmental Contamination and Toxicology* 35:441-446.

Relevance
Score: 100
Rating: R

Reliability
Score: 97
Rating: R

Reference	Nebeker & Schuytema 1998	<i>P. promelas</i>
Parameter	Value	Comment
Test method cited	ASTM 1997	
Phylum	Chordata	
Class	Actinopterygii	
Order	Cypriniformes	
Family	Cyprinidae	
Genus	<i>Pimephales</i>	
Species	<i>promelas</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	Embryo/Larval (E/L): 2.5 d Juvenile (J): 1.5 months	
Source of organisms	USEPA, Corvallis OR lab culture	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	Yes	
Test vessels randomized?	NR	
Test duration	E/L: 7-d; J: 10-d	
Data for multiple times?	No	
Effect 1	J: Survival	
Control response 1	100%	
Effect 2	J: Growth	
Control response 2	18.5mm, 50.9 mg	
Effect 3	Eggs hatched	
Control response 3	4.7 ± 0.1	
Effect 4	Embryo survival	
Control response 4	0.1	
Effect 5	Embryo growth	
Control response 5	0.1 mm, 0.7 mg	
Temperature	E/L: 25°C J: 24°C	
Test type	E/L: Static 7-d No renewal J: Static 10-d renewal	
Photoperiod/light intensity	NR	

Reference	Nebeker & Schuytema 1998	<i>P. promelas</i>
Parameter	Value	Comment
Dilution water	Well water	
pH	6.8 ± 0.1	
Hardness	23 ± 2 mg/L	
Alkalinity	25 ± 1 mg/L	
Conductivity	75 ± 5 µs/cm	
Dissolved Oxygen	NR	
Feeding	E/L: brine shrimp upon hatching J: brine shrimp, frozen fish food daily	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	NR	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	E/L: 31.2 mg/L J: 27.1 mg/L	E/L:3 reps, 5 per rep J: 3 reps, 4 per rep
Concentration 2 Meas	E/L: 15.1 mg/L J: 20.0 mg/L	E/L:3 reps, 5 per rep J: 3 reps, 4 per rep
Concentration 3 Meas	E/L: 8.3 mg/L J: 12.2 ± 1.6 mg/L	E/L:3 reps, 5 per rep J: 3 reps, 4 per rep
Concentration 4 Meas	E/L: 4.2 mg/L J: 6.5 ± 0.5 mg/L	E/L:3 reps, 5 per rep J: 3 reps, 4 per rep
Concentration 5 Meas	E/L: 2.0, 1.0 mg/L J: 3.4 mg/L	E/L:3 reps, 5 per rep J: 3 reps, 4 per rep
Concentration 6 Meas	E/L: 1.0 mg/L	E/L:3 reps, 5 per rep
Control	0	E/L:3 reps, 5 per rep J: 3 reps, 4 per rep
LC50; indicate calculation method	E/L: 7-d 11.7 (10.1-13.5) mg/L J: 10-d 27.1 mg/L	
NOEC; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	NOAEL: E/L: 4.2 mg/L J: 20.0 mg/L	Method: Dunnett's Mult. Comp., EPA p: ≤0.05
LOEC; indicate calculation method	LOAEL: E/L: 8.3 mg/L J: 27.1 mg/L	
MATC (GeoMean NOEC,LOEC)	E/L: 5.9 mg/L, J: 23.3	

Notes:

Embryo/Larval (E/L)

Juvenile (J)

Reliability Point Losses Table 3.7: -3 Photoperiod not actually reported, but likely followed that of ASTM method

Reliability Point Losses Table 3.8: -1 MSD not reported, -2 Photoperiod not reported

Toxicity Data Summary

Pseudacris regilla

Study: Schuytema GS, Nebeker AV. 1998. Comparative toxicity of diuron on Survival and growth of Pacific treefrog, bullfrog, red-legged frog, and African clawed frog embryos and tadpoles. *Archives of Environmental Contamination and Toxicology* 34:370-376.

Relevance

Score: 100

Rating: R

Reliability

Score: 89.5

Rating: R

Reference	Schuytema and Nebeker 1998	<i>P. regilla</i>
Parameter	Value	Comment
Test method cited	ASTM 1991 (embryo), 1997 (tadpole), Xenopus	
Phylum	Chordata	
Class	Amphibia	
Order	Anura	
Family	Hylidae	
Genus	<i>Pseudacris</i>	
Species	<i>regilla</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	Embryo: Stage 12 Tadpole: 12 days post-hatch	
Source of organisms	Eggs collected locally, Corvallis Oregon	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	No	
Test duration	Embryo: 10-d Tadpole: 14-d	
Data for multiple times?	No	
Effect 1	% Mortality Embryo	
Control response 1	1) 6.7% 2) 0%	
Effect 2	% Mortality Tadpole	
Control response 2	1) 4.2% 2) 12.5%	
Effect 3	Growth Inhibition – Length	
Control response 3	Not Reported	
Effect 4	Growth Inhibition – Wet Weight	
Control response 4	Not Reported	
Effect 5	Growth Inhibition – Dry Weight	
Control response 5	Not Reported	
Effect 6	Increased Deformity	

Reference	Schuytema and Nebeker 1998	<i>P. regilla</i>
Parameter	Value	Comment
Control response 6	Embryo: 1) 6.7%, 2) 0%	
Temperature	20 ± 1°C	
Test type	Static renewal	
Photoperiod/light intensity	16:8 light: dark	
Dilution water	Well water near Willamette River, Corvallis OR	
pH	7.4	
Hardness	72.4 ± 3.9 mg/L CaCO ₃	
Alkalinity	63.5 ± 5.7 mg/L	
Conductivity	194.6 ± 7.2 μS/cm	
Dissolved Oxygen	7.0 ± 0.1 mg/L	
Feeding	No	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	108.3% ± 3.1%	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	Not Reported	
Concentration 1 Meas	29.1 ± 0.5 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 2 Meas	21.1 ± 0.6 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 3 Meas	14.5 ± 0.4 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 4 Meas	7.6 ± 0.1 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 5 Meas	3.8 ± 0.1 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 6 Meas	1.0 ± 0.04 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 7 Meas	1.0 ± 0.2 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Concentration 8 Meas	0.5 ± 0.2 mg/L	3 rep 10 embryos/rep, 8 tadpoles/rep
Control	0	3 rep 10 embryos/rep, 8 tadpoles/rep
LC50; indicate calculation method	10-d Embryo: Acute toxicity insufficient (>29.1 mg/L)	Method: trimmed Spearman-Kärber

Reference	Schuytema and Nebeker 1998	<i>P. regilla</i>
Parameter	Value	Comment
	14-d Tadpole (95% CI): 1) 19.6 (13.9-27.7) mg/L 2) 10.8 (8.1 – 14.6) mg/L	
EC50; indicate calculation method	10-d Embryo for Deformity: 22.2 (95% CI 20.5-24.2)	Method: trimmed Spearman-Kärber
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	10-d Embryo: 1a) >29.1 mg/L - Length 1b) 14.5 mg/L - Deformity 14-d Tadpole: 1a) 21.0 mg/L – Wet Weight, Dry Weight 1b) 14.5 mg/L – Length 2a) >29.1 mg/L – Length, Wet Weight 2b) 21.1 mg/L – Dry Weight	Method: Dunnett's multiple comparison procedure p: MSD:
LOAEL; indicate calculation method	10-d Embryo: 1a) >29.1 mg/L – Length 1b) 29.1 mg/L – Deformity 14-d Tadpole: 1a) 29.1 mg/L – Wet Weight, Dry Weight 1b) 21.1 mg/L – Length 2a) >29.1 mg/L – Length, Wet Weight 2b) 29.1 mg/L – Dry Weight	Method: Dunnett's multiple comparison procedure
MATC (GeoMean NOEC, LOEC)	14-d Tadpole: Length: 17.49 mg/L Dry Weight: 24.75 mg/L Wet Weight: 24.72 mg/L Deformity: 20.54 mg/L	

Reliability Point Losses Table 3.7: -3 Photoperiod NR, -8 hypothesis tests

Reliability Point Losses Table 3.8: -2 inappropriate duration, -1 random assignment NR, -2 photoperiod NR, -2 random design NR, -3 hypothesis tests

Toxicity Data Summary

Pseudokirchneriella subcapitata (formerly *Selenastrum capricornutum*)

Study: Blasberg, J, Hicks, SL, Bucksath, J. 1991. Acute Toxicity of Diuron to *Selenastrum capricornutum* Printz. EPA MRID 422184-01. DuPont Agricultural Products Experimental Station. Wilmington, DE. (via ABC Laboratories, Inc. Columbia, MS)

Relevance
Score: 100
Rating: R

Reliability
Score: 87.5
Rating: R

Reference	Blasberg <i>et al.</i> 1991	<i>S. capricornutum</i>
Parameter	Value	Comment
Test method cited	EPA GLP for FIFRA	40 CFR 160
Phylum	Chlorophyta	Green algae
Class	Chlorophyceae	
Order	Sphaeropleales	
Family	Ankistrodesmaceae	
Genus	<i>Pseudokirchneriella</i>	formerly <i>Selenastrum</i>
Species	<i>subcapitata</i>	<i>capricornutum</i> Printz
Family in North America?	Yes	
Age/size at start of test/growth phase	2d old	
Source of organisms	lab culture	Dept. of Botany, University of Texas at Austin
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	Yes	
Test vessels randomized?	Yes	
Test duration	120h	
Data for multiple times?	Yes	
Effect 1	Growth inhibition	Via algal cell counts
Control response 1	Logarithmic growth	
Temperature (°C)	24	
Test type	Static (constant rotary agitation, 100rpm)	
Photoperiod/light intensity	Continuous/4600 lux	
Dilution water	Synthetic algae culture medium	Nutrient solutions diluted in RO water
pH	7.5 at t ₀	8.3-9.1 at 120 h
Hardness	Not reported	
Alkalinity	Not reported	
Conductivity	Not reported	
Dissolved Oxygen	Not reported	
Feeding	Dissolved nutrients in	Nutrients documented in

Reference	Blasberg <i>et al.</i> 1991	<i>S. capricornutum</i>
Parameter	Value	Comment
	solution	study
Purity of test substance	96.8%	
Concentrations measured?	Yes	At 0 and 120 h
Measured is what % of nominal?	91-104% at t ₀	68-88% at 120 h (due to algal uptake)
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	0.01% acetone or less	
Concentration 1 Nom*/Meas at t ₀ . Meas at 120 h (µg/L)	0.33/0.30/0.24	3 reps with ~4500 cells/mL for each flask
Concentration 2 Nom*/Meas at t ₀ . Meas at 120 h (µg/L)	0.65/0.61/0.44	3 reps with ~4500 cells/mL for each flask
Concentration 3 Nom*/Meas at t ₀ . Meas at 120 h (µg/L)	1.3/1.3/0.99	3 reps with ~4500 cells/mL for each flask
Concentration 4 Nom*/Meas at t ₀ . Meas at 120 h (µg/L)	2.5/2.5/2.0	3 reps with ~4500 cells/mL for each flask
Concentration 5 Nom*/Meas at t ₀ . Meas at 120 h (µg/L)	5.0/5.2/4.4	3 reps with ~4500 cells/mL for each flask
Control	Dilution water control, Solvent control (acetone)	3 reps with ~4500 cells/mL for each flask
EC50 (120h); indicate calculation method	2.9 µg/L 95% CI: 2.5-3.5 µg/L	*discrepancy with reporting in body and Table V of numbers
NOEL; calculation method, p-value and minimum significant difference (MSD)	1.3 µg/L	Method: Dunnett's Test p: 0.05 MSD: NR

Other notes:

-Logarithmic phase growth was confirmed at 120-h with a mean count of 1.3×10^6 cells/mL (a 290-fold increase from the initial).

-Growth data were subjected to a one-way ANOVA and multiple means test (Dunnett's test). Dunnett's test indicated a significant inhibition effect ($p \leq 0.05$) on growth for the 2.5 and 5.0 µg/L test concentrations compared to the vehicle blank.

-Other data reported

EC50 (72h) = 2.3 µg/L, 95% CI: 1. -2.3 µg/L, NOEL (72 h): 0.44 µg/L

EC50 (96h) = 3.0 µg/L, 95% CI: 2.1-2.9 µg/L, NOEL (96 h): 0.44 µg/L

Reliability Point Losses Table 3.7: -2 hardness NR, -2 alkalinity NR, -4 DO NR, -2 conductivity NR, -2 MSD NR.

Reliability Point Losses Table 3.8: -2 hardness NR, -2 alkalinity NR, -6 DO NR, -1 conductivity NR, -2 hypothesis tests

Toxicity Data Summary

Rana aurora

Study: Schuytema GS, Nebeker AV. 1998. Comparative toxicity of diuron on Survival and growth of Pacific treefrog, bullfrog, red-legged frog, and African clawed frog embryos and tadpoles. *Archives of Environmental Contamination and Toxicology* 34:370-376.

Relevance

Score: 100

Rating: R

Reliability

Score: 92

Rating: R

Reference	Schuytema and Nebeker 1998	<i>R. aurora</i>
Parameter	Value	Comment
Test method cited	ASTM 1991, 1997	
Phylum	Chordata	
Class	Amphibia	
Order	Anura	
Family	Ranidae	
Genus	<i>Rana</i>	
Species	<i>aurora</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	Tadpole: 7-day post-hatch	
Source of organisms	Eggs collected locally, Corvallis Oregon	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	No	
Test duration	Tadpole: 14-d	
Data for multiple times?	No	
Effect 1	% Mortality	
Control response 1	0%	
Effect 2	Growth Inhibition – Wet Weight	
Control response 2	Not Reported	
Temperature	20 ± 1°C	
Test type	Static renewal	
Photoperiod/light intensity	16:8 light: dark	
Dilution water	Well water near Willamette River, Corvallis OR	
pH	7.4	
Hardness	72.4 ± 3.9 mg/L CaCO ₃	
Alkalinity	63.5 ± 5.7 mg/L	
Conductivity	194.6 ± 7.2µS/cm	

Reference	Schuytema and Nebeker 1998	<i>R. aurora</i>
Parameter	Value	Comment
Dissolved Oxygen	7.0 ± 0.1 mg/L	
Feeding	No	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	108.3 ± 3.1%	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	Not Reported	
Concentration 1 Meas	29.1 ± 0.5 mg/L	3 rep 8 tadpoles/rep
Concentration 2 Meas	21.1 ± 0.6 mg/L	3 rep 8 tadpoles/rep
Concentration 3 Meas	14.5 ± 0.4 mg/L	3 rep 8 tadpoles/rep
Concentration 4 Meas	7.6 ± 0.1 mg/L	3 rep 8 tadpoles/rep
Concentration 5 Meas	3.8 ± 0.1 mg/L	3 rep 8 tadpoles/rep
Concentration 6 Meas	1.0 ± 0.04 mg/L	3 rep 8 tadpoles/rep
Concentration 7 Meas	1.0 ± 0.2 mg/L	3 rep 8 tadpoles/rep
Concentration 8 Meas	0.5 ± 0.2 mg/L	3 rep 8 tadpoles/rep
Control	0	3 rep 8 tadpoles/rep
LC50 (95% CI); indicate calculation method	14-d Tadpole: 22.2 mg/L (19.8-25.0)	Method: trimmed Spearman-Kärber
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	7.6 mg/L – Wet Weight	Method: Dunnett's multiple comparison procedure p: NR MSD: NR
LOAEL; indicate calculation method	14.5 mg/L – Wet Weight	Method: Dunnett's multiple comparison procedure
MATC (GeoMean NOEC, LOEC)	10.5 mg/L – Wet Weight	

Reliability Point Losses Table 3.7: -3 Photoperiod NR, -8 hypothesis tests

Reliability Point Losses Table 3.8: -2 inappropriate duration, -1 random assignment NR, -2 photoperiod NR, -2 random design NR, -3 hypothesis tests

Toxicity Data Summary

Rana catesbeiana

Study: Schuytema GS, Nebeker AV. 1998. Comparative toxicity of diuron on Survival and growth of Pacific treefrog, bullfrog, red-legged frog, and African clawed frog embryos and tadpoles. *Archives of Environmental Contamination and Toxicology* 34:370-376.

Relevance
Score: 100
Rating: R

Reliability
Score: 92
Rating: R

Reference	Schuytema and Nebeker 1998	<i>R. catesbeiana</i>
Parameter	Value	Comment
Test method cited	ASTM 1991 (embryo), 1997 (tadpole)	
Phylum	Chordata	
Class	Amphibia	
Order	Anura	
Family	Ranidae	
Genus	<i>Rana</i>	
Species	<i>catesbeiana</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	Tadpole: 15 month	
Source of organisms	Eggs collected locally, Corvallis Oregon	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	No	
Test duration	Tadpole: 14-d	
Data for multiple times?	No	
Effect 1	% Mortality	
Control response 1	1) 0%, 2) 0%, 3) 0%	
Effect 2	Growth Inhibition – Dry Weight	
Control response 2	Not Reported	
Effect 3	Growth Inhibition – Wet Weight	
Control response 3	Not Reported	
Effect 4	Growth Inhibition – Length	
Control response 4	Not Reported	
Temperature	24 ± 1°C	
Test type	Static renewal	
Photoperiod/light intensity	16:8 light: dark	

Reference	Schuytema and Nebeker 1998	<i>R. catesbeiana</i>
Parameter	Value	Comment
Dilution water	Well water near Willamette River, Corvallis OR	
pH	7.4	
Hardness	72.4 ± 3.9 mg/L CaCO ₃	
Alkalinity	63.5 ± 5.7 mg/L	
Conductivity	194.6 ± 7.2 μS/cm	
Dissolved Oxygen	7.0 ± 0.1 mg/L	
Feeding	No	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	108.3% ± 3.1%	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	29.1 ± 0.5 mg/L	3 reps 5 tadpoles/rep
Concentration 2 Meas	21.1 ± 0.6 mg/L	3 reps 5 tadpoles/rep
Concentration 3 Meas	14.5 ± 0.4 mg/L	3 reps 5 tadpoles/rep
Concentration 4 Meas	7.6 ± 0.1 mg/L	3 reps 5 tadpoles/rep
Concentration 5 Meas	3.8 ± 0.1 mg/L	3 reps 5 tadpoles/rep
Concentration 6 Meas	1.0 ± 0.04 mg/L	3 reps 5 tadpoles/rep
Concentration 7 Meas	1.0 ± 0.2 mg/L	3 reps 5 tadpoles/rep
Concentration 8 Meas	0.5 ± 0.2 mg/L	3 reps 5 tadpoles/rep
Control	0	3 reps 5 tadpoles/rep
LC50 (95% CI); indicate calculation method	10-d: >29.1 mg/L 14-d: >29.1 mg/L 21-d: 12.7 (9.8 – 16.7) mg/L	Method: trimmed Spearman-Kärber p: 0.05
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	10-d: 1a) 14.5 mg/L – Length, Wet Weight 1b) 7.6 mg/L – Dry Weight 14-d: 2a) 21.1 mg/L – Wet Weight 2b) 14.5 mg/L – Length, Dry Weight 21-d:	Method: Dunnett's multiple comparison procedure p: NR MSD: NR

Reference	Schuytema and Nebeker 1998	<i>R. catesbeiana</i>
Parameter	Value	Comment
	3a) >29.1 mg/L – Length, Wet Weight 3b) 7.6 mg/L – Dry Weight	
LOAEL; indicate calculation method	10-d: 1a) 29.1 mg/L – Length, Wet Weight 1b) 14.5 mg/L – Dry Weight 14-d: 2a) 29.1 mg/L –Wet Weight 2b) 21.1 mg/L – Length, Dry Weight 21-d: 3a) >29.1 mg/L – Length, Wet Weight 3b) 14.5 mg/L – Dry Weight	Method: Dunnett's multiple comparison procedure
MATC (GeoMean NOEC,LOEC)	Dry Weight: 12.45 mg/L** Wet Weight: 22.56 mg/L** Length: 18.95*	SMCV calculated from * 2 values ** 3 values

Reliability Point Losses Table 3.7: -3 Photoperiod NR, -8 hypothesis tests

Reliability Point Losses Table 3.8: -2 inappropriate duration, -1 random assignment NR, -2 photoperiod NR, -2 random design NR, -3 hypothesis tests

Toxicity Data Summary

Scenedesmus obliquus

Study: Geoffroy L, Teisseire H, Couderchet M, Vernet G. 2002. Effect of oxyfluorfen and diuron alone and in mixture on antioxidative enzymes of *Scenedesmus obliquus*. *Pesticide Biochemistry and Physiology*. 72:178-185.

Relevance

Score: 90*

Rating: R

Reliability

Score: 83

Rating: R

* No standard method

Reference	Geoffroy <i>et al.</i> 2002	<i>S. obliquus</i>
Parameter	Value	Comment
Test method cited	None	
Phylum	Chlorophyta	
Class	Chlorophyceae	
Order	Chlorococcales	
Family	Scenedesmaceae	
Genus	<i>Scenedesmus</i>	
Species	<i>obliquus</i>	SAG 276-3a
Family in North America?	Yes	
Age/size at start of test/growth phase	10 µg/mL chlorophyll in each well	Cultures maintained in exponential growth by subculturing every week
Source of organisms	Gottingen, Germany	
Have organisms been exposed to contaminants?	No	
Organisms acclimated and disease-free?	Yes	
Organisms randomized?	No	
Test vessels randomized?	No	
Test duration	24 h	
Data for multiple times?	Yes, 48 h	
Effect 1	Decrease in chlorophyll content	Marker for growth
Control response 1	24h 19.7 ± 3	
Effect 2	Decrease in antioxidative enzyme activity	4 enzymes: CAT, GR, APX, GST
Control response 2	Displayed in Fig. 3 for 4 enzymes	
Temperature	21° C	
Test type	Static	
Photoperiod/light intensity	Continuous 90 µmol PAR m ⁻² s ⁻¹	
Dilution water	Mineral growth medium	Couderchet & Boger 1993. (see notes)
pH	6.3	

Reference	Geoffroy <i>et al.</i> 2002	<i>S. obliquus</i>
Parameter	Value	Comment
Hardness	NR	
Alkalinity	NR	
Conductivity	NR	
Dissolved Oxygen	NR	
Feeding	Incorporated in media	
Purity of test substance	98%	
Concentrations measured?	No	
Measured is what % of nominal?	n/a	
Chemical method documented?	No	
Concentration of carrier (if any) in test solutions	0.05% (v/v) methanol	
Concentration 1 Nom ($\mu\text{g/L}$)	10	3 reps, triplicates
Concentration 2 Nom ($\mu\text{g/L}$)	20	3 reps, triplicates
Concentration 3 Nom ($\mu\text{g/L}$)	30	3 reps, triplicates
Concentration 4 Nom ($\mu\text{g/L}$)	40	3 reps, triplicates
Control	0	3 reps, triplicates
ECx; indicate calculation method	24 h EC10 = 4 $\mu\text{g/L}$ 24 h EC50 = 10 $\mu\text{g/L}$ 24 h EC90 = 18 $\mu\text{g/L}$	Student's t test p: < 0.05 based on growth

Other notes:

Couderchet M, Boger P. "Changes in fatty acid profile induced by herbicides," in Boger P, Sandmann G (Eds.). Target Assays for modern herbicides and related phytotoxic compounds, Lewis Publishers, Boca Raton, Ann Arbor, London, Tokyo, 1993, pp. 175-181.

Enzyme activity data presented in paper, but this is not a usable endpoint.

Hardness, alkalinity, and conductivity were not required because this was a plant toxicity test.

Reliability Point Losses Table 3.7: -4 analytical method NR, -3 measured conc NR, -8 hypothesis tests.
Reliability Point Losses Table 3.8: -5 no std method, -4 meas conc NR, -2 random design NR, -3 hypothesis tests.

Toxicity Data Summary

Xenopus laevis

Study: Schuytema GS, Nebeker AV. 1998. Comparative toxicity of diuron on Survival and growth of Pacific treefrog, bullfrog, red-legged frog, and African clawed frog embryos and tadpoles. *Archives of Environmental Contamination and Toxicology* 34:370-376.

Relevance

Score: 100

Rating: R

Reliability

Score: 92

Rating: R

Reference	Schuytema and Nebeker 1998	<i>X. laevis</i>
Parameter	Value	Comment
Test method cited	ASTM 1991, 1997, Xenopus	
Phylum	Chordata	
Class	Amphibia	
Order	Anura	
Family	Pipidae	
Genus	<i>Xenopus</i>	
Species	<i>laevis</i>	
Family in North America?	Yes	
Age/size at start of test/growth phase	Embryo: Stage 10-11 Tadpole: 11-d	
Source of organisms	Eggs collected locally, Corvallis Oregon	
Have organisms been exposed to contaminants?	No	
Animals acclimated and disease-free?	Yes	
Animals randomized?	No	
Test vessels randomized?	No	
Test duration	Embryo: 4-d Tadpole: 14-d	
Data for multiple times?	No	
Effect 1	% Mortality Tadpole	
Control response 1	1) 13.3% 2) 6.7%	
Effect 2	% Mortality Embryo	
Control response 2	1a) 1.7%, 1b) 0% 2a) 0%, 2b) 0%	
Effect 3	Growth Inhibition - Length	
Control response 3	Not Reported	
Effect 4	Growth Inhibition – Wet Weight	
Control response 4	Not Reported	
Effect 5	Growth Inhibition – Dry Weight	
Control response 5	Not Reported	
Effect 6	Increased Deformity	

Reference	Schuytema and Nebeker 1998	<i>X. laevis</i>
Parameter	Value	Comment
Control response 6	Embryo 1a) 1.7%, 1b) 0% 2a) 0%, 2b) 0%	
Temperature	24 ± 1°C	
Test type	Static renewal	
Photoperiod/light intensity	16:8 light: dark	
Dilution water	Well water near Willamette River, Corvallis OR	
pH	7.4	
Hardness	23 ± 1.2 mg/L CaCO ₃	
Alkalinity	25.4 ± 0.5 mg/L	
Conductivity	76.7 ± 3.7 μS/cm	
Dissolved Oxygen	7.0 ± 0.1 mg/L	
Feeding	No	
Purity of test substance	99.8%	
Concentrations measured?	Yes	
Measured is what % of nominal?	108.3% ± 3.1%	
Chemical method documented?	Yes	
Concentration of carrier (if any) in test solutions	NR	
Concentration 1 Meas	29.1 ± 0.5 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 2 Meas	21.1 ± 0.6 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 3 Meas	14.5 ± 0.4 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 4 Meas	7.6 ± 0.1 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 5 Meas	3.8 ± 0.1 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 6 Meas	1.0 ± 0.04 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 7 Meas	1.0 ± 0.2 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Concentration 8 Meas	0.5 ± 0.2 mg/L	3 reps 20 embryo/rep 10 tadpoles/rep
Control	0	3 reps 20 embryo/rep 10 tadpoles/rep

Reference	Schuytema and Nebeker 1998	<i>X. laevis</i>
Parameter	Value	Comment
LC50 (95% CI) ; indicate calculation method	4-d embryo: 1) >29.1 mg/L 2) >29.1 mg/L 14-d tadpole: 1) 14.5 (11.0-18.9) 2) 8.1 (5.4-12.0)	Method: Trimmed Spearman Karber p: 0.05
NOAEL; indicate calculation method, significance level (p-value) and minimum significant difference (MSD)	4-d embryo: 1) 14.5 mg/L – Length, Deformity 2a) 21.1 mg/L – Deformity 2b) 7.6 mg/L – Length 14-d tadpole: 1) >29.1 mg/L – Length, Wet Weight, Dry Weight 2) >29.1 mg/L - Length, Wet Weight, Dry Weight	Method: Dunnett's multiple comparison procedure p: NR MSD: NR
LOAEL; indicate calculation method	4-d embryo: 1) 29.1 mg/L – Length, Deformity 2a) 29.1 mg/L – Deformity 2b) 14.5 mg/L – Length 14-d tadpole: 1) >29.1 mg/L – Length, Wet Weight, Dry Weight 2) >29.1 mg/L - Length, Wet Weight, Dry Weight	Method: Dunnett's multiple comparison procedure
MATC (GeoMean NOEC, LOEC)	Embryo Length: 14.68 mg/L Deformity: 22.56 mg/L	

Reliability Point Losses Table 3.7: -3 Photoperiod NR, -8 hypothesis tests

Reliability Point Losses Table 3.8: -2 inappropriate duration, -1 random assignment NR, -2 photoperiod NR, -2 random design NR, -3 hypothesis tests