DATA EVALUATION RECORD

1. Chemical: Pydrin: cyano (3-phenoxyphenyl)methyl-4-chloro-alpha-(methylethyl)benzeneacetate

2. Test Material: SD 43775 94% ai

3. Study Type: Daphnia Life cycle

4. Study ID: Sanborn, J.R.; Bunding, I.M.; Barber, G.F. (1979) The Effect of SD 43775 on Reproduction of Daphnia magna in a Static Test System. Prepared for Shell Chemical Company, Modesto, California.

5. Reviewed by: Miachel Rexrode
Fishery Biologist
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Signature: Miachel Rexrode
Date: 6/25/86

6. Approved by: Norman Cook
Section Head
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Signature: Norman Cook
Date: 6.25.86

7. Conclusions:

This study does not appear to be scientifically sound and will not fulfill Registration requirements. Excessive mortality (> 80%) in the water controls places serious doubt as to the validity of the reported results.

8. Materials and Methods:

a. Test species:

Daphnia magna; descendants of a colony obtained from Dahl Biological Supply, Oakland, CA. Large adult Daphnia were transferred to 4-dram shell vials containing 10 mL of water and 0.1 mL of a 1 percent yeast suspension. To provide the young Daphnia 24 hours of age or less, the adults were transferred daily to ensure young Daphnia of known age were available for testing. The daily production per adult ranged from 0 to 15 per day. Daphnia mortality was observed by placing five 24-hour old daphnids in each test vessel with four replicates per concentration and control. Testing was done to measure 7-, 14-, and 21-day survival. Data on production of offspring was obtained by using 24-hour old daphnids, one per vessel, for information on survival, growth, and reproduction.

b. Test System:

Water was obtained from the wellhead of a 150-foot-deep well. One week prior to its use approximately 400 mL of loosely packed, steam-sterilized (1 hour at 150 °C), air-dried Hanford silt loam was added to the water. The treated water was stirred and allowed to settle at room temperature (18 °C) before use. The supernatant water was filtered through a Whatman Filter (60 x 180 mm) into a vessel 1 day prior to its use in the test. Total water hardness as $CaCO_3$ was 130 mg/L; specific conductance 516 to 463 micromhos/cm; temperature, 18.0 $\pm$ 0.5 °C; photoperiod 8D/16L at 150 to 200 foot-candles.

Water analyses for SD 43775 were carried out immediately after addition of the chemical and 7 days later to ensure its presence during the 1 week of exposure. Test water was added (to the beakers) followed by the food, and then the test chemical or acetone. Daphnia (24 hours old) were added to the test beakers after 1 hour had elapsed (refer to tables 1 and 2).

At the end of 1 week the entire process of filling the beakers with test water, food, and test chemical was repeated using a clean set of beakers. The Daphnia were then transferred into these freshly prepared beakers. The process was again repeated at the end of 2 weeks.

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c. Dose:

Testing was static renewable (once a week) with four concentration levels (0.5, 0.25, 0.10, 0.05 ppb), solvent control, and a negative control.

d. Statistics:

Probit analysis was used to estimate the LC_{50} at days 7, 14, and 21 in order to determine adult survival (not reproduction or growth). A two-factor analysis of variance (tests, dose, and test x dose interaction) was used to statistically evaluate the data on young produced. Dunnett's test was used to determine dosage levels differing from the control ($p < 0.05$). Response variables were as follows:

1. 14-day young/0-day adults
2. 14-day young/7-day adults
3. 14-day young/14-day adults
4. 14-day young/average of 7- and 14-day adults.
5. 21-day young/0-day adults
6. 21-day young/14-day adults
7. 21-day young/21-day adults
8. 21-day young/average of 14- and 21-day adults.

Variables 4 and 8 are an attempt to account for the possibility that the "parents" of the young died before being counted.

9. Reported Results:

The 7-, 14-, and 21-day LC_{50} values for SD 43775 are 0.90, 0.68, and 0.33 ppb, respectively. Examination of the data on the relationship between SD 43775 concentration and reproductive rate reveals no effects on the fecundity (young *Daphnia*/female *Daphnia*) at concentrations below those causing significant mortality in the reproducing females (only 0.5 ppb was significantly different).

10. Reviewer's Discussion:

a. Test Procedure: Testing followed the 1975 EPA Guidelines.

b. Statistical Analysis: None performed by EEB because of large control mortality in fecundity and survival testing. No data on growth were presented.

c. Discussion/Results: A dominant problem in this study was the lack of fecundity in the water control. According to Kenneth E. Biesinger, EPA National Water Quality Laboratory, Duluth, Minnesota (personal communication May 5, 1986), a chronic daphnid test is unacceptable if control mortality (> 70%) is high or fecundity is low. Biesinger suggested that the dilution water was poisoning the test organisms. Ironically, the production of progeny in the solvent control may have been due to a "solvent masking" effect and cannot be used as a comparison of concentration effects.

d. Adequacy of Study:

Category: Invalid
Repairability: N/A because of excess control mortality.

Table 1. PRODUCTION OF OFFSPRING OF *DAPHNIA MAGNA* IN WATER CONTAINING SD 43775

Dosage, ppb	Test 1 Rep 1	Test 1 Rep 2	Test 1 Rep 3	Test 1 Rep 4	Test 2 Rep 1	Test 2 Rep 2	Test 2 Rep 3	Test 2 Rep 4	Test 3 Rep 1	Test 3 Rep 2	Test 3 Rep 3	Test 3 Rep 4	Total of 3 Tests 1	Total of 3 Tests 2	Total of 3 Tests 3	Total All Tests
Young Produced - Fourteen Days																
0.50	2	0	0	0	5	0	0	0	0	0	0	0	2	5	0	7
0.25	36	25	33	7	45	46	15	28	28	35	21	17	101	134	101	336
0.10	20	29	33	43	29	32	27	26	29	36	45	24	125	114	134	373
0.05	40	30	21	31	41	34	21	18	38	37	25	15	122	114	115	351
Acetone	23	24	34	35	33	25	26	34	42	26	38	37	116	118	143	377
Control	19	28	9	0	0	0	0	0	0	0	0	0	56	0	0	56
TOTALS	140	136	130	116	153	137	89	106	137	134	129	93	522	485	493	1500
Young Produced - Twenty-One Days																
0.50	41	8	0	0	38	0	2	4	4	15	7	0	49	44	26	119
0.25	148	61	74	96	63	37	30	68	22	6	48	39	379	198	115	692
0.10	84	87	85	57	79	47	74	69	68	73	81	84	313	269	306	888
0.05	97	86	86	69	94	103	42	60	53	86	24	58	338	299	221	858
Acetone	93	133	82	80	96	85	66	(Lost)	81	88	10	79	388	247	258	893
Control	77	31	43	0	0	0	2	0	12	21	3	23	151	2	59	212
TOTALS	540	406	370	302	370	272	216	201	240	289	173	283	1618	1059	985	3662

Table 2. SUMMARY OF REPRODUCTIVE PERFORMANCE OF *DAPHNIA MAGNA*

	Dose (ppb)	14/0[a]	14/7	14/14	14/Avg.
14-Day	0.50	0.12[b]	0.25[b]	0.26[b]	0.26[b]
	0.25	5.60	5.60	5.77	5.66
	0.10	6.00	6.00	6.09	6.04
	0.05	5.85	5.92	6.01	5.96
	Acetone	6.10 ± 0.45	6.10 ± 0.46	6.19 ± 0.44	6.14 ± 0.45
	Water	0.93	0.93	1.05	0.99
		21/0	21/14	21/21	21/Avg.
21-Day	0.50	2.0[b]	3.7[b]	8.3[b]	5.4[b]
	0.25	11.5[b]	11.9[b]	13.3	12.5
	0.10	14.4	14.8	15.0	14.9
	0.05	14.3	14.7	14.9	14.8
	Acetone	15.9 ± 1.3	15.9 ± 1.4	16.6 ± 2.4	16.2 ± 1.7
	Water	3.5	3.8	4.2	4.0

a) a/b = least square mean ± standard error for young at "a" days per surviving adult at "b" days.

b) Significantly less than acetone control $p < 0.05$ by Dunnett's Test.