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SHAUGHNESSEY NO.  
035506

REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 6-28-85 OUT 7-19-85

FILE OR REG. NO. 352-326

PETITION OR EXP. PERMIT NO.

DATE OF SUBMISSION 6-13-85

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RD REQUESTED COMPLETION DATE 8-19-85

EEB ESTIMATED COMPLETION DATE 8-12-85

RD ACTION CODE/TYPE OF REVIEW 660/Reg. Std.

TYPE PRODUCT(S): I, D, H, F, N, R, S Insecticide

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. R. Taylor (25)

PRODUCT NAME(S) Linuron

COMPANY NAME E.I. DuPont De Nemours & Company

SUBMISSION PURPOSE Submission of 48-Hour Daphnia Study to support  
reregistration of linuron

SHAUGHNESSEY NO. CHEMICAL, & FORMULATION % A.I.

035506 Urea, N<sup>1</sup>-(3,4-dichlorophenyl)-N-methoxy- 94.4

N-methyl



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JUL 19 1985

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Linuron - Review

THRU: Harry Craven, Head - Section 4 *Harry Craven*  
Ecological Effects Branch  
Hazard Evaluation Division (TS-769-C)

THRU: Michael Slimak, Chief *M. Slimak*  
Ecological Effects Branch  
Hazard Evaluation Division (TS-769-C)

TO: Vickie Walters, (25)  
Herbicide/Fungicide Branch  
Registration Division (TS-767-C)

We have reviewed the attached study which meets data requirements for a 48-hour LC<sub>50</sub> test. This study will be added to our files.

*Bonnie J. Hileman*

Bonnie Hileman, Biologist  
Ecological Effects Branch  
Hazard Evaluation Division (TS-769-C)

Attachment

Data Evaluation Record

1. CHEMICAL: Linuron  
Urea, N'-(3,4-dichlorophenyl)-N-methoxy-N-methyl  
Shaughnessey No.: 035506
2. TEST MATERIAL: Linuron  
94.4% a.i.
3. STUDY TYPE: 48-Hour EC<sub>50</sub>  
Species tested: Daphnia magna
4. STUDY IDENTIFICATION: Litchfield, C. D. and R. G. Stahl, Jr.  
1985. Acute Toxicity of Linuron to  
Daphnia magna. Prepared by Haskell  
Laboratory for Toxicology and Industrial  
Medicine, Newark, DE; submitted by E. I.  
du Pont de Nemours & Company (Inc.),  
Wilmington, DE. Reg. No. 352-326  
Acc. No. 258300
5. REVIEW BY:  
Bonnie J. Hileman  
Ecological Effects Branch/HED  
Signature: *Bonnie J. Hileman*  
Date: 7/19/85
6. APPROVED BY:  
Henry T. Craven  
Ecological Effects Branch/HED  
Signature: *Henry T. Craven*  
Date: 7/19/85
7. CONCLUSIONS: This study is scientifically sound. With a 48-  
hour EC<sub>50</sub> = 0.12 mg/l (ppm), Linuron is highly  
toxic to Daphnia magna.
8. RECOMMENDATIONS: N/A
9. BACKGROUND: This study, an acute toxicity determination for  
an aquatic invertebrate species, was submitted as  
special review/re-registration (Registration  
Standard) data for Linuron (94.4% a.i.).
10. DISCUSSION OF INDIVIDUAL TEST: N/A
11. MATERIALS AND METHODS:  
A. Test species--Daphnia magna. Daphnids were bred at the  
Haskell Laboratory. Daphnids were less than 24 hours  
old.

- B. Test system--250 ml glass vessels containing 200 ml of test solution. Static exposure to water halfway between "soft" and "hard" water at 19.95°C for 48 hours. The photoperiod was 16 hours light/8 hours dark.
- C. Dose--Static bioassay using nominal concentrations. Dimethylformamide was the solvent used.
- D. Design--20 daphnids per level; 7 dose levels (0.02, 0.05, 0.07, 0.10, 0.15, 0.20, 0.30 ppm), water control, and dimethylformamide (solvent) control.
- E. Statistics--Probit Analysis (Finney, 1971).
12. REPORTED RESULTS: The study authors found the 48-hour  $EC_{50}$  to be 0.12 mg/l. Mortality and water chemistry data are attached.
13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:  
 48-hour  $EC_{50} = 0.12$  mg/l (ppm).  
 "All raw data are recorded in Haskell Laboratory notebooks and are retained permanently, as is the final report, at Haskell Laboratory or are archived at the Du Pont Hall of Records."
14. REVIEWER'S DISCUSSION AND INTERPRETATION OF THE STUDY:
- A. Test Procedures--The procedures were in accordance with recommended protocols. After telephone conversations with Ralph Stahl, Jr. (Haskell Laboratory) and discussions within EEB, the increase in dissolved oxygen (D.O.) over the 48-hour test period was attributed to the filtration system used to prepare the mass culture well water. A .45 micron Millipore filter and vacuum were utilized prior to the test to remove bacteria which were responsible for the problem with floaters. This filtering system caused the water to become unsaturated, thus, lowering the initial D.O. As oxygen diffused into the water and it became resaturated, the D.O. increased.
- B. Statistical Analysis--Using EEB's Toxanal program, the 48-hour  $EC_{50}$  was calculated to be .12 mg/l. This value is the same as that reported by the author. .1 and .15 mg/l can be used as statistically sound conservative 95% confidence limits. EEB's computer printout is attached.
- C. Discussion/Results--With a 48-hour  $EC_{50} = 0.12$  ppm, Linuron (94.4% a.i.) is "highly toxic" to Daphnia magna.

D. Adequacy of Study

1. Classification: Core
2. Rationale: See section 14 A
3. Repairability: N/A

15. Completion of One-Liner For Study

One-liner form completed 7/19/84.

16. CBI Appendix

N/A

035506 LINURON DAPHNIA. 48-HOUR LC50  
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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.3	20	20	100	9.53674E-05
.2	20	20	100	9.53674E-05
.15	20	20	100	9.53674E-05
.1	20	0	0	9.53674E-05
.07	20	0	0	9.53674E-05
.05	20	0	0	9.53674E-05
.02	20	0	0	9.53674E-05

THE BINOMIAL TEST SHOWS THAT .1 AND .15 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .122474

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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TABLE I

RESULTS OF A 48-HOUR ACUTE TOXICITY TEST  
WITH DAPHNIA MAGNA EXPOSED TO H-15,650 (MR-4581-252)

Nominal Test Concentrations (mg/L)	Observed Immobility (%)			
	24 Hours		48 Hours	
	A*	B*	A*	B*
0.30	100	100	100	100
0.20	100	0	100	100
0.15	0	0	100	100
0.10	0	0	0	0
0.07	0	0	0	0
0.05	0	0	0	0
0.02	0	0	0	0
DMF Control	0	0	0	0
H2O Control	0	0	0	0

\*Replicate exposure chambers containing ten daphnids each.

TABLE II

RESULTS OF PHYSICAL AND CHEMICAL PARAMETERS  
 MEASURED DURING A 48-HOUR ACUTE TOXICITY TEST  
 WITH DAPHNIA MAGNA EXPOSED TO H-15,650 (MR-4581-252)

Nominal Test Concentrations (mg/L)	0.3 mg/L (High)	0.10 mg/L (Medium)	0.02 mg/L (Low)	Control H <sub>2</sub> O	Control DMF
<u>Dissolved Oxygen (mg/L)</u>					
0 Hr.	7.4	7.3	7.2	7.3	7.3
48 Hr.	8.1*	8.5	8.4	8.5	8.5
<u>pH</u>					
0 Hr.	7.5	7.5	7.5	7.4	7.5
48 Hr.	7.3*	7.8	7.8	7.6	7.8
<u>Total Alkalinity (mg/L as CaCO<sub>3</sub>)</u>					
0 Hr.	-	-	-	78	-
<u>EDTA Hardness (mg/L as CaCO<sub>3</sub>)</u>					
0 Hr.	-	-	-	74	-
<u>Conductivity (umhos/cm)</u>					
0 Hr.	-	-	-	178	-

\*Final D.O. and pH were taken at 24 hours because complete mortality had occurred.