208288
RECORD NO.

128701
SHAUGHNESSY NO.

REVIEW NO.

EEB REVIEW

DATE: IN 12-1-87 OUT: 7-26-88

FILE OR REG. NO. 8340-23

PETITION OR EXP. NO.

DATE OF SUBMISSION 11-9-87

DATE RECEIVED BY HED 11-24-87

RD REQUESTED COMPLETION DATE 3-14-88

EEB ESTIMATED COMPLETION DATE 3-14-88

RD ACTION CODE/TYPE OF REVIEW 400

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

DATE ACCESSION NO (S). 404047-01 thru 404047-04

PRODUCT MANAGER NO. R. Mountfort (23)

PRODUCT NAME (S) Whip (fenoxaprop-Ethyl) 1 EC

COMPANY NAME Hoechst Celanese Corporation

SUBMISSION PURPOSE Submission of Supplemental Data In Support of Registration

SHAUGHNESSEY NO.	CHEMICAL AND FORMULATION	% A.I.
128701	Whip (Fenoxaprop-Ethyl) 1 EC	

100 Pesticide Name: Whip 1 EC

100.3 Submission Purpose

-Submission of a freshwater algae study;
-Submission of 48-hour EC_{50} study for both technical and formulated product; and
-Submission of an oyster study justification.

101 Chemical and Physical

101.1 Common Name: Whip 1 EC

101.2 Chemical Name: Fenoraprop-Ethyl

103 Toxicological Properties

- Justification for a 48-hour oyster study;
- 48-hour EC_{50} for Quahog clam study (technical);
- 48-hour EC_{50} for Quahog clam study (formulated); and
- Acute toxicity test for Green Algae.

105 Conclusions:

A. 48-Hour EC_{50} Oyster Study (justification-01)

The additional data submitted by the registrant did not fulfill the requirement in support of Hoe 033171 registration for an oyster study due to lack of raw data. Therefore, the oyster study remains supplemental.

B. 48-Hour EC_{50} for Quahog Clam (technical-02)

This study is scientifically sound and the 48-hour EC_{50} value of 0.20(0.15-0.26) ppm is considered as very highly toxic to embryo-larvae of Quahog clam (Mercenaria mercenaria) under static conditions. This study does fulfill the requirement in support of registration for an estuarine/marine invertebrate study. The percent reduction of normal 48-hour embryo-larvae were not significantly different than controls in concentration 0.12 and 0.071 ppm.

C. 48-Hour EC_{50} for Quahog Clam (Formulated 12.6% -03)

This study is scientifically sound. The 48-hour EC_{50} value for embryo-larvae of the Quahog clam (Mercenaria mercenaria) exposed to Hoe 033171 OH EC 13A122 under static test conditions is 0.816 ppm with 95% confidence limits of 0.81 and 0.82 ppm based on nominal concentrations of whole material.

With a 48-hour EC_{50} of 0.816 ppm, Whip is considered to be highly toxic to the Quahog clam. This study does fulfill the requirement in support of registration for a formulated product.

D. Acute Toxicity for Green Algae (Technical AI -04)

This study is scientifically sound with the 7-day EC_{25} and EC_{50} of 59.2 and 731.9 ppm, respectively. This study does fulfill the requirement in support of registration for a freshwater algae species. The no-observed-effect-level was 5.0 ppm.

Curtis E. Laird 8-12-88
Curtis E. Laird, Fishery Biologist
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

for Daniel Rieder 8-15-88
Norman J. Cook, Head-Section 2
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

James W. Akerman 8/18/88
James W. Akerman, Chief
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

Acute Toxicity of HOE 033171 (Whip) to

Embryo-Larvae HOE 033171 (Whip)

Accessein Number 404047-01

EEB has received and evaluated the additional HOE 033171 data submitted by the registrant for used in support of an oyster embryo-larvae study. We need the actual raw data in order to verify the EC_{50}, NOEL and percent of fertilization values. The registrant should have submitted the complete oyster study including the raw data instead of a summary. Therefore, the oyster study remains supplemental. The registrant should do one of the following:

a. Conduct another oyster study (§72-3); or

b. Resubmit the oyster study including the actual raw data.

CONFIDENTIAL BUSINESS INFORMATION

Ato Norm ON 4-14-88 With Corrections

Data Evaluation Record

Accession No. 404047-02

1. Chemical: Whip 1EC Herbicide: Ethyl-2-(4-(8-chloro-2-benzoxazolyloxy)-phenoxyl)-propanoate. HOE 033171 Technical

2. Test Material: HOE 033171, Technical grade (Lot No. OHZD 980001); 96.5% Active Ingredient

3. Study Type: Mollusc 48-Hour Embryo Larvae Study. Species Tested: Quahog clam, Mercenaria mercenaria.

4. Citation: Surprenant, D.C. 1987. Acute Toxicity of HOE 033171 Technical to Embryos-Larvae of the Quahog Clam (Mercenaria). Prepared by Springborn Life Sciences, Inc., Wareham, Massachusetts. Submitted by Hoechst Celanese Corporation, Somerville, New Jersey, Report No. A36206. Accession No. 404047-02.

5. Reviewed By: C. Steve Manning
Aquatic Toxicologist
ESE
Signature: C. Steve Manning
Date: 1/11/88

6. Approved By: Isabel C. Johnson, M.S.
Principal Scientist
KBN Engineering and
Applied Sciences, Inc.
Signature: Isabel C. Johnson
Date: 1/11/88

Henry T. Craven
Chief, EEB, HED
US EPA
Signature: Henry T. Craven
Date: 8/24/88

7. Conclusions: This study is scientifically sound. The 48-hour EC50 value for embryo-larvae of the Quahog clam (Mercenaria) exposed to HOE 033171 technical under static test conditions is 0.20 mg/L with 95% confidence limits of 0.11 and 0.35 mg/L based on nominal concentrations. With a 48-hour EC50 of 0.20 mg/L, Whip is considered highly toxic to Quahog clam.

8. Recommendations: N/A

9. Background:

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

A. Test Animals: Adult Quahog clams were maintained in a commercial shellfish hatchery, Cape Cod, Massachusetts in natural seawater prior to induced spawning. Adult clams were induced to spawn by raising water temperature to approximately 30°C in the presence of viable sperm from sexually mature male quahog. Eggs and sperm were mixed to provide fertilized embryos to initiate the test.

B. Test System: The test was conducted in a controlled environmental chamber in 1.0-L glass beakers containing 0.9 L of filtered (5 micrometers) natural seawater at a salinity of 32 °/oo and temperature of 20-22°C under static conditions. The seawater was collected from the Cape Cod Canal near Borne, Massachusetts. The photoperiod was 16 hours light/8 hours dark.

C. Dosage: A 48-hour static test was conducted.

D. Design: Test containers were inoculated with 26,832 embryos within 3.5 hours after fertilization. In this study the filtered seawater control was quadruplicated while all treatments and the solvent control were triplicated. A control, solvent control (dimethylformamide) and nominal concentrations of 0.071, 0.12, 0.20, 0.33. and 0.55 mg/L were employed.

E. Statistics: A computer program developed at the testing laboratory was utilized to compute four linear regression curves based on least squares. The percentage reduction of normally developed larvae were transformed to probits and concentrations to logs. Both untransformed and transformed data were regressed. The regression line which provided the best fit of the untransformed or transformed data was selected based on the highest associated coefficient of determination. The regression equation was then applied to calculate the EC50 and its 95% confidence limits.

"The no observed effect level (NOEL) concentration was determined by subjecting the biological response data for all treatment levels and controls to analysis of variance. If no significant difference (P=0.05) between control and solvent control responses was indicated, the treatment responses were compared to the pooled control response. Dunnett's Test was used to determine the highest treatment level not significantly different than the control, which was identified as the NOEL.

12. Reported Results:

Nominal Concentration (mg/L)	Percentage Reduction
0.55	100
0.33	77
0.20	61
0.12	15[b]
0.071	(+3)[b]
Solvent Control	N/A
Control	N/A
Pooled Controls[c]	N/A

a Percentage reduction in the number of normally developing embryos as compared to the mean response for the pooled control replicates.
b Not significantly (P=0.05) different than control.
c Pooled dilution water control and solvent control data.

13. Study Author's Conclusion/Quality Assurance Measures:

The 48-hour EC50 and 95% confidence interval, calculated by linear regression analysis, is 0.20 (0.11-0.35) mg/L for Quahog embryos and larvae exposed to HOE 033171 Technical. The NOEL is 0.12 mg/L.

The data were audited by the laboratory's Quality Assurance Unit to assure compliance with the protocols, standard operating procedures and pertinent EPA Good Laboratory Practices (GLPs). A GLP compliance statement was included and signed by the Quality Assurance Unit.

14. Reviewer's Discussion and Interpretation of Study Results:

A. Test Procedure: The test procedures were in general accordance with protocols recommended by the guidelines, but deviated from them as follows.

Embryos were inoculated within 3.5 hours of fertilization rather than the 1 hour recommended. No mention was made regarding the percentage of abnormally developed embryos in the test, and therefore, a determination as to whether abnormalities were less than the 10% required by the guidelines could not be made.

A complete characterization of the dilution water was not provided.

B. Statistical Analysis: The reviewer does not have access to the computer program utilized by the author to determine the EC50 value and therefore, the EC50 value was only checked by graphic interpolation. An EC50 of value of 0.18 mg/L was generated using the nominal concentration of active ingredient using the graphical interpolation method.

C. Discussion/Results: The 48-hour EC50 of HOE 033171 Technical for Mercenaria is 0.20 mg/L. Based on this EC50 value HOE 033171 Technical is classified as highly toxic. The toxicity test was conducted at 32°/oo salinity and temperature of 20-22°C.

D. Adequacy of the Study:

Classification: Core
Rationale: N/A
Repairability: N/A

15. Completion of One-liner for Study: Yes, January 7, 1988.

96 hour

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
.5	20	16	80	.5908966
.3	20	12	60.00001	25.17223
.2	20	9	45	41.19015
.1	20	0	0	9.536743E-05
.05	20	0	0	9.536743E-05
.025	20	0	0	9.536743E-05

THE BINOMIAL TEST SHOWS THAT .1 AND .5 CAN BE
USED AS STATISCALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS 99.40901 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .2288465

>>>>>>>>RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.1184713	.2523007	.2045377	.3123413

Data Evaluation Record

Accession No. 404047-02

1. Chemical: Whip 1EC Herbicide: Ethyl-2-(4-(8-chloro-2-benzoxazolyloxy)-phenoxyl)-propanoate. HOE 033171 Technical

2. Test Material: HOE 033171, Technical grade (Lot No. OHZD 980001); 96.5% Active Ingredient

3. Study Type: Mollusc 48-Hour Embryo Larvae Study. Species Tested: Quahog clam, Mercenaria mercenaria.

4. Citation: Surprenant, D.C. 1987. Acute Toxicity of HOE 033171 Technical to Embryos-Larvae of the Quahog Clam (Mercenaria). Prepared by Springborn Life Sciences, Inc., Wareham, Massachusetts. Submitted by Hoechst Celanese Corporation, Somerville, New Jersey, Report No. A36206. Accession No. 404047-02.

5. Reviewed By: C. Steve Manning
Aquatic Toxicologist
ESE
Signature:
Date:

6. Approved By: Isabel C. Johnson, M.S.
Principal Scientist
KBN Engineering and
Applied Sciences, Inc.
Signature:
Date:

Henry T. Craven
Chief, EEB, HED
US EPA
Signature: Henry T. Craven
8/26/88
Date:

CL 8-4-88
HTC 8.2.88

7. Conclusions: This study is scientifically sound. The 48-

hour EC50 value for embryo-larvae of the Quahog clam (Mercenaria) exposed to HOE 033171 technical under static test conditions is 0.20 mg/L with 95% confidence limits of 0.11 and 0.35 mg/L based on nominal concentrations. With a 48-hour EC50 of 0.20 mg/L, Whip is considered highly toxic to Quahog clam.

8. Recommendations: N/A

9. Background: This study was required based on a discussion in January 1987 between M. Slimak (Branch Chief) and company representatives to support HOE 033171 registration

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

A. Test Animals: Adult Quahog clams were maintained in a commercial shellfish hatchery, Cape Cod, Massachusetts in natural seawater prior to induced spawning. Adult clams were induced to spawn by raising water temperature to approximately 30°C in the presence of viable sperm from sexually mature male quahog. Eggs and sperm were mixed to provide fertilized embryos to initiate the test.

B. Test System: The test was conducted in a controlled environmental chamber in 1.0-L glass beakers containing 0.9 L of filtered (5 micrometers) natural seawater at a salinity of 32 °/oo and temperature of 20-22°C under static conditions. The seawater was collected from the Cape Cod Canal near Borne, Massachusetts. The photoperiod was 16 hours light/8 hours dark.

C. Dosage: A 48-hour static test was conducted.

D. Design: Test containers were inoculated with 26,832 embryos within 3.5 hours after fertilization. In this study the filtered seawater control was quadruplicated while all treatments and the solvent control were triplicated. A control, solvent control (dimethylformamide) and nominal concentrations of 0.071, 0.12, 0.20, 0.33. and 0.55 mg/L were employed.

E. Statistics: A computer program developed at the testing laboratory was utilized to compute four linear regression curves based on least squares. The percentage reduction of normally developed larvae were transformed to probits and concentrations to logs. Both untransformed and transformed data were regressed. The regression line which provided the best fit of the untransformed or transformed data was selected based on the highest associated coefficient of determination. The regression equation was then applied to calculate

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the EC50 and its 95% confidence limits.
he no observed effect level (NOEL) concentration was determined by subjecting the biological response data for all treatment levels and controls to analysis of variance. If no significant difference (P=0.05) etween control and solvent control responses was indicated, the treatment responses were compared to the pooled control response. Dunnett's Test was used to determine the highest treatment level not significantly different than the control, which was identified as the NOEL.

12. Reported Results:

Nominal Concentration (mg/L)	Percentage Reduction
0.55	100
0.33	77
0.20	61
0.12	15[b]
0.071	(+3)[b]
Solvent Control	N/A
Control	N/A
Pooled Controls[c]	N/A

a Percentage reduction in the number of normally developing embryos as compared to the mean response for the pooled control replicates.
b Not significantly (P=0.05) different than control.
c Pooled dilution water control and solvent control data.

13. Study Author's Conclusion/Quality Assurance Measures:

The 48 hour EC50 and 95% confidence interval, calculated by linear regression analysis, is 0.20 (0.11-0.35) mg/L for Quahog embryos and larvae exposed to HOE 033171 Technical. The NOEL is 0.12 mg/L.

The data were audited by the laboratory's Quality Assurance Unit to assure compliance with the protocols, standard operating procedures and pertinent EPA Good Laboratory Practices (GLPs). A GLP compliance statement was included and signed by the Quality Assurance Unit.

14. Reviewer's Discussion and Interpretation of Study Results:

A. Test Procedure: The test procedures were in general accordance with protocols recommended by the guidelines, but deviated from them as follows.

Embryos were inoculated within 3.5 hours of fertilization rather than the 1 hour recommended. No mention was made regarding the percentage of abnormally developed embryos in the test, and therefore, a determination as to whether abnormalities were less than the 10% required by the guidelines could not be made.

A complete characterization of the dilution water was not provided.

B. Statistical Analysis: The reviewer does not have access to the computer program utilized by the author to determine the EC50 value and therefore, the EC50 value was only checked by graphic interpolation. An EC50 of value of 0.18 mg/L was generated using the nominal concentration of active ingredient using the graphical interpolation method.

C. Discussion/Results: The 48-hour EC50 of HOE 033171 Technical for Mercenaria is 0.20 mg/L. Based on this EC50 value HOE 033171 Technical is classified as highly toxic. The toxicity test was conducted at 32°/oo salinity and temperature of 20-22°C.

D. Adequacy of the Study:

Classification: Core
Rationale: N/A
Repairability: N/A

15. Completion of One-liner for Study: Yes, January 7, 1988.

Laird Hoe 033171 Quahog Clam 02-18-88

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
.55	19371	19371	100	0
.33	19371	14915	76.99655	0
.2	19371	11816	60.9984	0
.12	19371	2905	14.99665	0
.071	19371	0	0	0

BECAUSE THE NUMBER OF ORGANISMS USED WAS SO LARGE, THE 95 PERCENT CONFIDENCE INTERVALS CALCULATED FROM THE BINOMIAL PROBABILITY ARE UNRELIABLE. USE THE INTERVALS CALCULATED BY THE OTHER TESTS.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .1785225

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	4.05566E-05	.1983584	.1975049	.1992155

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.2471922	885.4192	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 4.820855

95 PERCENT CONFIDENCE LIMITS = 2.424002 AND 7.217708

LC50 = .1976442

95 PERCENT CONFIDENCE LIMITS = .1477287 AND .2635532

LC10 = .1077569

95 PERCENT CONFIDENCE LIMITS = 5.363089E-02 AND .1448889

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CONFIDENTIAL BUSINESS INFORMATION

Data Evaluation Record

Accession No. 404047-03

1. Chemical: Whip 1EC Herbicide, Ethyl-2-(4-(8-chloro-2-benzoxazolyloxy)-phenoxyl)-propanoate. HOE 033171 OH EC 13A122

2. Test Material: HOE 033171, OH EC 13A122, 12.6% Purity

3. Study Type: Mollusc 48-Hour Embryo Larvae Study. Species Tested: Quahog Clam, Mercenaria mercenaria.

4. Citation: Surprenant, D.C. 1987. Acute Toxicity of HOE 033171 OH EC 13A122 to Embryos-Larvae of the Quahog Clam (Mercenaria). Prepared by Springborn Life Sciences, Inc., Wareham, Massachusetts. Submitted by Hoechst Celanese Corporation, Somerville, New Jersey, Report No. A36207. Accession No. 404047-03.

5. Reviewed By: C. Steve Manning
Aquatic Toxicologist
ESE
Signature: C. Steve Manning
Date: 1/11/88

6. Approved By: Isabel C. Johnson, M.S.
Principal Scientist
KBN Engineering and Applied Sciences, Inc.
Signature: Isabel C. Johnson
Date: 1/11/88

Henry T. Craven
Chief, EEB, HED
US EPA
Signature: Henry T. Craven
Date: 8/17/88

7. Conclusions: This study is scientifically sound. The 48-hour EC50 value for embryo larvae of the Quahog clam (Mercenaria) exposed to HOE 033171 OH EC 13A122 under static test conditions is 0.75 mg/L with 95% confidence limits of 0 and 0.27 mg/L based on nominal concentrations of whole material and 0.11 mg/L based on nominal concentrations of active ingredient. With a 48-hour EC50 of 0.75 mg/L, Whip is considered highly toxic to the Quahog clam.

8. Recommendations: N/A

9. Background:

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

A. Test Animals: Adult Quahog clams were maintained in a commercial shellfish hatchery, Cape Cod, Massachusetts in natural seawater, prior to induced spawning. Adult clams were induced to spawn by raising water temperature to approximately 30°C in the presence of viable sperm from sexually mature male quahog. Eggs and sperm were mixed to provide fertilized embryos to initiate the test.

B. Test System: The test was conducted in 1.0 L glass beakers containing 0.9 L of filtered (5 micrometers) natural seawater at a salinity of 32 °/oo and temperature of 21°C under static conditions. The seawater was collected from the Cape Cod Canal near Borne, Massachusetts. The photoperiod was 16 hours light/8 hours dark.

C. Dosage: A 48-hour static test was conducted.

D. Design: Test containers were inoculated with 26,800 embryos within 2.5 hours after fertilization. All treatments and control were triplicated. A control and nominal HOE 033171 OH EC 13A122 concentrations of 0.16, 0.26, 0.43, 0.72 and 1.2 mg/L were employed.

E. Statistics: A computer program developed at the testing laboratory was utilized to compute four linear regression curves based on least squares. The percentage reduction of normally developed larvae were transformed to probits and concentrations to logs. Both untransformed and transformed data were regressed. The regression line which provided the best fit of the untransformed or transformed data was selected based on the highest associated coefficient of determination. The regression equation was then applied to calculate the EC50 and its 95% confidence limits.

"The no observed effect level (NOEL) concentration was determined by subjecting the biological response data for all treatment levels and controls to analysis of variance. If no significant difference (P=0.05) between control and solvent control responses was indicated, the treatment responses were compared to the pooled control response. Dunnett's Test was used to determine the highest treatment level not significantly different than the control, which was identified as the NOEL."

12. Reported Results:

Nominal Concentration (mg/L)	Percentage Reduction *
1.2	92
0.72	20
0.43	31
0.26	13
0.16	11
Control	--

* Percentage reduction in the number of normally developing embryos as compared to the mean response for the pooled control replicates.

13. Study Author's Conclusion/Quality Assurance Measures:

"The 48 hour EC50 and 95% confidence interval, calculated by linear regression analysis, is 0.75 (0-27) mg/L for Quahog embryos and larvae exposed to HOE 033171 OH EC 13A122. The no observed effect level (NOEL) is 0.72 mg/L."

The data were audited by the laboratory's Quality Assurance Unit to assure compliance with the protocols, standard operating procedures and pertinent EPA Good Laboratory Practices (GLPs). A GLP compliance statement was included and signed by the Quality Assurance Unit.

14. Reviewer's Discussion and Interpretation of Study Results:

A. Test Procedure: The test procedures were in general accordance with protocols recommended by the guidelines, but deviated from them as follows.

Embryos were inoculated within 2.5 hours of fertilization rather than the 1 hour recommended. No mention was made regarding the percentage of abnormally developed embryos in the test, and therefore, a determination as to whether abnormalities were less than the 10% required by the guidelines could not be made.

A complete characterization of the dilution water was not provided.

B. Statistical Analysis: The reviewer does not have access to the computer program utilized by the author to determine the EC50 value and therefore, the EC50 value was only checked by graphic interpolation. In addition, the EC50 was determined for both whole material as reported by the author and as active ingredient, both determined by graphic interpolation. An EC50 of 0.87 mg/L was generated using the nominal whole material concentration as used by the author, and a value of 0.11 mg/L was generated using the nominal concentration of active ingredient.

C. Discussion/Results: The 48-hour EC50 based on whole material nominal concentrations of HOE 033171 OH EC 13A122 for Mercenaria is 0.75 mg/L. The 48-hour EC50 using active ingredient is 0.11 mg/L based upon graphic interpolation. Both whole material and active ingredient EC50 values classify this material as highly toxic. The toxicity test was conducted at 32°/oo salinity and temperature of 21°C.

D. Adequacy of the Study:

Classification: Core
Rationale: N/A
Repairability: N/A

15. Completion of One-liner for Study: Yes, January 7, 1988.

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

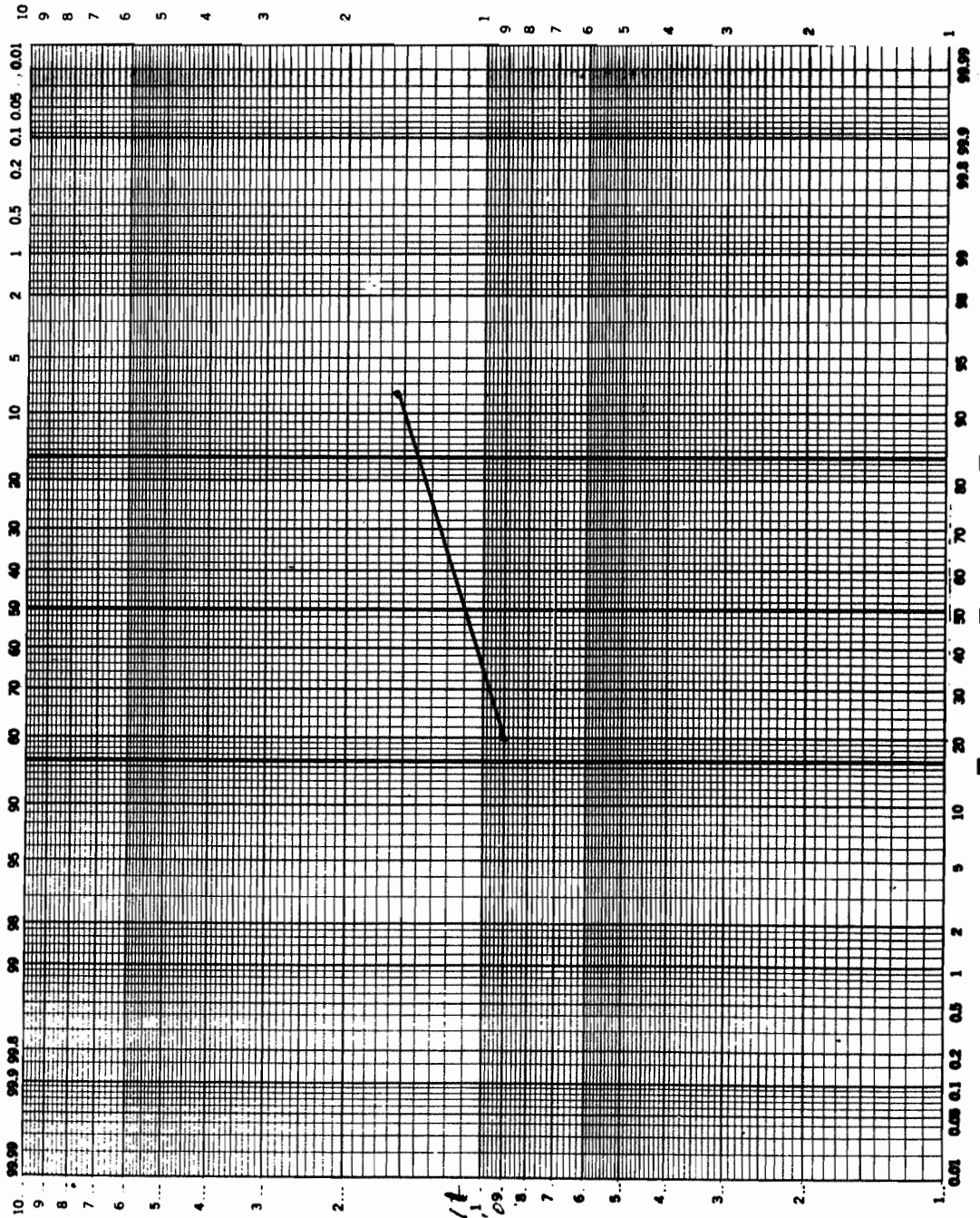
POST OFFICE BOX E.S.E. GAINESVILLE, FLORIDA 32601

CLIENT: _____ TEST DATES: _____

TEST METHOD: Static/Flow-through

TEST SPECIES: Mercenaria mercenaria CALCULATED BY: CM DATE: 1/5/88

EXPOSURE PERIOD: 48 Hr. REVIEWED BY: _____ DATE: _____



Normal distribution probability

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

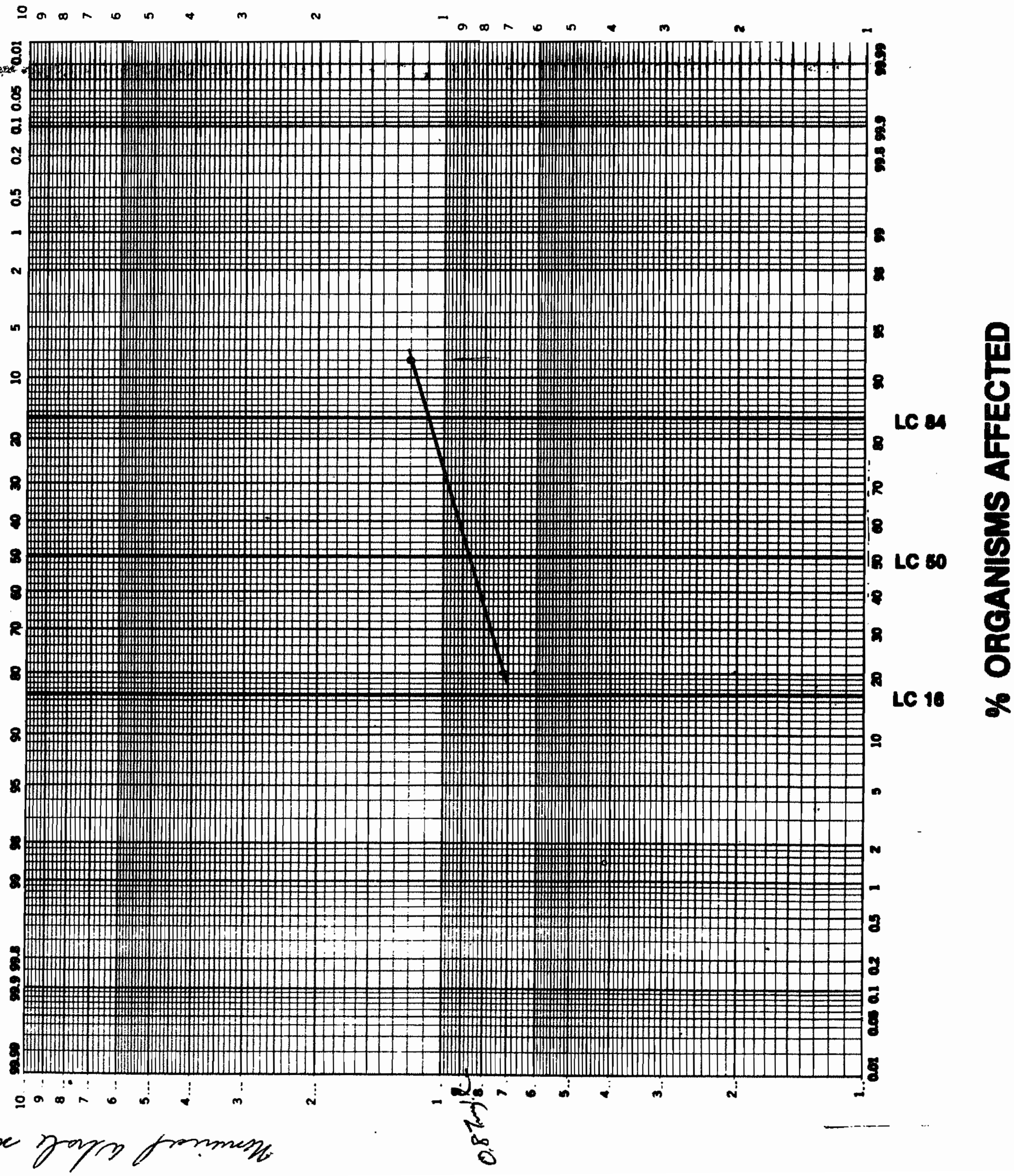
POST OFFICE BOX E.S.E. GAINESVILLE, FLORIDA 32601

CLIENT: ______________ TEST DATES: ______________

TEST METHOD: Static/Flow-through

TEST SPECIES: Mercenaria mercenaria CALCULATED BY: CSY DATE: 1/5/88

EXPOSURE PERIOD: 48 Hr. REVIEWED BY: ________ DATE: ________



0.87

Data Evaluation Record

Accession No. 404047-03

1. Chemical: Whip 1EC Herbicide, Ethyl-2-(4-(8-chloro-2-benzoxazolyloxy)-phenoxyl)-propanoate. HOE 033171 OH EC 13A122

2. Test Material: HOE 033171, OH EC 13A122, 12.6% Purity

3. Study Type: Mollusc 48-Hour Embryo Larvae Study. Species Tested: Quahog Clam, Mercenaria mercenaria.

4. Citation: Surprenant, D.C. 1987. Acute Toxicity of HOE 033171 OH EC 13A122 to Embryos-Larvae of the Quahog Clam (Mercenaria). Prepared by Springborn Life Sciences, Inc., Wareham, Massachusetts. Submitted by Hoechst Celanese Corporation, Somerville, New Jersey, Report No. A36207. Accession No. 404047-03.

5. Reviewed By: C. Steve Manning
Aquatic Toxicologist
ESE
Signature:
Date:

6. Approved By: Isabel C. Johnson, M.S.
Principal Scientist
KBN Engineering and
Applied Sciences, Inc.
Signature:
Date:

Henry T. Craven
Chief, EEB, HED
US EPA
Signature: Henry T. Craven
Date: 8/17/88

C.E. 8-12-88
DSR 8-15-88

7. Conclusions: This study is scientifically sound. The 48-hour EC50 value for embryo larvae of the Quahog clam (Mercenaria) exposed to HOE 033171 OH EC 13A122 under static test conditions is 0.816 mg/L with 95% confidence limits of 0.81 and 0.82 mg/L based on nominal concentrations of whole material. With a 48-hour EC50 of 0.816 mg/L, Whip is considered highly toxic to the Quahog clam. This study

does fulill the requirement in support of registration for 48-hour embryo-larvae study for a formulated product.

8. Recommendations: N/A

9. Background: This study was required based on a discussion in January 1987 betwwen M. Slimak (Branch Chief) and company representatives to support HOE 033171 registration.

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

A. Test Animals: Adult Quahog clams were maintained in a commercial shellfish hatchery, Cape Cod, Massachusetts in natural seawater, prior to induced spawning. Adult clams were induced to spawn by raising water temperature to approximately 30°C in the presence of viable sperm from sexually mature male quahog. Eggs and sperm were mixed to provide fertilized embryos to initiate the test.

B. Test System: The test was conducted in 1.0 L glass beakers containing 0.9 L of filtered (5 micrometers) natural seawater at a salinity of 32 °/oo and temperature of 21°C under static conditions. The seawater was collected from the Cape Cod Canal near Borne, Massachusetts. The photoperiod was 16 hours light/8 hours dark.

C. Dosage: A 48-hour static test was conducted.

D. Design: Test containers were inoculated with 26,800 embryos within 2.5 hours after fertilization. All treatments and control were triplicated. A control and nominal HOE 033171 OH EC 13A122 concentrations of 0.16, 0.26, 0.43, 0.72 and 1.2 mg/L were employed.

E. Statistics: A computer program developed at the testing laboratory was utilized to compute four linear regression curves based on least squares. The percentage reduction of normally developed larvae were transformed to probits and concentrations to logs. Both untransformed and transformed data were regressed. The regression line which provided the best fit of the untransformed or transformed data was selected based on the highest associated coefficient of determination. The regression equation was then applied to calculate the EC50 and its 95% confidence limits.

"The no observed effect level (NOEL) concentration was determined by subjecting the biological response data

for all treatment levels and controls to analysis of variance. If no significant difference (P=0.05) between control and solvent control responses was indicated, the treatment responses were compared to the pooled control response. Dunnett's Test was used to determine the highest treatment level not significantly different than the control, which was identified as the NOEL."

2. Reported Results:

Nominal Concentration (mg/L)	Percentage Reduction *
1.2	92
0.72	20
0.43	31
0.26	13
0.16	11
Control	--

* Percentage reduction in the number of normally developing embryos as compared to the mean response for the pooled control replicates.

13. Study Author's Conclusion/Quality Assurance Measures:

"The 48 hour EC50 and 95% confidence interval, calculated by linear regression analysis, is 0.75 (0-27) mg/L for Quahog embryos and larvae exposed to HOE 033171 OH EC 13A122. The no observed effect level (NOEL) is 0.72 mg/L."

The data were audited by the laboratory's Quality Assurance Unit to assure compliance with the protocols, standard operating procedures and pertinent EPA Good Laboratory Practices (GLPs). A GLP compliance statement was included and signed by the Quality Assurance Unit.

14. Reviewer's Discussion and Interpretation of Study Results:

A. Test Procedure: The test procedures were in general accordance with protocols recommended by the guidelines, but deviated from them as follows:

Embryos were inoculated within 2.5 hours of fertilization rather than the 1 hour recommended. No mention was made regarding the percentage of abnormally developed embryos in the test, and therefore, a determination as to whether abnormalities were less

than the 10% required by the guidelines could not be made.

A complete characterization of the dilution water was not provided.

B. Statistical Analysis: Using Stephan's program, EEB determined the EC50 to be 0.816 with 95% confidence limits of 0.81 and 0.82 ppm, respectively. The moving average method was utilized.

C. Discussion/Results: The 48-hour EC50 based on whole material nominal concentrations of HOE 033171 OH EC 13A122 for Mercenaria is 0.816 mg/L. The EC50 value classifies this material as highly toxic. The toxicity test was conducted at 32°/oo salinity and temperature of 21°C.

D. Adequacy of the Study:

Category: Core for a formulated product
Rationale: See section 7 above
Reparability: Not reparable

15. Completion of One-liner for Study: Yes, January 7, 1988.

Laird Whip (Hoe) Quahog Clam 08-04-88

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
1.2	19700	18121	91.98477	0
.72	19700	3940	20	0
.43	19700	6107	31	0
.26	19700	2561	13	0
.16	19700	2167	11	0

BECAUSE THE NUMBER OF ORGANISMS USED WAS SO LARGE, THE 95 PERCENT CONFIDENCE INTERVALS CALCULATED FROM THE BINOMIAL PROBABILITY ARE UNRELIABLE. USE THE INTERVALS CALCULATED BY THE OTHER TESTS.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .8797725

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	2.028972E-04	← .8156159 (LC50)	← .8102876 (95% C.L.)	.8210211 → (95% C.L.)

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	1.87493	4218.791	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 2.465824

95 PERCENT CONFIDENCE LIMITS =-.9105816 AND 5.842231

LC50 = .7164411

95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = .2188466

95 PERCENT CONFIDENCE LIMITS = 0 AND .530094

****

237 999

OBS	TRT	RESP1	RESP2	RESP3	RESP4	RESP5	RESP6	RESP7	RESP8	RESP9	RESP10	RESP11	RESP12	RESP13	RESP14	RESP15	RESP16	RESP17	RESP18	RESP19	RESP20
1	A	62	38	63	34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	B	52	38	41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	C	50	46	32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	D	38	34	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	E	42	32	44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	F	8	0	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
TRT	6	A B C D E F

NUMBER OF OBSERVATIONS IN DATA SET = 120

NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,
ONLY 19 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: RESP

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V
MODEL	5	4128.40789474	825.68157895	9.38	0.0006	0.782910	25.914
ERROR	13	1144.75000000	88.05769231		ROOT MSE		RESP MEA
CORRECTED TOTAL	18	5273.15789474			9.38390603		36.2105263

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR >
TRT	5	4128.40789474	9.38	0.0006	5	4128.40789474	9.38	0.000

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESP

NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
NOT THE EXPERIMENTWISE ERROR RATE

ALPHA=0.05 DF=13 MSE=88.0577

WARNING: CELL SIZES ARE NOT EQUAL.
HARMONIC MEAN OF CELL SIZES=3.13043

NUMBER OF MEANS	2	3	4	5	6
CRITICAL RANGE	16.1734	16.9519	17.4784	17.7586	17.9687

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN GROUPING	MEAN	N	TRT
A	49.250	4	A
A			
A	43.667	3	B
A			
A	42.667	3	C
A			
A	39.333	3	E
A			
A	34.000	3	D
B	4.000	3	F

JEUE

Acute Toxicity of Hoe 033171 (Whip) to
Embro-Larvae Hoe 033171 (Whip)
Accession Number 404047-01

EEB has received and evaluated the additional Hoe 033171 data submitted by the registrant for use in support of an oyster embryo-larvae study. We need the raw data in order to verify the EC_{50}, NOEL and percent of fertilization values. The registrant should have submitted the complete oyster study including the raw data instead of a summary. Therefore, the oyster study remains supplemental. The registrant should do one of the following:

a. Conduct another study (§72-3); or

b. Resubmit the oyster study including the actual raw data.

CONFIDENTIAL BUSINESS INFORMATION

Note: Later reviews determined this study to be scientif. sound and valid (see following reviews).
A. Vaughan 9.26.88

Data Evaluation Record

Accession No. 404047-04

1. Chemical: Whip 1EC Herbicide: Ethyl-2-(4-(8-chloro-2-benzoxazolyloxy)-phenoxyl)-propanoate. HOE-033171 Technical.

2. Test Material: HOE-033171-OHZD98-0001 Technical Grade (Batch no. CO-184-0047); 96.5% active ingredient.

3. Study type: Acute Toxicity Test for Green Algae. Species Tested: Green alga (Selenastrum capricornutum)

4. Citation: Hughes, J.S. 1987. The Toxicity of HOE 033171-OHZD98 Technical to Selenastrum capricornutum Laboratory Project Number 1093-02-1100-1. Prepared by Malcolm Pirnie Inc., White Plains, New York. Submitted by Hoechst Celanese Corporation. Somerville, New Jersey. Study No. A35948. Accession Number 404047-04.

5. Reviewed By: Bruce A. Rabe, Aquatic Toxicologist, ESE — Signature: Bruce A. Rabe — Date: 1/11/88

6. Approved By: Isabel C. Johnson, M.S., Principal Scientist, KBN Engineering and Applied Sciences, Inc. — Signature: Isabel C. Johnson — Date: 1/11/88

Henry T. Craven, Chief, EEB/HED, USEPA — Signature: Henry T. Craven — Date: 8/26/88

7. Conclusions: This study is not scientifically sound and cannot fulfill the guidelines requirements for an acute toxicity determination for a freshwater algal species. As a result of these findings, the study is considered invalid.

8. Recommendations: N/A

9. Background:

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

A. Test Species: Green alga, Selenastrum capricornutum. The original culture was obtained from the National Eutrophication Research Program, US EPA, Corvallis, OR. Stock cultures were maintained at the Malcolm Pirnie Laboratory, White Plains, New York.

B. Test System: The test was conducted under static conditions for 7 days. The test temperature was maintained at 24±2°C. The test was conducted in 125-ml glass Erlenmeyer flasks containing 25 ml of test solution. The flasks were continuously shaken at 100 oscillations/minute and continuously illuminated at 4306 ± 646 lumens/m^2. The dilution/control water was synthetic algal assay procedure (AAP) nutrient medium.

C. Dosage: 7-day static test.

D. Design: Each flask was inoculated with 3,000 cells/ml from the stock culture. A control, solvent control (DMF), and nominal test concentrations of 5, 10, 20, 40, and 80 mg a.i/L were maintained. The solvent control concentration was 500 microliter per liter.

E. Statistics: The EC25 and EC50 were determined by inverse estimation least squares linear regression. The NOEC value was derived from an analysis of variance and two separate multiple range tests, Duncan's new multiple range test and the student Newman-Keals test.

12. Reported Results: Effects of HOE-033171 on mean standing crop on day 7, relative to the solvent control, ranged from 8.0% in the 5 mg/L concentration to 27.1% in the 80 mg/L concentration. Mean standing crop values on day 7 were all significantly different from that in the solvent control except the lowest concentration (see attached Table 3).

13. Study Author's Conclusion/Quality Assurance Measures: "The 7-day EC25 is 59.2 mg/L (95% confidence limits 25.9 - 179.8 mg/L) and the 7 day EC50 is 731.9 mg/L (95% confidence limits 227.7 - 6,093.2 mg/L). The no observed effect concentration (NOEC) was determined to be 5 mg/L."

"The results of this study indicate that, according to the Pesticide Assessment Guidelines, a Tier 3 aquatic field test is not required. Direct application of 0.2 lb a.i. to a 1 acre, 0.5 ft. deep pond would result in an estimated environmental concentration of 0.147 mg/L which is well below the EC50 of 731.9 mg/L."

The data and study instrumentation were audited by the laboratory's Quality Assurance Unit Administrator to assure compliance with the protocols, standard operating procedures and pertinent EPA Good Laboratory Practice (GLP) Regulations. A GLP compliance statement was included and signed by the Quality Assurance Unit Administrator.

14. Reviewer's Discussion and Interpretation of Study Results:

A. Test Procedure: The test procedures followed the protocol outlined in the 1982 guidelines - subdivision J - Tier II for aquatic plants.

B. Statistical Analysis: Analysis of data using inverse estimation least squares linear regression indicated that the EC25 and EC50 values were 59.2 mg/L and 731.9 mg/L with 95 percent confidence limits of 25.9 - 179.8 mg/L and 227.7 - 6093.2 mg/L, respectively. Graphical interpolation yielded an EC25 of 57 mg/L and an EC50 of 690 mg/L.

C. Discussion/Results: Water solubility of HOE 033171 was reported to be 0.9 mg/L, however, the test material was reportably soluble in N,N-dimethylformamide. The test material was dissolved in a stock solution of DMF, but upon preparation of test concentrations the test material "appeared" to come out of solution in the three highest concentrations. Since no chemical analyses of actual toxicant concentrations were performed, exposure levels were unknown.

The lack of measured test concentrations in calculating the EC25 and EC50 values contributes to the degree of uncertainty of the calculated values. The guidelines indiate that if the test material precipitates out of solution, it should be measured.

D. Adequacy of the Study:

Classification: Invalid
Rationale: Actual test concentrations were not measured although solubility problems were observed.
Repairability: Yes. This study can be upgraded to core if measured test concentrations are provided for the beginning and end of exposure.

15. Completion of One-liner for Study: Yes, January 8, 1988.

Data Evaluation Record

Accession No. 404047-04

1. Chemical: Whip 1EC Herbicide: Ethyl-2-(4-(8-chloro-2-benzoxazolyloxy)-phenoxyl)-propanoate. HOE-033171 Technical.

2. Test Material: HOE-033171-OHZD98-0001 Technical Grade (Batch no. CO-184-0047); 96.5% active ingredient.

3. Study type: Acute Toxicity Test for Green Algae. Species Tested: Green alga (Selenastrum capricornutum)

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5. Reviewed By: Bruce A. Rabe
Aquatic Toxicologist
ESE
Signature:
Date:

6. Approved By: Isabel C. Johnson, M.S.
Principal Scientist
KBN Engineering and
Applied Sciences, Inc.
Signature:
Date:
CL 8-4-88
NC 5.2.W

Henry T. Craven
Chief, EEB/HED
USEPA
Signature:
Date:
Henry T. Craven 8/26/88

7. Conclusions: This study is scientifically sound and can fulfill the guidelines requirements for an acute toxicity determination for a freshwater algal species. As a result of these findings, the study is considered core.

8. Recommendations: N/A

9. Background: This study was required based on a discussion in January 1987 between M. Slimak (Branch Chief) and company representatives to support registration.

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

A. Test Species: Green alga, Selenastrum capricornutum. The original culture was obtained from the National Eutrophication Research Program, US EPA, Corvallis, OR. Stock cultures were maintained at the Malcolm Pirnie Laboratory, White Plains, New York.

B. Test System: The test was conducted under static conditions for 7 days. The test temperature was maintained at 24±2°C. The test was conducted in 125-ml glass Erlenmeyer flasks containing 25 ml of test solution. The flasks were continuously shaken at 100 oscillations/minute and continuously illuminated at 4306 ± 646 lumens/m^2. The dilution/control water was synthetic algal assay procedure (AAP) nutrient medium.

C. Dosage: 7-day static test.

D. Design: Each flask was inoculated with 3,000 cells/ml from the stock culture. A control, solvent control (DMF), and nominal test concentrations of 5, 10, 20, 40, and 80 mg a.i/L were maintained. The solvent control concentration was 500 microliter per liter.

E. Statistics: The EC25 and EC50 were determined by inverse estimation least squares linear regression. The NOEC value was derived from an analysis of variance and two separate multiple range tests, Duncan's new multiple range test and the student Newman-Keals test.

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"The results of this study indicate that, according to the Pesticide Assessment Guidelines, a Tier 3 aquatic field test is not required. Direct application of 0.2 lb a.i. to a 1 acre, 0.5 ft. deep pond would result in an estimated environmental concentration of 0.147 mg/L which is well below the EC50 of 731.9 mg/L."

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The lack of measured test concentrations in calculating the EC25 and EC50 values contributes to the degree of uncertainty of the calculated values. The guidelines indiate that if the test material precipitates out of solution, it should be measured.

D. Adequacy of the Study: The report indicated that the test material appeared to have come out of solution in the three highest concentrations. However, this should not have a bearing on the test results because the two lowest concentrations (5 and 10 ppm) did not indicate a problem of test material staying in solution. A 0.2 lb

a.i. to a 1.0 acre, 0.5 ft deep pond would result in an estimated environmental concentration of 0.147 ppm which is well below EC50 of 731.9 ppm and no-effect-level of 5.0 ppm. Therfore, this study does fulfill the guidelines requirement for a freshwater algae study.

Classification: core
Rationale: N/A

15. Completion of One-liner for Study: Yes, January 8, 1988.