

188285, 188292
RECORD NO.

128851
SHAUGHNESSEY NO.

REVIEW NO.

EEB REVIEW

DATE: IN 2/12/87 OUT FEB 17 1987

FILE OR REG. NO 1471-RLI, 1471-RLO

PETITION OR EXP. NO. _____

DATE OF SUBMISSION 1/19/87

DATE RECEIVED BY HED 2/10/87

RD REQUESTED COMPLETION DATE 2/17/87

EEB ESTIMATED COMPLETION DATE 2/17/87

RD ACTION CODE/TYPE OF REVIEW 125

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

DATA ACCESSION NO(S). 400595-11

PRODUCT MANAGER NO. R. Mountfort (23)

PRODUCT NAME(S) (EL-107) Isoxaben Technical (1471-RLI)

(EL-107) Prolan 75 Dry Flowable (1471-RLO)

COMPANY NAME Elanco Products Company

SUBMISSION PURPOSE New Chemical Screen For Proposed Technical

Product and End-Use Product For Use On:

Established Turf, Ornamentals, Nursery Stock,
Noncroplands, Non-bearing Fruit/Nut Crops, and Non-bearing

SHAUGHNESSEY NO. CHEMICAL, & FORMULATION & A.I.ing Viney



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FEB 13 1987

MEMORANDUM

SUBJECT: New Chemical Screen for Isoxaben (EL-107):
1471-RLI and 1471-RLO

TO: Richard Mountfort, PM-23
Herbicide-Fungicide Branch
Registration Division (TS-767C)

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

Based upon a review of the Ecological Effects Branch (EEB) file for EL-107, it appears these two registration submissions pass the new chemical screen. Note, however, that further data may be required because: (1) new uses (i.e., uses not previously reviewed under the experimental use permits (EUP's) submitted to EEB) are proposed for registration; and (2) certain of the available data are supplemental (e.g., 96-hour LC₅₀ for bluegill sunfish, 96-hour LC₅₀ for rainbow trout, fish early-life stage studies with rainbow trout and fathead minnow) and may not support the proposed uses and application rates. Further data which might be required include:

1. Freshwater 96-hour LC₅₀ data for rainbow trout and bluegill sunfish (§ 72-1);
2. Acute LC₅₀ data for estuarine and marine organisms (marine/estuarine fish, shrimp, and oyster)(§ 72-3);
3. Chronic aquatic studies for freshwater and/or marine/estuarine organisms (§ 72-4 or § 72-5);
4. Simulated or actual field studies for aquatic organisms (§ 72-7); or
5. Nontarget plant data (§ 158.150).

Of course, a full evaluation of the proposed uses is required to determine these data.

We make these comments in order to prevent any possible misunderstanding on the registrant's part -- that is, the registrant concludes that by "passing" the new chemical screen, the existing data base is satisfactory to support the proposed use patterns. This may not be so.

Norm Cook

Norm Cook, RD Coordinator
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

(First Non-Food Use)

NEW CHEMICAL/ ~~PRE-1988 USE~~ SCREEN

1. FILE SYMBOL/REG NO. (RSERB) 1471-RLI = Technical
2. ~~TOLERANCE PETITION NO. (RSERB)~~ 1471-RLD = Proton 75 Dry Flowable
3. CHEMICAL NAME (RSERB) Isoxaben[®]
4. PESTICIDE CHEMICAL CODE (RSERB) 125851-6
5. PRODUCT NAME (RSERB) Isoxaben ~~Technical~~ Technical and
6. PM ~~23~~ 23 7. PM TEAM REVIEWER (PM)²³ Enduse product
P. Shaha
Team 33
557-1526
8. DATE OF RECEIPT (RSERB) 1/27/87
9. USE PATTERN (PM) Enduse product = Non-Food use (See label attached)
10. DATE OF TRANSMISSION TO PM (RSERB) 2/6/87
(EPA Receipt Date Plus 3 Days)
11. DATE OF TRANSMISSION TO HED (PM) _____
(PM Receipt Date Plus 5 Days)
12. HED DUE DATE FOR COMPLETION OF SCREEN (RSERB) _____
(HED Receipt Date Plus 7 Days)
13. HED REVIEWER (HED) _____
14. HED REVIEW COMPLETION DATE (HED) _____
(EPA Receipt Date Plus 45 Weeks)
① 1471-RLI = 188285
15. RECORD NUMBER (PM) ② 1471-RLD = 188, 392

REGISTRANT PHONE CONTACT INFORMATION (PM)

Date of Contact _____

Person Contacted _____
Title _____

Decision & Comments _____

STATUS OF PACKAGE

Passed Screen

Failed Screen
(Documentation attached)

EEB

125851
SHAUGHNESSEY NO.

1
REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 11-17-83 OUT 1-30-84

FILE OR REG. NO. 1471-EUP-IL

PETITION OR EXP. PERMIT NO. _____

DATE OF SUBMISSION 6-9-83

DATE RECEIVED BY HED 11-17-83

RD REQUESTED COMPLETION DATE 2-6-84

EEB ESTIMATED COMPLETION DATE 2-2-84

RD ACTION CODE/TYPE OR REVIEW 701/EUP

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

DATA ACCESSION NO(S). _____

PRODUCT MANAGER NO. R. Taylor (25)

PRODUCT NAME(S) EL-107 50W

COMPANY NAME Elanco Products Company

SUBMISSION PURPOSE Proposed EUP for terrestrial

noncropland use

SHAUGHNESSEY NO.

CHEMICAL & FORMULATION

% A.I.

EL-107

50%

EEB Branch Review

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

The registrant (Elanco Products Company) has applied for a 2 year Experimental Use Permit to apply EL-107, a new selective herbicide to non-cropland areas such as railroad roadbeds and ballasts, tank farms, and lumberyards. EL-107 is used to control a variety of broadleaf weeds when applied either pre- or post-emergence.

100.2 Formulation Information

EL-17.....51.5%
Inerts.....48.5

100.3 Application Methods, Directions, Rates

EL-107 is a pre-emergence herbicide and should be applied before broadleaf weeds emerge.

EL-107 50W should be mixed with water and surface applied with any low pressure sprayer that provides uniform coverage. EL-107 50W should be applied at rates of 0.5 to 1 lb/acre.

100.4 Target Organisms

Broadleaf weeds (species not indicated on label)

100.5 Precautionary Labeling

Do not contaminate water by direct application, cleaning of equipment or disposal of wastes.

100.6 Proposed EUP Program

100.6.1 Objectives

The objective of the program are:

1. Evaluate the herbicide's efficacy in different geographical areas.
2. Evaluate the efficacy against a wide range of broadleaf weeds.
3. Determine dosage rates and delivery volumes necessary for effective use.

100.6.2 Date, Duration

The registrant has requested a two year permit. (no dates specified).

100.6.3 Amount Shipped, Groographical Distribution

EL-107				
<u>States</u>	<u>Year</u>	<u>lbs a.i</u>	<u>lbs 50W</u>	<u>Acres</u>
S.W. Region (OK, TX)	1983	5	10	10
W. Central (CO, IA, KS, MN, MO, E. MT, NE, ND, SD, WY)		5	10	10
W/NW Region (CA, ID, W. MT, OR, WA)		<u>2.5</u>	<u>5</u>	<u>5</u>
	TOTAL	12.5	25	25
SW Region	1984	5	10	10
W. Central		5	10	10
W/NW Region		<u>2.5</u>	<u>5</u>	<u>5</u>
		12.5	25	25

101 Hazard Assessment

101.2 Discussion

EL-107 will only be used on 25 acres each year. The maximum label rate per acre is 0.5 lbs a.i per acre.

101.2 Likelihood of Adverse Effects to Non-target Organisms

Based on the data submitted with this registration request, EL-107 can be considered practically non-toxic to birds on both an acute oral basis (Bobwhite quail LD₅₀ >2,000 mg/kg) and also a dietary basis (Bobwhite 8-day dietary LC₅₀ >5,000 ppm and Mallard dietary LC₅₀ >5,000 ppm). Thus if the herbicide is used at maximum rates on 25 acres of non-cropland, it is not expected that exposed populations of avian wildlife would be significantly affected.

The available toxicity data on aquatic species is limited. The 3 studies submitted (on trout, bluegill and daphnids) indicate that EL-107 is not toxic to aquatic at concentrations of 1.0 ppm or less (highest dosage tested).

At the highest label rate, EL-107 would be applied as 0.5 lbs a.i./acre. If the herbicide was inadvertently introduced into the aquatic environment at this rate, the following residues would be expected:

Residues (ppm) expected after 0.5 lbs ai/acre application	Water Depth (ft)			
	0.5	1	2	3
	0.37	0.18	0.09	0.06

Expected residues would not approach 1 ppm, thus it can be assumed that that aquatic organisms would not be affected if EL-107 is used at the maximum allowable rate provided on the EUP label.

101.3 Endangered Species Considerations

It is not expected that use of EL-107 in this experimental program will significantly affect Endangered/Threatened species. This is mainly because of the low potential for exposure due to low application rates (0.5 lbs a.i./acre) and the small amount of acreage to be treated (25 acres per year).

101.4 ²Adquacy of Toxicity Data

The study relating the acute oral toxicity of technical EL-107 to bobwhite quail is scientifically sound and may be used to fulfill the guidelines requirement for an acute oral LD₅₀ study on an upland game species. With an acute oral LD₅₀ in excess of 2,000 ppm, this compound is considered practically non-toxic to bobwhite quail.

The 2 studies relating the dietary toxicity of technical EL-107 to bobwhite quail and mallard ducks are scientifically sound and may be used to fulfill the guidelines requirements for two 8-day dietary studies: one on an upland game species and one on a waterfowl species, respectively. With LC₅₀'s in excess of 5,000 for both test species, this compound is considered practically non-toxic to quail and mallards.

The 2 studies relating the acute toxicity of EL-107 to bluegill and rainbow trout are scientifically sound but may not be used to fulfill guideline requirements for 96 hour LC₅₀ tests on both a warmwater and coldwater fish species. This is mainly because the toxicant was insoluble in the diluent, thus fish were exposed to amounts of EL-107 significantly less than the concentrations indicated by nominal designations. These studies may only be used to support registration actions for EL-107 where expected aquatic residues approach 1 ppm or less.

The study relating the acute toxicity of technical EL-107 to Daphnia magna is scientifically sound, but may not be use to fulfill the guideline requirement for a 48 hour EC₅₀ test on an aquatic invertebrate. This is mainly because the toxicant was insoluble in test water, thus daphnids were exposed to amounts

of EL-107 significantly less than concentrations indicated by nominal designations. This study may only be used to support registration actions for EL-107 where expected aquatic residues will approach 1 ppm or less.

The study relating the toxicity of EL-107 to earthworms is scientifically sound and shows the no-observed-effect level of the soil incorporated chemical to be greater than 100 mg/l.

The study relating the toxicity of EL-107 to Selenastrum capricornutum) is scientifically sound, and provides supplemental information about the chemical's toxicity to algae exposed to concentrations of 1 ppm or less of the technical material.

101.5 Adequacy of Labeling

To maintain consistency of labeling among products, the following statements should be incorporated into the EL-107 label:

"Do not apply directly to water or wetlands. Do not contaminate water by cleaning of equipment or disposal of wastes."

103 Conclusions

No significant adverse effects to populations of terrestrial and aquatic non-target species are anticipated under this EUP. This is mainly because of the very limited acreage involved in the experimental program. (Please refer to Sections 104.1 and 104.2 for details)

Elizabeth E. Zucker 2/1/84
Elizabeth E. Zucker
Wildlife Biologist
Ecological Effects Branch (EEB)
Hazard Evaluation Division (HED)

Raymond Matheny *Raymond W. Matheny 2/2/84*
Head, Section 1
EEB/HED

Clayton Bushong 2/2/84
Clayton Bushong
Chief
EEB/HED

125851

Shaughnessy No.: 125851

Date Out of EAB: DEC 19 1985

To: R. Mountfort
Product Manager 23
Registration Division (TS-767)

From: Samuel M. Creeger, Chief *SM*
Review Section #1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached, please find the EAB review of...

Reg./File # : 1471-EUP-TN
Chemical Name: EL-107
Type Product : Herbicide
Product Name : N/A
Company Name : Elanco
Purpose : EUP on wheat and barley (data submitted in response to
previous review -FAB review of Sept. 29, 1983).

Date Received: 7/16/85

Action Code(s): 731

Date Completed: DEC 19 1985

EAB #(s) : 5772

Days: 0.75

Deferrals to: _____ Ecological Effects Branch
_____ Residue Chemistry Branch
_____ Toxicology Branch

Monitoring study requested by EAB:

Monitoring study voluntarily conducted by registrant:

1. CHEMICAL:

N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide.

EL-107

PHYSICAL DATA: Please see EAB review of Sept. 29, 1983.

2. TEST MATERIAL: Not applicable

3. STUDY/ACTION TYPE: Adding information in response to deficiencies cited in the EAB review of 9/29/83 of the octanol/water partition coefficient data.

4. STUDY IDENTIFICATION: Octanol/Water Partition Coefficient

5. REVIEWED BY:

Akiva D. Abramovitch, Ph.D.
Chemist
Environmental Chemistry Review Section 1/EAB/HED/OPP

Abramovitch
Date: 12/19/85

6. APPROVED BY:

Samuel M. Creeger, Chief
Supervisory Chemist
Environmental Chemistry Review Section 1/EAB/HED/OPP

Sam M Creeger
DEC 19 1985
Date: / /85

7. CONCLUSIONS:

For a summary of the data from the previous submission see EAB review of Sept. 29, 1983.

The data in this submission enables EAB to accept the octanol/water partition coefficient data. The octanol/water partition coefficient was reported as 434.

Required data for the EUP (wheat and barley) are as follows:

<u>Data Requirement</u>	<u>Satisfied</u>
Hydrolysis	Yes (EAB review of 9/29/83)
Aerobic Soil Metabolism	No (not submitted)
Accumulation in Fish	No (not submitted)
Leaching	No (not accepted-EAB of 9/29/83)
Rotational Crops	No (not submitted)

8. RECOMMENDATIONS:

Aerobic soil metabolism, leaching and crop rotation data must be submitted and accepted by EAB for this EUP (wheat and barley).

An EUP should not be granted at this time.

For registration, photolysis (aqueous and soil), anaerobic soil metabolism, field dissipation and fish accumulation data will also be needed.

9. BACKGROUND:

A. Introduction: Elanco is seeking an EUP for EL-107. This EUP was last considered in the EAB review of 9/29/83.

B. Directions for Use: Please see EAB review of 9/29/83.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

A. Study Identification: Octanol/Water Partition Coefficient:

The study was conducted by J. M. Rodewald and J. T. Wilson in 1982 and reviewed in the EAB review of Sept. 29, 1983.

B. Material and Methods:

Additional information concerning the test chemical was submitted by J.M. Rodewald in response to questions cited in the EAB review of 9/29/83.

The test chemical was ^{14}C labeled in the carbonyl carbon and was found to have a radiochemical purity of 99.8%. The solubility of the test chemical was determined to be 1-5 ppm at pH's of 4-10.

C. Reported Results:

See EAB review of 9/29/83.

D. Study Author's Conclusions:

Octanol/Water partition coefficient was determined to be 434 (see EAB review of 9/29/83).

E. Reviewer's Discussion and Interpretation of Study Results: See EAB review of 9/29/83.

11. COMPLETION OF ONE LINER:

No one liner.

12. CBI APPENDIX:

No CBI Appendix.

125851

Shaughnessy No.: 125851

Date Out of EAB: DEC 31 1985

To: R. Taylor / Yowell
Product Manager 25
Registration Division (TS-767)

From: Samuel Creeger, Chief 
Review Section #1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached, please find the EAB review of...

Reg./File # : 1471-EUP-TN
Chemical Name: EL-107
Type Product : Herbicide
Product Name : EL-107 50K
Company Name : Elanco
Purpose : EUP for use on wheat and barley

Action Code(s): 730

EAB #(s) : 5305

Date Received: 2/15/85

TAIS Code: _____

Date Completed: DEC 31 1985

Total Reviewing Time: 1 day

Deferrals to:

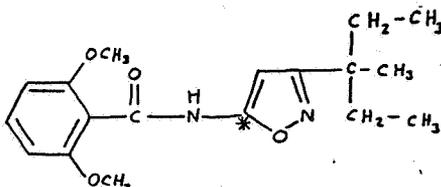
Ecological Effects Branch

Residue Chemistry Branch

Toxicology Branch

1. CHEMICAL: EL- 107, N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyll]-2,6-dimethoxybenzamide

2. TEST MATERIAL: C¹⁴ radiolabeled EL-107



3. STUDY/ACTION TYPE:

Experimental Use Permit for application to 4400 acres in 31 states for weed control on wheat and barley.

4. STUDY IDENTIFICATION:

Graper, L. K. "Behavior of ¹⁴C EL-107 in field soil" Eli Lilly and Co. Study No. ABC-0097 and ABC-0146, June, 1984, EPA Acc. No. 073291.

5. REVIEWED BY:

Stephen J. Simko
Chemist
EAB/HED/OPP

Signature:

S. Simko

Date:

12/31/85

6. APPROVED BY:

Samuel M. Creeger
Chief, Section 1
EAB/HED/OPP

Signature:

Samuel M. Creeger

Date:

DEC 31 1985

7. CONCLUSIONS:

This field dissipation study using radiolabeled EL-107 applied to small area enclosed by a metal cylinder demonstrated that the parent compound had a half-life of approximately six months. The two major degradates were N-[3-(1-Hydroxyethyl)-5-isoxazolyll]-2,6-dimethoxybenzamide (≤ 3.9% of the applied) and N-[3-(1-Hydroxy-1-methylpropyl)-5-isoxazolyll]-2,6-dimethoxybenzamide (≤ 8.6% of the applied).

This study is not acceptable because the use of a metal cylinder does not represent actual field use conditions. Additionally, soil samples were not taken to a sufficient depth to define the extent of leaching. However, this study is not required for an EUP.

EAB files currently contain the following satisfactory data:

Hydrolysis - stable

K_{ow} = 434 (not required for this EUP)

8. RECOMMENDATIONS:

A field dissipation study is not required for this EUP.

EAB recognizes the problem of detecting the low levels of residues resulting from application of small amounts of the newer pesticides and encourages the development of new and innovative techniques for detecting lower levels of these potent pesticides.

The data requirements for this EUP and their current status are:

hydrolysis - satisfied (9/29/83 review)

aerobic soil metabolism - not submitted

leaching - found to be unacceptable (9/29/83 review)

fish accumulation - not submitted

rotational crop - not submitted

The fate of EL-107 is not known at this time; therefore, we cannot concur with the proposed EUP.

9. BACKGROUND:

A copy of the EUP label is appended.

A copy of the experimental program is appended.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

10.1 Study Identification

Graper, L.K. "Behavior of ¹⁴C EL-107 in field soil" Eli Lilly and Co. Study No. ABC-0097 and ABC-0146, June, 1984, EPA Acc. No. 073291.

Materials and Methods

Field dissipation was studied using ¹⁴C EL-107 (purity > 99%) labeled in the carbonyl carbon (specific activity 4.45 uCi/mg) in the first study and labeled in the carbonyl

carbon (specific activity 9.78 uCi/mg) or the 5-position of the isoxazole ring (specific activity 11.21 uCi/mg) in the second study. The soil was a silty loam (34.8% sand, 50.4% silt, 14.8% clay, 3.3% organic matter, pH 6.6, CEC 14.5 meq/100g) located at the Lilly Research Laboratories in Greenfield, IN. In the first study two plots were seeded with winter barley and later treated at 250 g ai/ha. In the second study two plots were not seeded but were treated at 150 g ai/ha and maintained in a vegetation-free condition during the course of the study. The individual test plots were 0.656 m² in area and were enclosed by a circular metal border extending 20 cm above and 50 cm below the soil surface to prevent runoff or lateral leaching of the test substance. In the first study, sampling was at 21, 30 and 49 weeks post-treatment (plot 1) or at 23, 33 and 51 days (plot 2). Each sample consisted of 6 cores taken to a depth of 15 cm. In the second study, sampling was at 0, 23, 27, 32, 37, 42, 50, 77, 86 and 100 weeks. Each sample consisted of 8 cores taken to a depth of 7.5 cm for the zero time sample, 15 cm for the next five sampling periods and 37.5 cm for the last four sampling periods.

Thirty grams of soil were extracted by refluxing in 80:20 MeOH/H₂O (V/V) for one hour, filtered and dried. The compounds were identified by TLC with four solvent systems. Radioactive zones were visualized by autoradiography, or by spark chamber radiograms. Unlabeled reference compounds were visualized by UV light. For positive identification of the degradates, an extract from 400g of soil was subjected to column chromatography, TLC twice, further column chromatography, HPLC and MS. Portions of soil both before and after extraction were combusted and the evolved ¹⁴C₂ determined by LSC. The total radioactivity of the soil extracts and TLC scrapings were determined by LSC.

Reported Results

Results along with rainfall data are included in the appended tables.

The soil half-life of the parent compound was approximately six months (excluding soil bound fractions). In the second study, using ring labeled EL-107, total radioactivity declined from 100% at week 0 to 34.9% at week 100. In the 15.0-37.5 cm soil layer, levels decreased from 3 to 1.7% of the total over the same time period. In all studies, soil bound fractions ranged from \leq 16% and the degradates comprised \leq 20% of the applied radioactivity. The two major degradates were N-[3-(1-Hydroxyethyl)-5-isoxazolyl]-2,6-dimethoxybenzamide (\leq 3.9% of the applied) and N-[3-(1-Hydroxy-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide (\leq 8.6% of the

applied).

Reviewer's Discussion and Interpretation of Study Results

This study is not acceptable because the use of steel cylinders does not represent actual field use conditions. This study, in conjunction with a field study conducted under use conditions showing the difficulties with detecting residues, may satisfy the field dissipation study requirement. EL-107 was found in the deepest soil layers sampled and it is unknown what levels of the compound leached into lower soil layers. Zero weeks samples in the lower soil layers contained 3.0 ppm residues indicating rapid leaching or contaminated samples. The 6 month half-life under field conditions shows the pesticide to be persistent.

11. COMPLETION OF ONE-LINER: Not completed.
12. CBI APPENDIX: Tables.

125851
SHAUGHNESSEY NO.

2
REVIEW NO.

DATE: IN 5-30-84 OUT 7-31-84

FILE OR REG. NO. 1471-EUP-82

PETITION OR EXP. PERMIT NO. _____

DATE OF SUBMISSION 4-5-84

DATE RECEIVED BY HED 5-24-84

RD REQUESTED COMPLETION DATE 8-13-84

EEB ESTIMATED COMPLETION DATE 8-6-84

RD ACTION CODE/TYPE OF REVIEW 701/EUP

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

DATA ACCESSION NO(S). _____

PRODUCT MANAGER NO. R. Taylor (25)

PRODUCT NAME(S) EL-107

COMPANY NAME Elanco Products Company

SUBMISSION PURPOSE Submission of data for review

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
<u>125851</u>	<u>EL-107</u>	<u>95.5%</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____



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

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

III 31 1984

TO: Robert Taylor, Product Manager (
Registration Division (TS-767)

THRU: Raymond Matheny *RWM*
Head, Review Section 1
Ecological Effects Branch
Hazard Evaluation Division (TS-769)

THRU: Clayton Bushong *CB*
Chief, Ecological Effects Branch
Hazard Evaluation Division (TS-769)

SUBJECT: EEB review of data submitted by Elanco Products Company to
support registration of active ingredient EL-107

To support the registration of EL-107, Elanco Products submitted 6 studies under Accession No. 252915. EEB reviewed the 4 studies on the toxicity of the chemical to freshwater fish species.

The study relating the acute toxicity of technical EL-107 to Japanese carp is scientifically sound, but may not be used to fulfill guidelines requirements for a 96 hour LC₅₀ test on a freshwater fish species. This is mainly because the carp is not a recommended species, and only 20 fish were tested at a single measured concentration of approximately 1 ppm.

The study relating the chronic toxicity of technical EL-107 to Daphnia magna is scientifically sound and may be used to fulfill the guidelines requirement for a life-cycle test on an aquatic invertebrate. Based on statistically significant effects found for growth and brood size test parameters, the chronic no-observed-effect concentration of EL-107 for Daphnia magna was 0.69. mg/l.

The study relating the chronic toxicity of technical EL-107 to fathead minnows can not be used to fulfill a guidelines requirement for an early-life stage study on a warmwater fish species. This is because an effect level was not determined for the toxicant concentrations tested. The results of this study can only be used in hazard assessments where aquatic concentrations of the chemical reach approximately 0.40 mg/l/

The study relating the chronic toxicity of technical EL-107 to rainbow trout can not be used to fulfill a guidelines requirement for an early-life study on a coldwater fish species. This is because an effect level was not determined for the toxicant concentrations tested. The results of this study can only be used in hazard assessments where aquatic concentrations of the chemical reach approximately 0.42 mg/l.

Elizabeth E. Zucker
Elizabeth E. Zucker
Wildlife Biologist

Data Evaluation Record

1. Chemical: EL-107
2. Formulation: 92.4% active ingredient
3. Citation: Lake, S.G., P. Francis and D. Grothe. January 1984. The acute toxicity of EL-107 (Compound 121607) to the Japanese carp (Cyprinus carpio) in a static test system. Study F10383. Prepared by Lilly Research Laboratories, Greenfield, Ind. for Elanco Products Co., Indianapolis, Indiana. EPA Accession No. 252915.
4. Reviewed by: Elizabeth E. Zucker
Wildlife Biologist
EEB/HED
5. Date Reviewed: June 27, 1984
6. Test Type: Acute toxicity test on freshwater fish
 - A. Test Species: Japanese carp (Cyprinus carpio)
7. Reported Results: Carp showed no physical signs of toxicity after 96 hours of exposure to EL-107 at nominal concentrations of 100 mg/l. Because of the low water solubility of the test material, actual concentrations of EL-107 in solutions averaged 1.09 mg/l.
8. Reviewer's Conclusions: This study is scientifically sound, but may not be used to fulfill guideline requirements for an acute toxicity test on a freshwater fish species. This is mainly because only 20 fish were tested at a single measured concentration of approximately 1 ppm test material. Also the carp is not a recommended test species.

Material/Methods

Test Procedures

One-summer-old carp were obtained from Aquatic Control of Seymour Indiana and held in the laboratory for eight weeks prior to testing. Test specifics of note include:

Test concentrations (nominal): 0, 100 mg/l

Diluent was conditioned well water adjusted to a hardness of 100 mg/l.

Material was adjusted for 92.8% purity.

Test chambers: 150 l glass aquaria containing 100 ml solution

Twenty fish (10 fish in each of 2 chambers) per dosage group.

Solutions were aerated

2 tanks without fish but with 100 mg/l solutions were maintained

Length of fish - 64.4 ± 4.4 mm

Weight of fish - 7.4 ± 1.6 g

Photoperiod: 16 hours light

Water samples for chemical analyses were taken from each test vessel at 2, 48, and 96 hours.

pH, D.O. and temperature were measured daily

Statistical Analyses

None were performed

Results/Discussion

No mortalities or other signs of toxicity were observed in fish exposed to controls or treatment.

Test temperature averaged 22.0 ± 0.2 C. pH ranged from 8.0 to 8.5. D.O. concentration was at least 94% of saturation in all test solutions. Hardness, alkalinity and conductivity of dilution water were 103 mg/l, (as CaCO_3), 102 mg/l (as Ca CO_3) and 200 $\mu\text{mhos/cm}$ respectively.

Because of the low solubility of EL-107 actual concentrations in treatment water ranged from 1.03 to 1.18 ppm.

Reviewers Evaluation

A. Test Procedures

This study was performed under conditions that deviated from current standards. Deviations include:

1. The carp is not an acceptable test species.
2. Fish were larger than recommended.
3. Only 20 fish were tested at the single treatment level.
4. Temperature was not recorded continuously in at least one vessel
5. Actual measured concentrations of test material only reached about 1 ppm.

B. Statistical Analysis

There were no mortalities, thus analyses was not necessary.

C. Results/Discussion

The chemicals's insolubility in the diluent limits the usefulness of the test results. Conclusions can not be drawn about EL-107's toxicity to carp at concentrations greater than 1 ppm.

D. Conclusions

1. Category: Supplemental
2. Rationale: Only 20 fish were exposed to a single concentration of about 1 ppm toxicant. Also, the carp is not a recommended species.
3. Repairability: None

Data Evaluation Record

1. Chemical: EL-107
2. Formulation: 95.5% active ingredient
3. Citation: Lake, S., S. Sauter and R.D. Meyerhoff. October 1983. The toxicity of EL-107 in water to fathead minnows (Pimephales promelas) in a 33-day early life-stage study. Study F08183. Prepared by Lilly Research Laboratories, Greenfield, Indiana. Submitted to Elanco Products Co., Indianapolis, Indiana. EPA Accession 252915.
4. Reviewed by: Elizabeth E. Zucker
Wildlife Biologist
EEB/HED
5. Date Reviewed: July 25, 1984
6. Test Type: Early-life stage study on a warmwater fish species
 - A. Test Species: Fathead minnow (Pimephales promelas)
7. Reported Results: The survival and body size of fathead minnows were not significant reduced by exposure to any concentration of EL-107. The highest no-observed effect level for fathead minnows in this study was an EL-107 concentration of 0.40 mg/l, the highest level tested.
8. Reviewer's Conclusions

This study relating the chronic toxicity of EL-107 to fathead minnows can not be used to fulfill guideline requirements for an early-life stage study on a warmwater fish species. This is mainly because an effect level was not determined. It should be noted that deformed larvae were found in both control groups and all treatment groups.

Reviewer's Evaluation

A. Test Procedures

This study was performed under conditions that generally complied with current ASTM standards for conductive early-life stage toxicity tests (Draft No. 5, February 1982). The following are notable exceptions to procedures:

1. A no-effect level was not determined at the dosage tested.
2. ASTM protocols state that the time required for hatching depends on species, egg size, and water temperature. At 10 C hatching normally occurs by 31 days for rainbow trout. In this study, eggs were only exposed to the test material for 10 days prior to hatching.
3. Deformation of larvae occurred in control and treatment groups.

B. Statistical Analysis

The author's result were visually examined and accepted.

C. Results/Discussion

The primary objective of this type of chronic study is to determine concentrations of the chemical that cause an effect and a no-observed effect level for early life stages of fish. Assuming that deformities found in larvae are not due to exposure to the test material (deformed larvae were found in control as well as treatment groups), an effect level was not determined in this study. Test concentrations were too low.

The attached Record of Telephone Conversations discusses the observation of deformities in both fish early life-stage studies submitted.

D. Conclusions

1. Category: Supplemental.
2. Rationale: An effect level was not determined for the toxicant levels tested. Results can only be utilized in hazard assessments where aquatic concentrations of EL-107 reach about 0.42 mg/l.
3. Repairability: None

Materials/Methods

Minnow embryos were obtained from at least 3 spawns of adult fish housed at EG and G Bionomics. A total of 700 embryos less than 48 hours old were selected and exposed to solutions in groups of 50 embryos in each of 2 replicates per treatment dosage. After incubation of eggs for 6 days, live larvae were transferred to growth chambers, where they were exposed to the same toxicant levels for another 28 days.

Replicate groups of embryos were contained in an egg cup which was set inside a vessel equipped with a self-starting siphon and designed to partially empty after filling with each diluter cycle. Eggs were immersed continuously. Larvae growth chambers were 5 gallon glass aquaria, which held 12 liters of test solution at a depth of 15 cm. Biomass per test solution flow rate did not exceed 0.021 g/liter/24 hours.

Larvae were fed live brine shrimp nauplii between one and four times daily. Excess food and fecal material were removed three times a week.

Test solutions were dissolved in DMF. Actual concentrations of EL-107 were measured weekly. During the first and last week of the study, each of the two replicates per treatment were assayed. For the remaining weeks, samples from the two replicates were mixed and then analyzed.

Well water was used as diluent, at a rate of 15 volume replacements per day per aquarium. Temperature was monitored continuously in one control vessel. Every aquarium was monitored once per week. Dissolved oxygen and pH were recorded for all aquaria at the beginning and end of the test. On subsequent days, these parameters were measured in both replicates of one treatment, such that each solution was monitored once per week. Total alkalinity, specific conductance, hardness and ammonia were measured once per week in one replicate of each treatment.

On day 6, when all embryos had hatched, mortality was recorded. Growth aquaria were checked daily for mortalities and toxic symptoms. Mean length of larvae in each replicate was determined from photographs on day 33. After being photographed, all larvae were killed, blotted dry, and weighed individually.

Statistical Analysis

Treatment data for percent survival data and percent hatch data were analyzed using a 2x2 Chi-Square calculation ($p < 0.05$ divided by 2 times the number of comparisons). A two-tailed Dunnett t-test was used to statistically compare the mean length and weight of solvent or water control fish with mean values for all fish treated with EL-107 ($p < 0.05$).

Results/Discussion

Test concentrations of EL-107 ranged from 25% to 46% below nominal concentrations for 2 days during a diluter malfunction which began on day 28. The data for the samples taken during the malfunction are not included in Table 2.

Water characteristics were as follows:

	Mean \pm SD	Range
Temp ($^{\circ}$ C)	23.8 \pm 0.4	23-24
DO (mg/l)	8.3 \pm 0.3	7.4-8.8
pH	-	7.9 - 8.5
Total Hardness (CaCO ₃)	134.5 \pm 6	120-127
Total Alkalinity (CaCO ₃)	151.9 \pm 4.8	146-160
Conductance (umhos/cm)	282 \pm 7.7	270-290
Total Ammonia	68.8 \pm 55.4	14-175

Data tables are appended.

There was no significant difference between the survival of larvae exposed to any treatment level of EL-107 and the survival of larvae exposed to controls.

One or 2 individual fish per treatment level from 0.0 to 0.095 mg/l displayed temporarily hyporesponsive behavior. A number of deformed larvae were found: 0.40 mg/l (10); 0.18 (6); 0.095 (8); 0.048 (9); 0.025 (9); solvent (4); water (4). The authors did not attribute the deformities to exposure to test material.

There was no significant reduction in the length or weight of fish in groups exposed to EL-107 when compared to fish in control groups. There was a significant increase in mean length and body weight in fish exposed to 0.40 mg/l and 0.18 mg/l EL-107. The authors' did not consider the increase to be toxicologically significant.

Reviewers Evaluation

A. Test Procedures

This study was performed under conditions that generally complied with current ASTM standards for conducting early life-stage toxicity tests (Draft No. 5, February 1983). The following are notable exceptions:

1. Embryos were aged as less than 48 hours old at exposure, as opposed to the recommended age of 2 to 24 hours.
2. The authors' did not determine an effect level for the concentrations tested.
3. Deformed larvae occurred in all test and control groups.

B. Statistical Analysis

Several of the authors analyses were checked by this reviewer. A 2 x 2 Chi Square Contingency test was used to analyses survival data. (Calculation appended). The authors results are accepted.

C. Results/Discussion

The primary objective of this type of chronic test is to determine concentration of the chemical that cause an effect and a no-observed effect level for early-life stage of fish. Assuming that the deformities found in larvae are not due to exposure to the test material (deformed larvae were found in both control as well as treatment groups), an effect level was not determined in this study. Test concentrations were too low.

The attached Record of Telephone Conversations discusses the observations of deformities found in both fish early-life stage studies submitted.

D. Conclusions

1. Category: Supplemental
2. Rationale: An effect level was not determined for the toxicant levels tested. Results can onlt be utilized in hazard assessments where aquatic concentrations of EL-107 reach about 0.40 mg/l/
3. Repairability: None

July 31, 1984

Record of Telephone Conversation

M. Rexrode contacted Jim McKim of the EPA Lab in Duluth concerning the appearance of deformed larvae in both chronic studies (rainbow trout and fathead minnow) submitted by Elanco. Deformed larvae were observed in control and treatment groups in the two studies. No significant toxicological effects were seen in the parameters of the study.

Jim McKim feels that there would cause for concern if the amount of deformities exceeded 10% in the controls. He would be concerned about the type of deformity.

August 1, 1984

L. Touart called R. Meyerhoff (a principal investigator with Elanco) to discuss the occurrence of deformities in the 2 chronic studies. Meyerhoff stated that he sees no significance at all in the amount of deformities ($\leq 4\%$) seen in the rainbow trout study. He felt that this is "expected background". He also feels that the elevated occurrence in the fathead minnow study ($\leq 10\%$) is not surprising, and is indicative of an old genetic stock, needing replacement. The deformities were of a wide variety of gross morphological manifestations which were not considered compound related. Meyerhoff stated they were typical for untreated background populations. The deformed larvae were included in overall effects tabulation and are reflected in the final results which indicate no effects attributable to the test material.

295
797.4

Fathead Minnow

I. % larvae survival at Hatched (Day 6)
0.18 mg/l vs control

	<u>Dead</u>	<u>Alive</u>
Control	11	89
Treat.	25	75

$$\chi^2 = \frac{100 (2225 - 825)^2}{100 \cdot 100 \cdot 36 \cdot 164} = \frac{1.96 \times 10^8}{5.9 \times 10^7}$$

NS = 3.32

II % larvae survival on Day 33

	<u>Dead</u>	<u>Alive</u>
Control	21	79
Treat	32	68

$$\chi^2 = \frac{100 (1428 - 2528)^2}{100 \times 100 \times 89 \times 111} = \frac{1.21 \times 10^8}{9.88 \times 10^7}$$

NS = 1.21

DATA EVALUATION RECORD

1. Chemical: EL-107
2. Formulation: 95.5% active ingredient
3. Citation: Lake, S., R. Meyerhoff and S. Sauter. October 1983. The toxicity of EL-107 in water to rainbow trout (Salmo gairdneri) in a 66 day early life-stage study. Study F00383. Prepared by Lilly Research Laboratories, Greenfield, Indiana. Submitted to Elanco Products Co. Indianapolis, Indiana. EPA Accession No. 252915.
4. Reviewed by: Elizabeth E. Zucker
Wildlife Biologist
EEB/HED
5. Date Reviewed: July 11, 1984
6. Test Type: Early life-stage study on a coldwater fish species
 - A. Test Species: Rainbow trout (Salmo gairdneri)
7. Reported Results: No effects were found on hatching success, behavior, survival or final size of rainbow trout exposed to concentrations of EL-107. The highest no-observed effect level was considered to be an EL-107 concentration of 0.42 mg/l, the highest level tested.
8. Reviewer's Conclusions: This study relating the chronic toxicity of EL-107 to rainbow trout may not be use to fulfill the guidelines required, for an early-life stage study on a coldwater fish species. This is mainly because an effect level was not determined. It should be noted that deformed larvae were observed in some of the control and treatment groups.

Materials/Methods

Test Procedure

Early-eyed trout eggs were obtained from Trout Lodge in McMillan, Washington. Eggs were held in test diluent water for two days prior to study initiation.

Embryos in each test replicate were contained in 2 egg cups. Cups were set inside chambers equipped with a self-starting siphon, and were designed to partially empty after filling with each diluter cycle. Eggs were continuously immersed in test solution. Larvae were exposed in replicate 15 gallon glass aquarium container 27 liters of test solution filled to a depth of 15 cm. Test solution was continually discharged from each aquarium through a port drilled in the side of each aquarium.

Fish were exposed to five nominal concentrations of EL-107: 0.40; 0.20; 0.10; 0.05; 0.05 and 0.025 mg/l. The study was initiated by exposing 50 embryos to solutions in each of 2 replicates per treatment. Two replicates were used for each of the water control and solvent control. After an incubation period of 10 days, 25 of the live larvae were transferred to growth aquarium. Larvae were exposed to same treatment levels for 56 days.

Trout were fed one to four times daily throughout the test. Excess food and fecal material were removed from growth aquaria at least 5 times each week.

Stock solutions of toxicant were prepared by dissolving EL-107 in DMF. The solution was mixed in a stainless steel drum, then pumped into a chamber where it was combined with diluent water to produce the highest test concentration. This concentration was sequentially diluted to produce the remaining treatments. The solvent control consisted of concentrations of DMF equal to the amount contained in the highest dose level.

Actual concentrations of EL-107 in test solutions were assayed each week. Samples were taken from each of the 2 replicates per treatment during the first, sixth and tenth week. During the other weeks, samples from replicates were mixed before analyzation.

Well water was used as diluent at a rate of 6.8 volume replacements per aquarium. Temperature was monitored continuously in one control aquarium. Water temperature in each aquaria was measured at the beginning, middle and end of the study. Temperature of each aquaria was also measured once a week. DO and pH were recorded for all vessels at the beginning middle and end of the study. These parameters were also measured for each test solution once a week. Alkalinity specific conductance, total hardness and total ammonia were measured once per week in one replicate of the control and treatment group.

Every day throughout the 10 day incubation period each group of embryos was checked for mortalities. On day 10, the number of dead embryos, dead larvae, and deformed larvae were counted. Twenty-five live larvae were transferred to growth aquaria.

Mortalities and toxic symptoms were noted daily. Mean length of larvae for each replicate was determined from photographs on 28 and 56 day post hatch. After being photographed on day 28, all larvae from each replicate were weighed as a group. At the test's termination, survivors were sacrificed, blotted dry and weighed individually.

Statistical Analysis

Treatment data for per cent survival was analyzed using a 2 x 2 Chi-square calculation ($p < 0.05$ divided by 2 times the number of comparisons).

A two-tailed Dunnett's t-test was used to statistically compare the mean length and weights of water or solvent control fish with mean lengths or weights in each treatment ($P < 0.05$).

Results/Discussion

Data from sampling EL-107 concentrations in the test water are presented in Table 1. A diluent malfunction occurred on day 49, resulting in low concentrations for about one day. Concentrations found during malfunction were not included in Table 1.

Water characteristics were as follows:

	Mean + S.D.	Range
Temp (C)	13.1 + 0.6	12-15
DO (mg/l)	9.4 + 1.2	6.4-11
pH	--	7.5-8.2
Total hardness (mg/l CaCO ₃)	130 + 8	120-137
Total alkalinity (mg/l CaCO ₂)	156 + 5	146-161
Conductance (umhos/cm)	280 + 18	250-295

Data tables are appended.

Survival of trout was not significantly affected by EL-107 concentrations as high as 0.42 mg/l. The mean percentage of live hatch of eggs ranged from 98% to 100% in all treated and control groups. At the end of the study, mean percentage of survival of fish ranged from 96% to 100% in treated and control groups.

At 28 days post-hatch, fish in the 0.024 and 0.048 mg/l treatment groups were significantly shorter than the fish in the solvent control group. However, by the end of the study, no treatment group had a mean length significantly less than the mean lengths of fish in the solvent or water control groups.

The behavior of fish at each treatment level was normal. At hatch, 3 deformed larvae were found in each of the water control and solvent control groups, one deformed larvae was found at the 0.19 mg/l level, and 2 deformed larvae were found in each of the 0.42 and 0.093 mg/l dosage groups. After hatch, one deformed fish was found in the water control group, and one deformed fish was found at each of the 0.42 and 0.09 mg/l levels. The authors do not consider the deformities to be compound related.

Data Evaluation Record

1. Chemical: EL-107
2. Formulation: 95.5%
3. Citation: Lake, S., P. Francis and D. Grothe, January 1984. The toxicity of EL-107 to Daphnia magna in a 21-day static renewal life-cycle test. Study C03683. Prepared by Lilly Research Lab., Greenfield Indiana. Submitted to Elanco Products Co., Indianapolis, Indiana. EPA Accession No. 252915
4. Reviewed by: Elizbeth E. Zucker
Wildlife Biologist
EEB/HED
5. Date Reviewed: July 5, 1984
6. Test Type: Aquatic invertebrate life cycle study
 - A. Test Species: Daphnia magna
7. Reported Results: The chronic no-effect concentration of EL-107 for Daphnia magna was 0.69 mg/l.
8. Reviewer's Conclusion: This study relating the effects of technical EL-107 on the survivalship, growth and reproduction of Daphnia magna is scientifically sound and may be used to fulfill the guideline requirement for an aquatic invertebrate life cycle study. Based on statistically significant effects found for growth and brood size parameters, the chronic no-observed-effect concentration of EL-107 for Daphnia magna was 0.69 mg/l.

Materials/Methods

Test Procedure

First-instar daphnids (less than 24 hours old) were obtained from an in-house laboratory culture. Nominal exposure concentrations were 0, 0.1, 0.6 and 1.2 mg/l EL-107. Ten replication chambers were used at each treatment level. Seven replicates contained one daphnid and were observed for growth, reproduction, behavior and survival. Three replicates housed five daphnids and were used for determining survival frequencies. Test solutions were renewed on Days 0, 2, 5, 7, 9, 12, 14, 16 and 19. A stock solution was prepared 24 hours prior to test initiation and stirred continuously throughout the study period. Exposure concentrations were made by mixing volumes of stock solutions with conditioned well water. Treatment dilutions were aerated until their use in exposure chambers. Test chambers were 250 ml glass beakers containing 200 ml solution. Each day, 0.5 to 0.75 ml of a suspension containing green algae cells (Selenastrum caricornutum) were supplied to organisms in each vessel.

Daphnids were observed for toxic symptoms on days of test solution renewal. Reproduction was determined in the seven single-animal replicates. Following release of first broods (i.e. Day 8), adults were transferred to fresh test solutions, and young from each replicate were placed on filter paper and enumerated with an electric counter. After 21 days, the length of each adult (from apex of the helmet to the base of the tail spine) was measured to the nearest 0.01 mm.

On Days 0, 2, 9, and 16, samples were collected from each treatment stock solution. On days 2, 9, 16 and 21, composite samples were collected by pooling aliquots from the ten replicates of each treatment group. All samples were analyzed for EL-107.

D.O., pH and temperature were measured daily in one replicate from each treatment. Water quality was measured in each replicate at least twice during the study period. Water temperature was measured continuously in at least one vessel. Additionally, the 3 parameters were recorded for each treatment stock solution at test initiation and on each day of solution renewal. Total hardness and alkalinity and conductivity were determined at the study's initiation and termination.

Statistical Analysis

For the single-animal replicates, mean standard deviation and range were calculated for total number of young per female, number of young per brood, and body length. A two-tailed Dunnetts "t" test was used to detect statistically significant differences between control and treated populations. Statistical tests were performed using SAS.

Results/Discussion

Dissolved oxygen averaged 10.1 ± 1.4 mg/l and remained at least 68% of saturation throughout the study. pH ranged from 8.0 to 8.9 with an average of 8.5. Temperature averaged 19.5 ± 0.5 C. Total hardness, alkalinity and conductivity were 131 mg/l (as CaCO₃), 142 mg/l (CaCO₃) and 200-250 umhos/cm

35

respectively.

Based on chemical analyses of all sample solutions, average EL-107 concentrations were 0.13; 0.69 and 1.01 mg/l. These assayed concentrations were 130%, 128% and 84% of nominal values respectively.

At the control, 0.13 and 0.69 mg/l concentrations, all daphnids appeared normal. On day 16, one daphnid of the single animal replicated at the 1.01 mg/l level exhibited hypoactivity. In the five-animal replicates, 13% of the daphnids at 1.01 mg/l were immobilized by the end of the study.

After 21 days, the average number of young produced per adult were 175, 170, 174 and 161 at the EL-107 concentrations of control, 0.13, 0.69, and 1.01 mg/l respectively. The number of young per adult was reduced by 8% at the 1.01 mg/l dosage as compared to control, however this was not a statistically significant difference. Treated and control adults released their first brood of young between day 8 and 9 and produced 5 broods over the 21 day period. At all treatments, brood size increased with age of the animal. On days 14 and 19, broods at 1.01 mg/l treatment averaged 14.5% and 12.0% smaller than control brood. These reductions were statistically significant.

Average body lengths of daphnids exposed to 0.13 and 0.69 mg/l EL-107 were not significantly different from body lengths of controls. There was a significant reduction in body length seen in animals exposed to 1.01 mg/l EL-107.

Data tables are appended.

Reviewer's Evaluation

A. Test Procedures

This study was performed under conditions that generally complied with current protocols (ASTM Working Document - Draft No. 3- July 1983-Proposed Standard Practice for Conducting Renewal Life-Cycle Toxicity Test with Daphnia magna) Notable exceptions to testing standards include:

1. Only 3 concentrations were tested (It is recommended that 5 concentrations be tested)
2. Current ASTM guidelines recommended that 10 daphnids be tested individually at each concentration. In this study, the authors followed previously recommended procedures where 7 daphnids were individually maintained and observed for reproduction, with 15 daphnids (5 per vessel) observed for growth and survival only (ASTM Draft No. 5 Sept. 1979)
3. Raw data were not provided.

B. Statistical Analysis

Some of the authors' results were checked by this reviewer. Survivorship at the 1.01 mg/l concentration versus survivorship of controls were compared using a 2 x 2 Contingency Table. A Student T-test was utilized to cursorily check the data for number of young per brood at day 21 (1.01 mg/l concentrations vs. control).

Calculations are appended. No significant differences were detected for either parameter.

Total number of young per adult (Table 4) at the 1.01 mg/l dosage was compared to total number of young found for controls. A significant difference was found using the T-test. However, the Dunnetts test, as used by the authors controls internal error, thus is more appropriate.

C. Results/Discussion

El-107 begins to affect the growth and reproduction of daphnids at a concentration between 0.69 ml/l and 1.01 mg/l. Survivorship was reduced by 13% at the 1.01 mg/l level but this was not a statistically significant reduction.

D. Conclusions

1. Category: Core
2. Rationale: N/A
3. Repairability: N/A