



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

MAY 2 1996

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Review of Sediment Toxicity Test with *Chironomus tentans*
Submitted To Support the Registration of ADBAC

FROM: *for* Anthony F. Maciorowski, Chief *Ann Stavola*
Ecological Effects Branch
Environmental Fate and Effects Division (7507C)

TO: (PM)
Registration Division (7505C)
Special Review And Reregistration Division ()

EEB has received and reviewed the sediment toxicity study submitted by the ADBAC QUAT Joint Venture/Chemical Specialties Manufacturers Association. The study was submitted to support the registration of ADBAC. The following is a brief summary of the review:

CITATION: Dorothy C. England & Tom Leak. 1995. Chronic Toxicity Of Sediment-Incorporated ADBAC To *Chironomus tentans*, performed by ABC Laboratories, Inc., Environmental Toxicology, 7200 E. ABC Lane, Columbia, Missouri 65202, and submitted by ADBAC QUAT Joint Venture/Chemical Specialties Manufacturers Association, 1913 Eye Street N.W., Washington, D.C. 20006, Laboratory Report ID: #41004, MRID No.: 437311-01.

CONCLUSIONS: This study is scientifically sound and partially fulfills the guideline requirement for a (70-1) special study. After 14 days, mean survival of *Chironomus tentans* exposed to 120, 260, 520, 1200 and 2100 mg/Kg was 93%, 93%, 77%, 3% and 0% respectively. Survival at the three highest test concentrations were significantly lower than mean survival in the controls (97%). The wet and dry weights of larval midges were also measured on day 14, and were found to be significantly lower than controls at measured concentrations greater than 520 mg/Kg. The 14 day LC50 was 548 mg/Kg (95% C.I. 458 - 656 mg/Kg). The 14 day NOEC, LOEC, and MATC was 260, 520, and 368 mg/Kg respectively.



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CONCURRENCES

SYMBOL	7507C	7507C	7507C				
SURNAME	T. Bailey	Crown	Arvola				
DATE	5-2-96	5/2/96	5/8/96				

After 28 days of exposure, control survival was reported to be 77±21%. No midges survived after 28 days at 2100 mg/Kg and only 7% survived at 1200 mg/Kg. As treatment concentration increased, average time to emergence also increased. Decreases in average time to emergence were significant for female midges at concentrations between 520 and 1200 mg/Kg. No sex related trends were noted for survival or total emergence. The 28 day LC50 was 479 mg/Kg (95% C.I. 377 - 600 mg/Kg). The NOEC was determined to be 520 mg/Kg and the LOEC was determined to be 1200 mg/Kg. The 28 day MATC was calculated to be 790 mg/Kg.

Results Synopsis:

ENDPOINT	DAY 14	DAY 28
LC50 (95% C.I.) (mg/Kg)	548 (458-656)	479 (377-600)
NOEC (mg/Kg)	260	520
LOEC (mg/Kg)	520	1200
MATC (mg/Kg)	368	790

If you have questions concerning this submission, please contact Tom A. Bailey (703-305-6666).

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DP Barcode : D220267
PC Code No : 069105
EEB Out :

To: Larry Schnaubelt 72
Product Manager
Special Review and Reregistration Division (H7508W)

From: Anthony F. Maciorowski, Chief
Ecological Effects Branch/EFED (H7507C)

Attached, please find the EEB review of...

Reg./File # : S495718
Chemical Name : ADBAC
Type Product : Ammonium Quat
Product Name : ADBAC
Company Name : ADBAC QUAT joint Venture/Chemical Specialties
Manufacturers Association
Purpose : Review of Chironomus tentans sediment toxicity
study

Action Code : 627 Date Due : 04/15/96
Reviewer : Tom A. BAiley Date In EEB: 10/26/95

EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT
71-1(A)			72-2(A)			72-7(A)		
71-1(B)			72-2(B)			72-7(B)		
71-2(A)			72-3(A)			122-1(A)		
71-2(B)			72-3(B)			122-1(B)		
71-3			72-3(C)			122-2		
71-4(A)			72-3(D)			123-1(A)		
71-4(B)			72-3(E)			123-1(B)		
71-5(A)			72-3(F)			123-2		
71-5(B)			72-4(A)			124-1		
72-1(A)			72-4(B)			124-2		
72-1(B)			72-5			141-1		
72-1(C)			72-6			141-2		
72-1(D)						141-5		

Y=Acceptable (Study satisfied Guideline)/Concur

P=Partial (Study partially fulfilled Guideline but
additional information is needed

S=Supplemental (Study provided useful information but Guideline was

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DP BARCODE: D220267

REREG CASE # 0350

CASE: 819070
SUBMISSION: S495718

DATA PACKAGE RECORD
BEAN SHEET

DATE: 10/20/95
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 627 CORE DATA
CHEMICALS: 069105 Alkyl* dimethyl benzyl ammonium chloride *(50%C14, 100.00 %

ID#: 069105

COMPANY:

PRODUCT MANAGER: 72 LARRY SCHNAUBELT

703-308-8058

ROOM: CS1

3E3

PM TEAM REVIEWER: BEVERLY LAVIS

703-308-8376

ROOM: CS1

3RD FL

RECEIVED DATE: 07/25/95

DUE OUT DATE: 10/23/95

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 220267 EXPEDITE: N DATE SENT: 10/20/95 DATE RET.: / /
CHEMICAL: 069105 Alkyl* dimethyl benzyl ammonium chloride *(50%C14, 40%C12,
DP TYPE: 001 Submission Related Data Package

CSF: N

LABEL: N

ASSIGNED TO

DATE IN

DATE OUT

ADMIN DUE DATE: 01/18/96

DIV : EFED

10/26/95

/ /

NEGOT DATE: / /

BRAN: EEB

10/26/95

/ /

PROJ DATE: / /

SECT:

10/26/95

/ /

REVR :

Bailey

10/26/95

/ /

CONTR:

10/26/95

/ /

* * * DATA REVIEW INSTRUCTIONS * * *

Please review the attached Chironomus tentans GLN 72-2(a)
MRD# 43731101. Call Beverly Lavis @ 308-8376 for questions
or concerns.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
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DATA EVALUATION RECORD
SEDIMENT TOXICITY TESTING WITH CHIRONOMUS TENTANS
S70-1

1. CHEMICAL: ADBAC PC Code No.: 069105

2. TEST MATERIAL: ADBAC & ¹⁴C-analyte Purity: 81.9%

3. CITATION

Authors: Dorothy C. England & Tom Leak
Title: Chronic Toxicity Of Sediment-Incorporated
ADBAC To *Chironomus tentans*

Study Completion Date: January 4, 1995

Laboratory: ABC Laboratories, Inc.

Sponsor: ADBAC QUAT Joint Venture/Chemical
Specialties Manufacturers Assosiation

Laboratory Report ID: Amended Final Report #41004

MRID No.: 437311-01

DP Barcode: D220267

4. REVIEWED BY: Tom A. Bailey, Sr. Aquatic Biologist, EEB, EFED

Signature: *Tom A. Bailey*

Date: *2 May 1996*

5. APPROVED BY: Henry C. Craven, Head of Section (4), EEB, EFED

Signature: *Henry C. Craven*

Date: *5/2/96*

6. STUDY PARAMETERS

Scientific Name of Test Organism:	<i>C. tentans</i>
Age or Size of Test Organism:	10 days (2nd instar)
Definitive Test Duration:	28 Days
Study Method:	Static (sediment + Water)
Type of Concentrations:	Mean measured

7. CONCLUSIONS:

C. tentans were exposed to measured concentrations of sediment-incorporated ADBAC ranging from 120 to 2100 mg/Kg. After 14 days, mean survival at 120, 260, 520, 1200 and 2100 mg/Kg was 93%, 93%, 77%, 3% and 0% respectively. Survival at the three highest test concentrations were significantly lower than mean survival in the controls (97%). The wet and dry weights of larval midges were also measured on day 14, and were found to be significantly lower than controls at measured concentrations greater than 520 mg/Kg. The 14 day LC50 was 548 mg/Kg (95% C.I. 458 - 656 mg/Kg). The 14 day NOEC, LOEC, and MATC was 260, 520, and 368 mg/Kg respectively.

After 28 days of exposure, survival and emergence were

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measured in controls and treatment groups. Control survival was reported to be 77±21%. No midges survived after 28 days at 2100 mg/Kg and only 7% survived at 1200 mg/Kg. As treatment concentration increased, average time to emergence also increased. Decreases in average time to emergence were significant for female midges at concentrations between 520 and 1200 mg/Kg. No sex related trends were noted for survival or emergence. The 28 day LC50 was 479 mg/Kg (95% C.I. 377 - 600 mg/Kg). The NOEC was determined to be 520 mg/Kg and the LOEC was determined to be 1200 mg/Kg. The 28 day MATC was calculated to be 790 mg/Kg.

14 DAY:

LC₅₀: 548 mg/Kg ai
NOEL: 260 mg/Kg ai

95% C.I.: 458-656 mg/Kg ai
Probit Slope: 5.13

28 DAY:

LC₅₀: 479 mg/Kg ai
NOEL: 520 mg/Kg ai

95% C.I.: 377-600 mg/Kg ai
Probit Slope: 4.22

8. ADEQUACY OF THE STUDY

A. Classification: Supplemental

B. Rationale: Substantial deviations from cited protocols.

C. Repairability:

9. Guideline Deviations

1. The pH range was greater than 0.4 units over the course of the study.
2. Although continuous temperature measurements were recorded for the water bath, hourly measurements in at least one test vessel was not made.
3. The two lowest treatment levels exceeded the 50% dilution factor.
4. Specifics on handling not provided.
5. Moisture content of sediment was measured but not reported.

6. Eh, pE, total inorganic carbon, total volatile solids, organosilicones, petroleum hydrogens, and interstitial water

DP Barcode: D220267

MRID No.: 437311-01

analysis were not measured or reported.

7. A feeding rate was not reported.

8. The health condition of test midges during the acclimation period was not reported.

9. The study author did not state how dilution water was added to test vessels.

10. The study author did not report whether covers for test vessels were used.

11. Limited information on acclimation was provided.

10. SUBMISSION PURPOSE: Review of chronic sediment toxicity study with *Chironomus tentans*.

11. MATERIALS AND METHODS**A. Test Organisms/Acclimation**

Guideline Criteria	Reported Information
<u>Species</u> Preferred species are (<i>Hyalla azteca</i> , <i>Chironomus tentans</i> , <i>Chironomus riparius</i> , <i>Daphnia</i> sp., <i>Ceriodaphnia</i> sp.).	<i>Chironomus tentans</i>
<u>Age</u> 2nd Instar larvae	10 days (2nd Instar)
<u>Source</u> Brood stock can be obtained from wild, laboratory, or commercial stocks.	ABC Laboratories In-house culture.
<u>Brood Stock</u> Brood stock must be acclimated to culture water gradually from transport water to 100% culture water; water temperature exchange rate not to exceed 2°C within 24 h; Avoid unnecessary stress, crowding and rapid temperature and water quality changes.	Larvae were hatched and maintained in ABC blended water in 8-L aquaria. No further details of acclimation were provided.
<u>QUALITY OF TEST ORGANISM</u> Test organisms should be analyzed for presence of test material in tissues if there is a likelihood that the material may be present in the environment.	N/A

Guideline Criteria	Reported Information
<u>HANDLING</u> Midges should be handled as little as possible. Larvae should be transported using a 7-mm inner diameter glass pipet. Midges should be released into solutions beneath the air-water interface. Any midges touching dry surfaces, dropped, or injured should be discarded.	Specifics on handling not provided.
<u>Food-</u> Dry fish food flakes; mixture of ground cereal leaves and finely crushed fish food flakes in water; goldfish food..	Fed suspension of fish food (Salmon starter, Zeigler Bros., Inc.), algae (chlorella and Spirulina), Magic Worm Food (Carolina biological Supply), and alfalfa pellets (Bourn Feeds, columbia, MO); food analyzed and free of contaminants.
<u>Food Concentration</u> 50 mg fish food flakes (dry wt. in 0.5 mL suspension) daily per 3-L chamber/25 larvae; 0.1 mL suspension of 0.06 g/mL goldfish food daily/midge in each centrifuge tube.	supplied daily until day before test. A feeding rate was not reported.
Were midges in good health during acclimation period?	Not reported

B. Test System

Guideline Criteria	Reported Information
<u>Overlying Water</u> Unpolluted well or spring that has been tested for contaminants, or appropriate reconstituted water (see ASTM for details).	ABC hard blended water: ABC well water blended with reversed osmosis treated ABC well water.
<u>Quality Of Water</u> Particulate, TOC, COD <5 mg/L Residual chlorine <11 µg/L	TOC <1 mg/L; COD <7 mg/L; suspended solids, 0.2 - 0.6 mg/L.

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Guideline Criteria	Reported Information
<u>Overlying Water Quality Measurements</u> Should measure conductivity, hardness, pH, and alkalinity in all treatments at beginning and end of short-term test and weekly during long-term test.	Measured on dilution water at test initiation, day 14, and day 28; measurements made on pooled replicates day 14 and day 28.
<u>Water Temperature</u> 20°C ± 2°C. Daily mean test temperature Must not deviate more than ±1 °C and instantaneous temperature must be within ±3.	Target: 20°C Range: 19 to 21°C
<u>pH</u> Not specified, but should be amenable to the test species, measured at the beginning and at end of short-term test and weekly during a long-term test, and should not deviate more than 0.4 units.	6.7 to 8.2 Mean = 7.6±0.3
<u>Total Hardness</u> Not specified, but should be amenable to the test species; Measured at the beginning and at end of short-term test and weekly during a long-term test;	150 mg/L as CaCO ₃
<u>Dissolved Oxygen</u> Should be measured at the beginning and at end of short-term test and weekly during a long-term test; Should be >40% and ≤100% saturation.	2.6 to 8.6 mg/L Mean = 6.5 mg/L; D.O. saturation was <40% in replicate E of 520, 1200, and 2100 mg/Kg on day 28.

Guideline Criteria	Reported Information
<u>Sediment Characterization</u> All sediment must be characterized for: pH, organic carbon content (TOC), total volatile sulfides, particle size distribution (% sand, silt, clay), and percent water content.	Total volatile sulfides and percent water content not reported. Control sediments were characterized and reported. Specifically: pH - 4.5 TOC - 1.9 Sand = 54.5% Clay = 34.0% Silt = 11.6% Moisture content was measured gravimetrically but results were not reported
<u>Additional Sediment Analysis</u> BOD, COD, cation exchange capacity, Eh, pE, total inorganic carbon, total volatile solids, acid volatile sulfides, total ammonia, metals, organosilicones, synthetic organic compounds, oil and grease, petroleum hydrocarbons, and interstitial water analysis.	Eh, pE, total inorganic carbon, total volatile solids, organosilicones, petroleum hydrogens, and interstitial water analysis were not measured or reported.
<u>Laboratory Spiked Sediment</u> Material should be reagent grade unless prior evaluations dictate formulated materials, etc.; Must know the test material's identity, quantity of major ingredients and impurities, water solubility, estimated toxicity, precision and bias of analytical method, handling and disposal procedures.	The test substance was adequately characterized. Nonradiolabeled: ADBAC Quat 80% Radioactive Analyte: ¹⁴ C ADBAC specific Activity= 25 mCi/mmol activity=1.0 mCi Radiochemical Purity = 98.4%

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Guideline Criteria	Reported Information
<u>Stock Solutions</u> Test material should be dissolved in a solvent prior to mixing into test sediment; If solvent is used, both solvent control and negative control are required;	No solvent used.
<u>Test Concentrations For Spiked Sediment</u> For LC50 calculation, test concentrations should bracket the predicted LC50; Sediment concentrations may be normalized to factors other than dry weight (e.g. organic content, acid volatile sulfides); Sediment may be mixed using rolling mill, feed mixer or hand mixer.	Sediment concentrations were reported as ¹⁴ C activity calculated as concentration of equivalents of ADBAC in test sediments on day 0, 14, and 28. Sediment concentrations were normalized to dry weight.
<u>Test Vessels or Compartments</u> 1. <u>Material</u> : Glass, No. 316 stainless steel, or perfluorocarbon plastics 2. <u>Size</u> : 2 L beakers with 2 cm of sediment and 1.5 L overlying water (static test); 3 L aquaria (20.5 X 12.5 X 14.5 cm with 12.5 X 44.5 cm piece of fine mesh at upper end of one side); 50 mL plastic centrifuge tubes with 7.5 g sediment and 47 mL of water; For flow-through test, delay starting flow for 24 h to allow settling of test organisms into sediment.	1. Glass beakers used. 2. 2-L glass beakers (12.5 cm i.d. X 28 cm depth); 300 mL sediment:1500 mL dilution water.
<u>Covers</u> <u>Static</u> : Test vessels should be covered with a glass plate. <u>Flow-through</u> : openings in test compartments should be covered with mesh nylon or stainless steel screen.	Not reported whether covers were used.

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Guideline Criteria	Reported Information
Type of Dilution System Must provide reproducible supply of toxicant. Inter-mittent flow proportional diluters or continuous flow serial diluters should be used.	(For flow-through studies only)
Flow Rate Consistent flow rate is required (flow through any two chambers should not differ by more than 10%); meter systems calibrated before study and checked daily during test period.	N/A (For flow-through studies only)
Aeration Dilution water should be vigorously aerated; In static systems, overlying water may be gently aerated through a 1-mL pipet located not closer than 2 cm from the sediment surface; Test organisms should not be added for 12 to 24h; Water quality characteristics should be measured before test organisms are added.	Light aeration was applied to test beakers after overnight equilibration.
Photoperiod 16 hours light, 8 hours dark, with a 15-30 min transition period.	16 hours light:8 hours dark 30 minute transition period.
Solvents Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests. Acceptable solvents include triethylene glycol, methanol, ethanol, or acetone. Surfactants should not be used.	Solvent: N/A

C. Test Design

Guideline Criteria	Reported Information
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<u>Sediment Into Test Chambers</u> One day prior (Day -1) to start of test: test sediment, reference sediment, and negative control sediment should be added to test chambers; Sediment in chambers should be settled by smoothing with a suitable utensil; overlying water should be gently poured along side of test chamber.	Sediment was added to test vessels on Day -1 and sediment settled by allowing to stand overnight. It was not reported how dilution water was added to test vessels.
<u>Static Test:</u> Overlying water may be added to specified volume depending on design and test vessel (47 mL to 2 L); Test chambers should be covered and aerated overnight without disturbing sediment; 2- to 3-L beakers, 3-L aquaria, or plastic centrifuge tubes are acceptable; Sediment depths of 2- to 3 cm or 7.5g to 100g are allowable depending on design and test vessel used. <u>Flow-Through</u> Overlying water may be added to a volume of 2-Liter and sediment 100g.	Overlying water was added to a volume of 1500 mL (120 mm); Aeration was applied following the settling out period (overnight).
<u>Duration</u> The test begins once test organisms are placed in the test chambers (Day 0); Sediment Toxicity test with <i>C. tentans</i> range from <10 days to >10 days up to 25 days.	Total duration of the test was 28 days with some destructive sampling for analytical measures at day 0, 14, and 28 and for growth and survival data at day 14.
<u>Nominal Concentrations</u> Control(s) and at least 5 test concentrations; dilution factor not greater than 50%. Concentrations above aqueous solubility may be used.	A negative control and five measured test concentrations (120, 260, 520, 1200, 2100 mg/Kg) were used in this study. The two lowest treatment levels exceeded the 50% dilution factor.

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<u>Number of Test Organisms</u> Typically 20 to 25 midges/test level. Depending on design, as many as 100 midges/level may be acceptable.	This study tested 60 midges per treatment level with 10 test organisms per vessel.
<u>Test organisms randomly or impartially assigned to test vessels?</u> Larvae must be collected from at least three egg cases. Test chambers should be inspected <2 h after introduction of midges to assure none are trapped at surface.	Yes
<u>Feeding</u> Midges are fed during static or flow-through tests. See above section on food and feeding.	Test organisms were fed three times weekly beginning with Day 0.
<u>Water Parameter Measurements</u> 1. Dissolved oxygen must be measured at each concentration at least once a week. 2. pH, alkalinity, hardness, and conductance must be measured once a week in one test concentration and in one control. (For long-term test) 3. Temperature should be monitored at least hourly throughout the test in one test chamber, and near the beginning, middle and end of the test in all test chambers.	1. D.O. was measured twice weekly in all replicates. 2. pH was measured twice weekly in all replicates alkalinity, hardness, and conductance was measured in dilution water on day of test initiation and at terminal points on day 14 and 28 (pooled replicates). 3. Temperature measured twiced weekly in all replicates; continuous water bath temperature measurement recorded for duration of test.

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Chemical Analysis

Needed if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used.; Concentrations should be measured in bulk sediment, interstitial water, overlying water, and stock solution.

Analytical measurements were taken on day 0, 14, and 28.

1. Radioactivity measured using liquid scintillation.

2. Counting efficiencies were determined by the external standardization method (used external standard ratios).

3. On days 0, 14, and 28 ^{14}C activity was calculated as ^{14}C ADBAC equivalents in the water column and interstitial water.

4. ^{14}C activity was calculated as concentration equivalents in test sediments sampled on days 0, 14, and 28 by triplicate analysis of wet sediment samples using sample combustion followed by Liquid scintillation counting.

12. REPORTED RESULTS**A. General Results**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
<u>Control Mortality</u> ≤ 30%	3% after 14 days 23% after 28 days

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Guideline Criteria	Reported Information
Data Endpoints - Survival of Larvae - Growth of Larvae - Dry weight (required) and Head capsule length - Percent emergence - Mean emergence time - Day to first emergence - Number of eggs produced - Number of eggs hatched	1. Mortality 2. Survival 14 and 28 day 3. Mean dry and wet weight 4. Emergence: male and female number emerged time to emergence
Raw data included?	Yes (but not for every endpoint)

Effects Data

Sediment Toxicant Concentration (mg/Kg)		Survival (n=30) 14 days	Survival/ Emergence 28 days	Dry Weight (mg)	Number Emerged		Mean Days To Emergence
Nominal	Measured				M	F	
Control	--	29 (97%)	23 (77%)	4.1	3	4.7	21.3
Solvent Control	--	--	--	--	--	--	--
125	120	28 (93%)	21 (70%)	3.7	3.7	3	21.9
250	260	28 (93%)	27 (87%)	3.7	2	7	21.7
500	520	22 (93%)	23 (77%)	3.1	4.3	3.3	22.8
1000	1200	1 (3%)	2 (7%)	0.7	0	0.3	28.0
2000	2100	0 (0%)	0 (0%)	--	0	0	--

Toxicity Observations:**B. Statistical Results**

Most sensitive endpoint: 14-day survival and growth.

ENDPOINT	METHOD	NOEC	LOEC	MATC
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DP Barcode: D220267

MRID No.: 437311-01

Survival 14 d	Stephen LC50; Levene's test chi-square; Fisher's exact test	¹ 548 mg/Kg 260 mg/Kg	520 mg/Kg	368 mg/Kg
Survival/Emergence 28 d	ANOVA; Dunnett's one tailed t-test	¹ 479 mg/Kg 520 mg/Kg	1200 mg/Kg	790 mg/Kg
Dry Weight	ANOVA; Dunnett's one tailed t-test	260 mg/Kg	520 mg/Kg	368 mg/Kg
Number Emerged	None Reported	-	-	-
Mean Day to emergence 28 d	ANOVA; Dunnett's one tailed t-test	520 mg/Kg	1200 mg/Kg	790 mg/Kg

¹LC50

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13. VERIFICATION OF STATISTICAL RESULTS

Most sensitive endpoint: Survival/Emergence and Larval Dry Weight.

ENDPOINT	METHOD	NOEC	LOEC	MATC
Survival 14 d	Stephen's LC50 program	² 548 mg/Kg (458-656)		
Survival 28 d	Stephen's LC50 program	² 479 mg/Kg (377-600)		
Survival/Emergence 28 d	ANOVA; Dunnett's	260 mg/Kg	520 mg/Kg	368 mg/Kg
Dry Weight	ANOVA; Dunnett's	260 mg/Kg	520 mg/Kg	368 mg/Kg
Number Emerged				
Mean Day to emergence				
Male	ANOVA; Dunnett's	520 mg/Kg	1200 mg/Kg	
Female	ANOVA; Dunnett's	1200 mg/Kg	2100 mg/Kg	
Total	ANOVA; Dunnett's			

14. REVIEWER'S COMMENTS: There were several deviations from the cited guideline for conducting a sediment toxicity test, but were not considered serious enough to affect the results of this study. The most sensitive endpoints were survival/emergence and larval dry weight with an NOEC of 260 mg/Kg, an LOEC of 520 mg/Kg, and an MATC of 368 mg/Kg. The LC50s for survival after 14 d and 28 d of exposure were 548 mg/Kg and 479 mg/Kg respectively. This study was categorized as **Supplemental**.

²LC50 and 95% Confidence Limits

TOM A. BAILEY ADBAC SEDIMENT TOXICITY TEST (14 d LC50)*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	30	30	100	9.313227E-08
1200	30	29	96.66666	2.8871E-06
520	30	7	23.33334	.261144
260	30	2	6.666667	4.339964E-05
120	30	2	6.666667	4.339964E-05

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 681.7159

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
.4	3.059564E-02		547.6628 457.7131
655.5074			

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
GOODNESS OF FIT PROBABILITY		
6	1.565638	8.821011

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 = 3.678778
95 PERCENT CONFIDENCE LIMITS = -.9243095 AND 8.281865

LC50 = 577.5215
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 260.8224
95 PERCENT CONFIDENCE LIMITS = 0 AND 629.8733

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TOM A. BAILEY ADBAC SEDIMENT TEST (28 d LC50)*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	30	30	100	9.313227E-08
1200	30	28	93.33334	4.339964E-05
520	30	7	23.33334	.261144
260	31	4	12.90323	1.697662E-03
120	30	9	30	2.138698

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 698.1801

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
4	4.938905E-02		479.0011 377.4135

600.0516

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
6	2.2499	11.4751

GOODNESS OF FIT PROBABILITY

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 = 2.19242
95 PERCENT CONFIDENCE LIMITS = -1.096137 AND 5.480977

LC50 = 468.352
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 123.3969
95 PERCENT CONFIDENCE LIMITS = 0 AND 480.1743

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NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

TOM A. BAILEY ADBAC SEDIMENT TOXICITY TEST (14 d LC50)

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	29	29	100	1.862645E-07
1200	29	28	96.55169	5.587936E-06
520	29	6	20.6897	.115785
260	29	1	3.4483	5.587936E-06
120	29	1	3.4483	5.587936E-06

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 696.0871

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
4	.0285622	584.9135	492.6428 697.3752

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
6	3.223109	15.75775

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 = 4.416902
95 PERCENT CONFIDENCE LIMITS = -3.512771 AND 12.34657

LC50 = 624.3561
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 322.0333
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

TOM A. BAILEY ADBAC SEDIMENT TOXICITY TEST (28 d LC50)

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	23	23	100	1.192093E-05
1200	23	21	91.3044	3.302097E-03

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520	23	0	0	1.192093E-05
260	31	4	12.90323	1.697662E-03
120	23	2	8.6957	3.302097E-03

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 857.6212

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	4.051066E-02		671.2117	549.7608

.836.3843

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
6	2.106218	10.17297

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 = 3.125711
95 PERCENT CONFIDENCE LIMITS = -1.410575 AND 7.661998

LC50 = 658.8637
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 258.5165
95 PERCENT CONFIDENCE LIMITS = 0 AND 925.8969

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ADBAC SEDIMENT TOXICITY TEST - SURVIVAL/EMERGENCE (14d)
File: ADBAC Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	3	90.000	100.000	96.667
2	120 MG/KG	3	90.000	100.000	93.333
3	260 MG/KG	3	80.000	100.000	93.333
4	520 MG/KG	3	60.000	90.000	76.667
5	1200 MG/KG	3	0.000	10.000	3.333
6	2100 MG/KG	3	0.000	0.000	0.000

ADBAC SEDIMENT TOXICITY TEST - SURVIVAL/EMERGENCE (14d)
File: ADBAC Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	33.333	5.774	3.333	5.97
2	120 MG/KG	33.333	5.774	3.333	6.19
3	260 MG/KG	133.333	11.547	6.667	12.37
4	520 MG/KG	233.333	15.275	8.819	19.92
5	1200 MG/KG	33.333	5.774	3.333	173.21
6	2100 MG/KG	0.000	0.000	0.000	N/A

ADBAC SEDIMENT TOXICITY TEST - SURVIVAL/EMERGENCE (14d)
File: ADBAC Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	31961.111	6392.222	82.186
Within (Error)	12	933.333	77.778	
Total	17	32894.444		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho: All equal

ADBAC SEDIMENT TOXICITY TEST - SURVIVAL/EMERGENCE (14d)
File: ADBAC Transform: NO TRANSFORM

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DUNNETT'S TEST - TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	96.667	96.667		
2	120 MG/KG	93.333	93.333	0.463	
3	260 MG/KG	93.333	93.333	0.463	
4	520 MG/KG	76.667	76.667	2.777	*
5	1200 MG/KG	3.333	3.333	12.961	*
6	2100 MG/KG	0.000	0.000	13.424	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

ADBAC SEDIMENT TOXICITY TEST - SURVIVAL/EMERGENCE (14d)

File: ADBAC Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 2 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	3			
2	120 MG/KG	3	18.002	18.6	3.333
3	260 MG/KG	3	18.002	18.6	3.333
4	520 MG/KG	3	18.002	18.6	20.000
5	1200 MG/KG	3	18.002	18.6	93.333
6	2100 MG/KG	3	18.002	18.6	96.667

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
 File: EMERGMAL Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	3	18.000	21.300	19.500
2	120 mg/kg	3	19.800	23.300	21.033
3	260 mg/kg	3	18.000	21.000	19.333
4	520 mg/kg	3	21.000	22.300	21.700
5	1200 mg/kg	3	0.000	0.000	0.000
6	2100 mg/kg	3	0.000	0.000	0.000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
 File: EMERGMAL Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	2.790	1.670	0.964	8.57
2	120 mg/kg	3.863	1.966	1.135	9.34
3	260 mg/kg	2.333	1.528	0.882	7.90
4	520 mg/kg	0.430	0.656	0.379	3.02
5	1200 mg/kg	0.000	0.000	0.000	N/A
6	2100 mg/kg	0.000	0.000	0.000	N/A

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
 File: EMERGMAL Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1675.396	335.079	213.502
Within (Error)	12	18.833	1.569	
Total	17	1694.229		

Critical F value = 3.11 (0.05,5,12)
 Since F > Critical F REJECT Ho: All equal

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)

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File: EMERGMALÉ

Transform: NO TRANSFORM

DUNNETT'S TEST

TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	19.500	19.500		
2	120 mg/kg	21.033	21.033	-1.499	
3	260 mg/kg	19.333	19.333	0.163	
4	520 mg/kg	21.700	21.700	-2.151	
5	1200 mg/kg	0.000	0.000	19.064	*
6	2100 mg/kg	0.000	0.000	19.064	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)

File: EMERGMALÉ

Transform: NO TRANSFORM

DUNNETT'S TEST

TABLE 2 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	3			
2	120 mg/kg	3	2.557	13.1	-1.533
3	260 mg/kg	3	2.557	13.1	0.167
4	520 mg/kg	3	2.557	13.1	-2.200
5	1200 mg/kg	3	2.557	13.1	19.500
6	2100 mg/kg	3	2.557	13.1	19.500

TITLE: ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)

FILE: EMERGMALÉ

TRANSFORM: NO TRANSFORM

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	18.0000	18.0000
1	CONTROL	2	21.3000	21.3000
1	CONTROL	3	19.2000	19.2000
2	120 mg/kg	1	20.0000	20.0000
2	120 mg/kg	2	23.3000	23.3000
2	120 mg/kg	3	19.8000	19.8000
3	260 mg/kg	1	18.0000	18.0000
3	260 mg/kg	2	21.0000	21.0000
3	260 mg/kg	3	19.0000	19.0000
4	520 mg/kg	1	22.3000	22.3000
4	520 mg/kg	2	21.0000	21.0000
4	520 mg/kg	3	21.8000	21.8000
5	1200 mg/kg	1	0.0000	0.0000
5	1200 mg/kg	2	0.0000	0.0000

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5	1200 mg/kg	3	0.0000	0.0000
6	2100 mg/kg	1	0.0000	0.0000
6	2100 mg/kg	2	0.0000	0.0000
6	2100 mg/kg	3	0.0000	0.0000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
File: EMERGMAL Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	3	18.000	21.300	19.500
2	120 mg/kg	3	19.800	23.300	21.033
3	260 mg/kg	3	18.000	21.000	19.333
4	520 mg/kg	3	21.000	22.300	21.700
5	1200 mg/kg	3	0.000	0.000	0.000
6	2100 mg/kg	3	0.000	0.000	0.000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
File: EMERGMAL Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	2.790	1.670	0.964	8.57
2	120 mg/kg	3.863	1.966	1.135	9.34
3	260 mg/kg	2.333	1.528	0.882	7.90
4	520 mg/kg	0.430	0.656	0.379	3.02
5	1200 mg/kg	0.000	0.000	0.000	N/A
6	2100 mg/kg	0.000	0.000	0.000	N/A

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
File: EMERGMAL Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1675.396	335.079	213.502
Within (Error)	12	18.833	1.569	
Total	17	1694.229		

Critical F value = 3.11 (0.05, 5, 12)
Since F > Critical F REJECT Ho: All equal

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ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
 File: EMERGMAL Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	19.500	19.500		
2	120 mg/kg	21.033	21.033	-1.499	
3	260 mg/kg	19.333	19.333	0.163	
4	520 mg/kg	21.700	21.700	-2.151	
5	1200 mg/kg	0.000	0.000	19.064	*
6	2100 mg/kg	0.000	0.000	19.064	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
 File: EMERGMAL Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	3			
2	120 mg/kg	3	2.557	13.1	-1.533
3	260 mg/kg	3	2.557	13.1	0.167
4	520 mg/kg	3	2.557	13.1	-2.200
5	1200 mg/kg	3	2.557	13.1	19.500
6	2100 mg/kg	3	2.557	13.1	19.500

TITLE: ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (FEMALE)
 FILE: EMERGFEMALE
 TRANSFORM: NO TRANSFORM
 NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	22.2000	22.2000
1	CONTROL	2	22.0000	22.0000
1	CONTROL	3	22.4000	22.4000
2	120 mg/kg	1	21.5000	21.5000
2	120 mg/kg	2	0.0000	0.0000
2	120 mg/kg	3	22.7000	22.7000
3	260 mg/kg	1	21.6000	21.6000
3	260 mg/kg	2	23.6000	23.6000
3	260 mg/kg	3	22.0000	22.0000
4	520 mg/kg	1	25.0000	25.0000

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4	520 mg/kg	2	22.8000	22.8000
4	520 mg/kg	3	25.0000	25.0000
5	1200 mg/kg	1	28.0000	28.0000
5	1200 mg/kg	2	0.0000	0.0000
5	1200 mg/kg	3	0.0000	0.0000
6	2100 mg/kg	1	0.0000	0.0000
6	2100 mg/kg	2	0.0000	0.0000
6	2100 mg/kg	3	0.0000	0.0000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (FEMALE)
File: EMERGFEMALE Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	3	22.000	22.400	22.200
2	120 mg/kg	3	0.000	22.700	14.733
3	260 mg/kg	3	21.600	23.600	22.400
4	520 mg/kg	3	22.800	25.000	24.267
5	1200 mg/kg	3	0.000	28.000	9.333
6	2100 mg/kg	3	0.000	0.000	0.000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (FEMALE)
File: EMERGFEMALE Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.040	0.200	0.115	0.90
2	120 mg/kg	163.163	12.774	7.375	86.70
3	260 mg/kg	1.120	1.058	0.611	4.72
4	520 mg/kg	1.613	1.270	0.733	5.23
5	1200 mg/kg	261.333	16.166	9.333	173.21
6	2100 mg/kg	0.000	0.000	0.000	N/A

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (FEMALE)
File: EMERGFEMALE Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1344.658	268.932	3.777
Within (Error)	12	854.540	71.212	
Total	17	2199.198		

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Critical F value = 3.11 (0.05,5,12)
 Since F > Critical F REJECT Ho: All equal

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (FEMALE)
 File: EMERGFEMALE Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	22.200	22.200		
2	120 mg/kg	14.733	14.733	1.084	
3	260 mg/kg	22.400	22.400	-0.029	
4	520 mg/kg	24.267	24.267	-0.300	
5	1200 mg/kg	9.333	9.333	1.867	
6	2100 mg/kg	0.000	0.000	3.222	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (FEMALE)
 File: EMERGFEMALE Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	3			
2	120 mg/kg	3	17.225	77.6	7.467
3	260 mg/kg	3	17.225	77.6	-0.200
4	520 mg/kg	3	17.225	77.6	-2.067
5	1200 mg/kg	3	17.225	77.6	12.867
6	2100 mg/kg	3	17.225	77.6	22.200

TITLE: ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (TOTAL)
 FILE: EMERGTOTAL
 TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	21.6000	21.6000
1	CONTROL	2	21.7000	21.7000
1	CONTROL	3	20.8000	20.8000
2	120 mg/kg	1	20.9000	20.9000
2	120 mg/kg	2	23.3000	23.3000
2	120 mg/kg	3	21.4000	21.4000

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3	260 mg/kg	1	21.0000	21.0000
3	260 mg/kg	2	22.4000	22.4000
3	260 mg/kg	3	21.7000	21.7000
4	520 mg/kg	1	23.7000	23.7000
4	520 mg/kg	2	22.0000	22.0000
4	520 mg/kg	3	22.6000	22.6000
5	1200 mg/kg	1	28.0000	28.0000
5	1200 mg/kg	2	0.0000	0.0000
5	1200 mg/kg	3	0.0000	0.0000
6	2100 mg/kg	1	0.0000	0.0000
6	2100 mg/kg	2	0.0000	0.0000
6	2100 mg/kg	3	0.0000	0.0000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (TOTAL)

File: EMERGTOTAL

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	3	20.800	21.700	21.367
2	120 mg/kg	3	20.900	23.300	21.867
3	260 mg/kg	3	21.000	22.400	21.700
4	520 mg/kg	3	22.000	23.700	22.767
5	1200 mg/kg	3	0.000	28.000	9.333
6	2100 mg/kg	3	0.000	0.000	0.000

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (TOTAL)

File: EMERGTOTAL

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.243	0.493	0.285	2.31
2	120 mg/kg	1.603	1.266	0.731	5.79
3	260 mg/kg	0.490	0.700	0.404	3.23
4	520 mg/kg	0.743	0.862	0.498	3.79
5	1200 mg/kg	261.333	16.166	9.333	173.21
6	2100 mg/kg	0.000	0.000	0.000	N/A

ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (TOTAL)

File: EMERGTOTAL

Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1325.289	265.058	6.015

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

TOM A. BAILEY ADBAC SEDIMEN TOXITY TESTING

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*****
CONC.      NUMBER      NUMBER      PERCENT      BINOMIAL
           EXPOSED      DEAD        DEAD        PROB. (PERCENT)
2100       29          29          100          1.862645E-07
1200       29          28          96.55169     5.587936E-06
520        29          6           20.6897      .115785
260        29          1           3.4483       5.587936E-06
120        29          1           3.4483       5.587936E-06
```

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 696.0871

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.0285622	584.9135	492.6428	697.3752

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
6	3.223109	15.75775

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 = 4.416902
 95 PERCENT CONFIDENCE LIMITS = -3.512771 AND 12.34657

LC50 = 624.3561
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 322.0333
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

TOM A. BAILEY ADBAC SEDIMENT TOXICITY TESTING

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*****
CONC.      NUMBER      NUMBER      PERCENT      BINOMIAL
           EXPOSED      DEAD        DEAD        PROB. (PERCENT)
2100       23          23          100          1.192093E-05
1200       23          22          95.6522      2.861023E-04
```

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NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

TOM A. BAILEY ADBAC SEDIMENT TOXICITY TEST

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	97	97	100	1.192093E-05
1200	97	94.00001	96.90719	2.861023E-04
520	97	20	20.6186	7.154533E-02
260	97	4	4.1237	2.973807E-03
120	97	4	4.1237	3.302097E-03

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 692.4811

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	8.019429E-03		572.1335	522.5774

626.885

RESULTS CALCULATED USING THE PROBIT METHOD
ITERATIONS. G H

GOODNESS OF FIT PROBABILITY
7 2.701211 45.42037

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 = 4.235359
95 PERCENT CONFIDENCE LIMITS = -2.725606 AND 11.19632

LC50 = 614.4831
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 308.0727
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

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TOM A. BAILEY ADBAC SEDIMENT TOXICITY TEST

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	77	77	100	1.192093E-05
1200	77	70	90.90911	2.861023E-04

520	30	6	20	7.154533E-02
260	30	4	13.33333	2.973807E-03
120	23	2	8.6957	3.302097E-03

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 706.4208

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	3.974749E-02		555.0013	456.4269

677.899

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
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GOODNESS OF FIT PROBABILITY

6	1.329488	6.434792
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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 = 3.222551
95 PERCENT CONFIDENCE LIMITS = -.4931605 AND 6.938263

LC50 = 584.0755
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 235.7062
95 PERCENT CONFIDENCE LIMITS = 0 AND 547.2698

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520	77	0	0	7.154533E-02
260	100	13	13	2.973807E-03
120	77	7.000001	9.090899	3.302097E-03

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 864.4245

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	1.128646E-02		671.72	603.8856

751.248

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
6	2.141913	34.19954

GOODNESS OF FIT PROBABILITY

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 = 3.086216
95 PERCENT CONFIDENCE LIMITS = -1.430545 AND 7.602977

LC50 = 659.234
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 255.5834
95 PERCENT CONFIDENCE LIMITS = 0 AND 927.3363

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CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 718.139

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

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TOM A. BAILEY ADBAC SEDIMENT TOXICITY TESTING

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	10	10	100	9.765625E-02
1200	10	10	100	9.765625E-02
520	10	2	20	5.46875
260	10	1	10	1.074219
120	10	1	10	1.074219

THE BINOMIAL TEST SHOWS THAT 260 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 676.5706

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.1112049	504.0399	348.6904	714.5642

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
5	1.772299	3.442575
GOODNESS OF FIT PROBABILITY		
1.597601E-02		

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

SLOPE = 3.363974
95 PERCENT CONFIDENCE LIMITS = -1.114408 AND 7.842357

LC50 = 543.0295
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 227.6638
95 PERCENT CONFIDENCE LIMITS = 0 AND 622.9186

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

TOM A. BAILEY ADBAC SEDIMENT TOXICITY TESTING

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2100	9	9	100	.1953125
1200	9	9	100	.1953125
520	9	1	11.1111	1.953125
260	9	0	0	.1953125
120	9	0	0	.1953125

THE BINOMIAL TEST SHOWS THAT 520 AND 1200 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT

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Hydrscarina
Post Treatment 1 (46%) (32.8%) +44.7%
Post Treatment 2 (57%) +7% +32.9%
Variance Total
Cnidaria
Post Treatment 1 (53%) (56%) (78%)
Post Treatment 2 (420%) (71%) (70.6%)
Vaariance Total
Nematoda
Post Treatment 1 (20%) (65%) +73%
Post Treatment 2 +4% +44.6% +85%

```

A:\PYRID.MIC Cell A15 Doc 1 Pg 7 Ln 7.89" Pos 1.12"

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[Row] [Cell] [Cell] [Cell] [Cell] [Cell]
[Row] [Cell] [Cell] [Cell] [Cell] [Cell]
[Row] [Cell] [Cell] [Cell] [Cell] [Cell]

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Press Reveal Codes to restore screen

TITLE: ADBAC SEDIMENT TOXICITY TEST - LARVAL DRY WT (28d)
 FILE: DRYWT
 TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	4.2000	4.2000
1	CONTROL	2	4.1000	4.1000
1	CONTROL	3	3.9000	3.9000
2	120 MG/KG	1	3.6000	3.6000
2	120 MG/KG	2	3.9000	3.9000
2	120 MG/KG	3	3.6000	3.6000
3	260 MG/KG	1	3.3000	3.3000
3	260 MG/KG	2	3.9000	3.9000
3	260 MG/KG	3	4.0000	4.0000
4	520 MG/KG	1	3.4000	3.4000
4	520 MG/KG	2	3.6000	3.6000
4	520 MG/KG	3	2.3000	2.3000
5	1200 MG/KG	1	0.7000	0.7000
5	1200 MG/KG	2	0.7000	0.7000
5	1200 MG/KG	3	0.7000	0.7000
6	2100 MG/KG	1	0.0000	0.0000
6	2100 MG/KG	2	0.0000	0.0000
6	2100 MG/KG	3	0.0000	0.0000

ADBAC SEDIMENT TOXICITY TEST - LARVAL DRY WT (28d)
 File: DRYWT Transform: NO TRANSFORM

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SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	3	3.900	4.200	4.067
2	120 MG/KG	3	3.600	3.900	3.700
3	260 MG/KG	3	3.300	4.000	3.733
4	520 MG/KG	3	2.300	3.600	3.100
5	1200 MG/KG	3	0.700	0.700	0.700
6	2100 MG/KG	3	0.000	0.000	0.000

ADBAC SEDIMENT TOXICITY TEST - LARVAL DRY WT (28d)
File: DRYWT Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	CONTROL	0.023	0.153	0.088	3.76
2	120 MG/KG	0.030	0.173	0.100	4.68
3	260 MG/KG	0.143	0.379	0.219	10.14
4	520 MG/KG	0.490	0.700	0.404	22.58
5	1200 MG/KG	0.000	0.000	0.000	0.00
6	2100 MG/KG	0.000	0.000	0.000	N/A

ADBAC SEDIMENT TOXICITY TEST - LARVAL DRY WT (28d)
File: DRYWT Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	45.752	9.150	79.954
Within (Error)	12	1.373	0.114	
Total	17	47.125		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho: All equal

ADBAC SEDIMENT TOXICITY TEST - LARVAL DRY WT (28d)
File: DRYWT Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 1 OF 2

Ho: Control < Treatment

TRANSFORMED MEAN CALCULATED IN

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	CONTROL	4.067	4.067		
2	120 MG/KG	3.700	3.700	1.327	
3	260 MG/KG	3.733	3.733	1.207	
4	520 MG/KG	3.100	3.100	3.500	*
5	1200 MG/KG	0.700	0.700	12.188	*
6	2100 MG/KG	0.000	0.000	14.723	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

ADBAC SEDIMENT TOXICITY TEST - LARVAL DRY WT (28d)
File: DRYWT Transform: NO TRANSFORM

DUNNETT'S TEST		TABLE 2 OF 2		Ho:Control<Treatment	
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	3			
2	120 MG/KG	3	0.691	17.0	0.367
3	260 MG/KG	3	0.691	17.0	0.333
4	520 MG/KG	3	0.691	17.0	0.967
5	1200 MG/KG	3	0.691	17.0	3.367
6	2100 MG/KG	3	0.691	17.0	4.067

TITLE: ADBAC SEDIMENT TOXICITY - TIME TO EMERGENCE (MALE)
FILE: EMERGMAL
TRANSFORM: NO TRANSFORM
NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	18.0000	18.0000
1	CONTROL	2	21.3000	21.3000
1	CONTROL	3	19.2000	19.2000
2	120 mg/kg	1	20.0000	20.0000
2	120 mg/kg	2	23.3000	23.3000
2	120 mg/kg	3	19.8000	19.8000
3	260 mg/kg	1	18.0000	18.0000
3	260 mg/kg	2	21.0000	21.0000
3	260 mg/kg	3	19.0000	19.0000
4	520 mg/kg	1	22.3000	22.3000
4	520 mg/kg	2	21.0000	21.0000
4	520 mg/kg	3	21.8000	21.8000
5	1200 mg/kg	1	0.0000	0.0000
5	1200 mg/kg	2	0.0000	0.0000
5	1200 mg/kg	3	0.0000	0.0000
6	2100 mg/kg	1	0.0000	0.0000
6	2100 mg/kg	2	0.0000	0.0000
6	2100 mg/kg	3	0.0000	0.0000

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TRS

Toxicology/Regulatory Services

Facsimile Transmission Summary

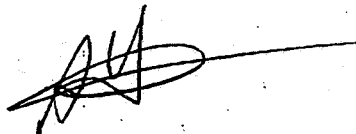
Recipient:	Mr. Tom Bailey	Date:	April 10, 1996
Company:	U.S. EPA - EEB	Facsimile #:	(703) 305-6309
From:	Amy S. Fenster, M.S.	Pages:	1 of 4
Hard Copy:	Will NOT follow		
Subject:	ADBAC Midge Study - MRID # 43731101		

Dear Mr. Bailey:

As requested by Dr. Jim Hill, following is the information you requested regarding the calculation of the LD₅₀ for the subject study.

If you have any questions, or if you require additional information, please do not hesitate to contact me at (804) 977-5957.

Sincerely,



cc: Jim T. Hill, CSMA, via facsimile, without enclosures

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Page ____ is not included in this copy.

Pages 44 through 46 are not included in this copy.

The material not included contains the following type of information:

- ☐ Identity of product inert ingredients.
- ☐ Identity of product inert impurities.
- ☐ Description of the product manufacturing process.
- ☐ Description of quality control procedures.
- ☐ Identity of the source of product ingredients.
- ☐ Sales or other commercial/financial information.
- ☐ A draft product label.
- ☐ The product confidential statement of formula.
- ☐ Information about a pending registration action.
- ☒ FIFRA registration data.
- ☐ The document is a duplicate of page(s) _____.
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