(3-21-96)

DATA EVALUATION RECORD
AQUATIC INVERTEBRATE LIFE CYCLE TEST
GUIDELINE 72-4(B)

1. **CHEMICAL:** Alachlor **PC Code No.:** 090501
CAS #: 15972-60-B

2. **TEST MATERIAL:** Alachlor technical, Lot MUS-9107-3181-T
Purity: 94.6 %

3. **CITATION**
Authors: Forbis, Alan D.
Title: Chronic Toxicity of Alachlor to Daphnia Under Flow-Through Conditions
Study Completion Date: August 8, 1994
Laboratory: ABC Laboratories, Columbia, Mo.
Sponsor: Monsanto Company, St. Louis, Mo.
Laboratory Report ID: ABC #41517
MRID No.: 437747-07
DP Barcode: D 219382

4. **REVIEWED BY:** Brian Montague, Fisheries Biologist
Ecological Effects Branch, EFED
Signature: Brian Montague **Date:** 3/12/96

5. **APPROVED BY:** Les Touart, PhD., Supervisory Biologist
Ecological Effects Branch, EFED (7507C)
Signature: L.W. Touart **Date:** 3/21/96

6. **STUDY PARAMETERS**

Scientific Name of Test Organism: *Daphnia magna*
Age of Test Organism: Full life cycle study
Definitive Test Duration: 21 Days
Study Method: Flow-through
Type of Concentrations: Mean measured

7. **CONCLUSIONS:**

Results Synopsis
NOEC: 0.11 mg ai/L LOEC: 0.23 mg ai/L*
LOEC's for specific effects
Egg Production: 0.45 mg ai/L
Adult Survival: 1.7 mg ai/L
Growth (length or weight): 0.23 mg ai/L length *
0.45 mg ai/L weight

8. **ADEQUACY OF THE STUDY**

A. Classification: Core
B. Rationale: The study results reported by the laboratory are supported by the Agency's independent statistical analysis.

C. Repairability: N/A

9. GUIDELINE DEVIATIONS No major deviations from Agency accepted methodology were noted for this study. Analysis of separate samples from individual test vessels would have been preferred over analysis of composite samples, at least during 2 or three of the sampling days. Composites of test water in a single test group may mask differences in individual vessel concentrations caused by delivery system blockage.

10 SUBMISSION PURPOSE: Submitted to satisfy reregistration guidelines for chronic testing of alachlor on a freshwater invertebrate species.

11. MATERIALS AND METHODS

A. Test Organisms/Acclimation

Guideline Criteria	Reported Information
Species	*Daphnia magna*
Source	ABC Laboratory cultures
Parental Acclimation Conditions	Maintained in temperature controlled area 20^{0}C and equipped with flourescent light at 42-54 ftcandle intensity-16D/8N photoperiod. Culture Vessels=1.5L Glass
Parental Acclimation Period	Not clarified.
Age of Parental Stock	At initiation: 15 Days old
Feed Regime During Acclimation	Suspensions of 1 of two algal species supplemented with dry yeast/trout chow mix.
Food Concentration	During testing: Algal suspension at 2x10^8 cells/L. Trout chow/yeast supplement(5 mg/ml suspension) twice daily
Daphnid health at acclimation	All daphnids appeared healthy

B. Test System

Guideline Criteria	Reported Information
Test Water Source and Treatment	Hard blended water obtained by blending wellwater with wellwater demineralized by reverse osmosis.
Water Temperature Range	Target: 19-21°C Range: 20 °C
pH Range	8.0 to 8.2 on Day 0 7.9-8.5 during 21D study
Total Hardness	148-156 mg/L as $CaCO_3$
Dissolved Oxygen Range	21 Day Range: 4.0-7.8 mg/L 46 to 90 % saturation
Test Vessels 1. Material: 2. Size: 3. Fill volume:	1 Liter Glass Beakers with notched drains. Top and drains were covered with 50 mesh stainless steel screen.
Test Vessel Covers	See above
Type of Dilution System (if applicable)	Intermittent half-liter proportional diluter system (Mount&Brungs) Individual flow splitting boxes delivering to 7 sets of 4 beakers via 14 gauge hypodermic needles
Flow Rate	3.5 ml/min or 5.3 1 liter volume replacements/24 hours
Aeration	Prior to intro to vessels only
Photoperiod	16D/8N with 30 min. transition
Solvents and Maximum Concentration	DMF at maximum of 0.1 ml/L concentration.

C. Test Design

Guideline Criteria	Reported Information
Duration	21 Day study
Nominal Concentrations	0.15, 0.30, 0.60, 1.2, and 2.4 mg ai/L with solvent and dilution controls.
Number of Test Organisms	**# Per Concentration:** 40 **# Per Test Vessel:** 10 **Estimated Loading:** 1/100 ml
Test Organisms Assignment Methods	After dilution system had operated for 6 hours daphnia were introduced by computer generated randomization of 28 vials containing 10 daphnids.
Renewal Regime	Not applicable
Water Parameter Measurements	**pH:** Daily for dilution water and days 0, 4, 7, 10, 14, 18, and 21 for other vessels. **Temperature:**Same as above except continous on waterbath **Dissolved Oxygen:**Same as pH
Chemical Analysis Regime and Methodology	10 ml composited samples(2.5 ml/replicate) were taken on Days -3, 0, 4, 7, 14, and 21. They were analyzed by gas chromatography with ECD detection.

12. REPORTED RESULTS

A. General Results

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements	Statements are included.
Control Mortality	0% in Dilution Control 3 % in Solvent Control
Control 21 day Totals and Reproduction/Daphnid	Dilution Controls=Mean 1755 Solvent Controls=Mean 1804 Mean Reprod/Daphnid=180
Ephippia noted?	None observed

Guideline Criteria	Reported Information
Data Endpoints **Survival** 1st-generation **Fecundity** **Growth Effects**	Adult survival Total young produced/female Number of days to 1st Brood Adult weight and length
Raw data	Summaries of raw data included

Effects Data

Toxicant Concentration (mg/L)		No. (%) Dead or Immobile (21 Days)	Young per Female per Repro. Day	Total Length (mm)	Dry Weight (mg)
Nominal	Measured				
Control	--	0(0%)	11.70	4.42	0.76
Solvent Control	--	1(3%)	12.32	4.39	0.77
0.15	0.11	0(0%)	11.80	4.33	0.77
0.30	0.23	1(3%)	11.79	4.25	0.72
0.60	0.45	3(8%)	11.64	4.27	0.66
1.2	0.86	3(8%)	10.19	4.12	0.52
2.4	1.7	32(80%)	6.03	3.50	0.16

Toxicity Observations: Based on mortality of adult daphnids the 21 Day EC50 was estimated by the laboratory to be 1.3 PPM.

B. Laboratory's Statistical Results

Most sensitive endpoint: Adult length

*Values expressed in PPM

Endpoint	Method	NOEC	LOEC
Survival	Dunnett's 1-tailed	0.86	1.7
Reproduction	" "	0.45	0.86
Weight	" "	0.23	0.45
Length	" "	0.11	0.23

13. VERIFICATION OF STATISTICAL RESULTS

Most sensitive endpoint: 21 Day Adult Length
*All values expressed in PPM

Endpoint	Method	NOEC	LOEC
Survival	Dunnetts, Bonferoni T, and Williams Test	0.86	1.7
Reproduction	" "	0.23	0.45
Weight	" "	0.23	0.45
Length	" "	0.11	0.23

14. REVIEWER'S COMMENTS: With the exception of reproduction, the Agency statistical results were in agreement with the study author's analysis. The lowest LOEC was for adult length and the Agency analysis confirmed this conclusion. Results indicate that Alachlor is highly toxic to daphnia growth and reproductive processes at dosages below 0.5 ppm. The study is acceptable for reregistration requirements for chronic lifecycle testing of a freshwater invertebrate species.

6

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent C	4	9.000	10.000	9.750
2	Dilution C	4	10.000	10.000	10.000
3	0.11	4	10.000	10.000	10.000
4	0.23	4	9.000	10.000	9.750
5	0.45	4	9.000	10.000	9.250
6	0.86	4	9.000	10.000	9.250
7	1.7	4	0.000	4.000	2.000

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Solvent C	0.250	0.500	0.250
2	Dilution C	0.000	0.000	0.000
3	0.11	0.000	0.000	0.000
4	0.23	0.250	0.500	0.250
5	0.45	0.250	0.500	0.250
6	0.86	0.250	0.500	0.250
7	1.7	3.333	1.826	0.913

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	203.857	33.976	54.889
Within (Error)	21	13.000	0.619	
Total	27	216.857		

Critical F value = 2.57 (0.05,6,21)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Adult survival

File: Alacadlt.srv Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	9.750	9.750		
2	Dilution C	10.000	10.000	-0.449	
3	0.11	10.000	10.000	-0.449	
4	0.23	9.750	9.750	0.000	
5	0.45	9.250	9.250	0.899	
6	0.86	9.250	9.250	0.899	
7	1.7	2.000	2.000	13.931	*

Dunnett table value = 2.46 (1 Tailed Value, P=0.05, df=20,6)

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

DUNNETTS 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	Solvent C	4			
2	Dilution C	4	1.369	14.0	-0.250
3	0.11	4	1.369	14.0	-0.250
4	0.23	4	1.369	14.0	0.000
5	0.45	4	1.369	14.0	0.500
6	0.86	4	1.369	14.0	0.500
7	1.7	4	1.369	14.0	7.750

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	203.857	33.976	54.889
Within (Error)	21	13.000	0.619	
Total	27	216.857		

Critical F value = 2.57 (0.05,6,21)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	9.750	9.750		
2	Dilution C	10.000	10.000	-0.449	
3	0.11	10.000	10.000	-0.449	
4	0.23	9.750	9.750	0.000	
5	0.45	9.250	9.250	0.899	
6	0.86	9.250	9.250	0.899	
7	1.7	2.000	2.000	13.931	*

Bonferroni T table value = 2.60 (1 Tailed Value, P=0.05, df=21,6)

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

BONFERRONI T-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	Solvent C	4			
2	Dilution C	4	1.448	14.8	-0.250
3	0.11	4	1.448	14.8	-0.250
4	0.23	4	1.448	14.8	0.000
5	0.45	4	1.448	14.8	0.500
6	0.86	4	1.448	14.8	0.500
7	1.7	4	1.448	14.8	7.750

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent C	4	9.750	9.750	9.917
2	Dilution C	4	10.000	10.000	9.917
3	0.11	4	10.000	10.000	9.917
4	0.23	4	9.750	9.750	9.750
5	0.45	4	9.250	9.250	9.250
6	0.86	4	9.250	9.250	9.250
7	1.7	4	2.000	2.000	2.000

Alachlor Adult survival
File: Alacadlt.srv Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent C	9.917				
Dilution C	9.917	0.300		1.72	k= 1, v=21
0.11	9.917	0.300		1.80	k= 2, v=21
0.23	9.750	0.000		1.83	k= 3, v=21
0.45	9.250	0.899		1.84	k= 4, v=21
0.86	9.250	0.899		1.85	k= 5, v=21
1.7	2.000	13.930	*	1.85	k= 6, v=21

s = 0.787
Note: df used for table values are approximate when v > 20.

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent C	4	11.350	13.610	12.320
2	Dilute C	4	10.320	12.560	11.700
3	0.11	4	10.570	12.900	11.798
4	0.23	4	11.230	12.800	11.785
5	0.45	4	11.370	11.910	11.643
6	0.86	4	9.460	11.060	10.188
7	1.7	4	4.660	6.840	6.033

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Solvent C	0.912	0.955	0.478
2	Dilute C	0.930	0.964	0.482
3	0.11	0.912	0.955	0.477
4	0.23	0.518	0.720	0.360
5	0.45	0.089	0.298	0.149
6	0.86	0.560	0.748	0.374
7	1.7	0.942	0.970	0.485

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	115.588	19.265	27.719
Within (Error)	21	14.586	0.695	
Total	27	130.174		

Critical F value = 2.57 (0.05,6,21)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	12.320	12.320		
2	Dilute C	11.700	11.700	1.052	
3	0.11	11.798	11.798	0.886	
4	0.23	11.785	11.785	0.908	
5	0.45	11.643	11.643	1.149	
6	0.86	10.188	10.188	3.618	*
7	1.7	6.033	6.033	10.666	*

Dunnett table value = 2.46 (1 Tailed Value, P=0.05, df=20,6)

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

DUNNETTS 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	Solvent C	4			
2	Dilute C	4	1.450	11.8	0.620
3	0.11	4	1.450	11.8	0.522
4	0.23	4	1.450	11.8	0.535
5	0.45	4	1.450	11.8	0.677
6	0.86	4	1.450	11.8	2.133
7	1.7	4	1.450	11.8	6.288

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	115.588	19.265	27.719
Within (Error)	21	14.586	0.695	
Total	27	130.174		

Critical F value = 2.57 (0.05,6,21)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	12.320	12.320		
2	Dilute C	11.700	11.700	1.052	
3	0.11	11.798	11.798	0.886	
4	0.23	11.785	11.785	0.908	
5	0.45	11.643	11.643	1.149	
6	0.86	10.188	10.188	3.618	*
7	1.7	6.033	6.033	10.666	*

Bonferroni T table value = 2.60 (1 Tailed Value, P=0.05, df=21,6)

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

BONFERRONI T-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	Solvent C	4			
2	Dilute C	4	1.534	12.5	0.620
3	0.11	4	1.534	12.5	0.522
4	0.23	4	1.534	12.5	0.535
5	0.45	4	1.534	12.5	0.677
6	0.86	4	1.534	12.5	2.133
7	1.7	4	1.534	12.5	6.288

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent C	4	12.320	12.320	12.320
2	Dilute C	4	11.700	11.700	11.761
3	0.11	4	11.798	11.798	11.761
4	0.23	4	11.785	11.785	11.761
5	0.45	4	11.643	11.643	11.643
6	0.86	4	10.188	10.188	10.188
7	1.7	4	6.033	6.033	6.033

Alachlor Daphnid Young/Female/Repro Day
File: AlacYAD.DM Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent C	12.320				
Dilute C	11.761	0.949		1.72	k= 1, v=21
0.11	11.761	0.949		1.80	k= 2, v=21
0.23	11.761	0.949		1.83	k= 3, v=21
0.45	11.643	1.150		1.84	k= 4, v=21
0.86	10.188	3.619	*	1.85	k= 5, v=21
1.7	6.033	10.669	*	1.85	k= 6, v=21

s = 0.833
Note: df used for table values are approximate when v > 20.

Alachlor Daphnia 21 Day Adult Weight
File: alacadlt.wt Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent C	4	4.340	4.440	4.388
2	Dilute C	4	4.350	4.480	4.418
3	0.11	4	4.250	4.400	4.330
4	0.23	4	4.160	4.310	4.248
5	0.45	4	4.230	4.290	4.265
6	0.86	4	4.030	4.180	4.115
7	1.7	3	3.450	3.550	3.500

Alachlor Daphnia 21 Day Adult Weight
File: alacadlt.wt Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

TITLE: Alachlor Daphnid 21 Day Mean Weight
FILE: Alacdmad.wt
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Solvent C	1	0.8100	0.8100
1	Solvent C	2	0.6900	0.6900
1	Solvent C	3	0.7700	0.7700
1	Solvent C	4	0.8100	0.8100
2	Dilution C	1	0.8700	0.8700
2	Dilution C	2	0.8500	0.8500
2	Dilution C	3	0.6100	0.6100
2	Dilution C	4	0.7000	0.7000
3	0.11	1	0.8100	0.8100
3	0.11	2	0.7300	0.7300
3	0.11	3	0.7400	0.7400
3	0.11	4	0.7900	0.7900
4	0.23	1	0.6900	0.6900
4	0.23	2	0.6900	0.6900
4	0.23	3	0.7700	0.7700
4	0.23	4	0.7100	0.7100
5	0.45	1	0.7400	0.7400
5	0.45	2	0.6100	0.6100
5	0.45	3	0.6600	0.6600
5	0.45	4	0.6400	0.6400
6	0.86	1	0.4900	0.4900
6	0.86	2	0.4900	0.4900
6	0.86	3	0.5000	0.5000
6	0.86	4	0.6000	0.6000
7	1.7	1	0.2000	0.2000
7	1.7	2	0.1800	0.1800
7	1.7	3	0.1000	0.1000

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent C	4	0.690	0.810	0.770
2	Dilution C	4	0.610	0.870	0.758
3	0.11	4	0.730	0.810	0.768
4	0.23	4	0.690	0.770	0.715
5	0.45	4	0.610	0.740	0.663
6	0.86	4	0.490	0.600	0.520
7	1.7	3	0.100	0.200	0.160

File: Alacdmad.wt Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Solvent C	0.003	0.057	0.028
2	Dilution C	0.015	0.124	0.062
3	0.11	0.001	0.039	0.019
4	0.23	0.001	0.038	0.019
5	0.45	0.003	0.056	0.028
6	0.86	0.003	0.054	0.027
7	1.7	0.003	0.053	0.031

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.961	0.160	40.000
Within (Error)	20	0.088	0.004	
Total	26	1.049		

Critical F value = 2.60 (0.05,6,20)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

DUNNETTS TEST

****** WARNING ******

This data set has unequal replicates. The Bonferroni T-test should be used instead of the Dunnetts test.

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	0.770	0.770		
2	Dilution C	0.758	0.758	0.280	
3	0.11	0.768	0.768	0.056	
4	0.23	0.715	0.715	1.230	
5	0.45	0.663	0.663	2.404	
6	0.86	0.520	0.520	5.590	*
7	1.7	0.160	0.160	12.628	*

Dunnett table value = 2.46 (1 Tailed Value, P=0.05, df=20,6)

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

DUNNETTS 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	Solvent C	4			
2	Dilution C	4	0.110	14.3	0.012
3	0.11	4	0.110	14.3	0.002
4	0.23	4	0.110	14.3	0.055
5	0.45	4	0.110	14.3	0.108
6	0.86	4	0.110	14.3	0.250
7	1.7	3	0.119	15.4	0.610

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.961	0.160	40.000
Within (Error)	20	0.088	0.004	
Total	26	1.049		

Critical F value = 2.60 (0.05,6,20)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

	TRANSFORMED	MEAN CALCULATED IN

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	Solvent C	0.770	0.770		
2	Dilution C	0.758	0.758	0.280	
3	0.11	0.768	0.768	0.056	
4	0.23	0.715	0.715	1.230	
5	0.45	0.663	0.663	2.404	
6	0.86	0.520	0.520	5.590	*
7	1.7	0.160	0.160	12.628	*

Bonferroni T table value = 2.61 (1 Tailed Value, P=0.05, df=20,6)

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

BONFERRONI T-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	Solvent C	4			
2	Dilution C	4	0.117	15.2	0.012
3	0.11	4	0.117	15.2	0.002
4	0.23	4	0.117	15.2	0.055
5	0.45	4	0.117	15.2	0.108
6	0.86	4	0.117	15.2	0.250
7	1.7	3	0.126	16.4	0.610

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent C	4	0.770	0.770	0.770
2	Dilution C	4	0.758	0.758	0.763
3	0.11	4	0.768	0.768	0.763
4	0.23	4	0.715	0.715	0.715
5	0.45	4	0.663	0.663	0.663
6	0.86	4	0.520	0.520	0.520
7	1.7	3	0.160	0.160	0.160

Alachlor Daphnid 21 Day Mean Weight
File: Alacdmad.wt Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM

Solvent C	0.770				
Dilution C	0.763	0.160		1.72	k= 1, v=20
0.11	0.763	0.160		1.81	k= 2, v=20
0.23	0.715	1.171		1.83	k= 3, v=20
0.45	0.663	2.289	*	1.85	k= 4, v=20
0.86	0.520	5.324	*	1.86	k= 5, v=20
1.7	0.160	12.027	*	1.86	k= 6, v=20

s = 0.066
Note: df used for table values are approximate when v > 20.

TITLE: Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
FILE: alacadlt.len
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Solvent C	1	4.4100	4.4100
1	Solvent C	2	4.3400	4.3400
1	Solvent C	3	4.3600	4.3600
1	Solvent C	4	4.4400	4.4400
2	Dilute C	1	4.4300	4.4300
2	Dilute C	2	4.4800	4.4800
2	Dilute C	3	4.4100	4.4100
2	Dilute C	4	4.3500	4.3500
3	0.11	1	4.3500	4.3500
3	0.11	2	4.2500	4.2500
3	0.11	3	4.3200	4.3200
3	0.11	4	4.4000	4.4000
4	0.23	1	4.3100	4.3100
4	0.23	2	4.2300	4.2300
4	0.23	3	4.2900	4.2900
4	0.23	4	4.1600	4.1600
5	0.45	1	4.2700	4.2700
5	0.45	2	4.2900	4.2900
5	0.45	3	4.2300	4.2300
5	0.45	4	4.2700	4.2700
6	0.86	1	4.0300	4.0300
6	0.86	2	4.0800	4.0800
6	0.86	3	4.1800	4.1800
6	0.86	4	4.1700	4.1700
7	1.7	1	3.4500	3.4500
7	1.7	2	3.5000	3.5000
7	1.7	3	3.5500	3.5500

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Solvent C	4	4.340	4.440	4.388
2	Dilute C	4	4.350	4.480	4.418
3	0.11	4	4.250	4.400	4.330
4	0.23	4	4.160	4.310	4.248
5	0.45	4	4.230	4.290	4.265
6	0.86	4	4.030	4.180	4.115
7	1.7	3	3.450	3.550	3.500

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Solvent C	0.002	0.046	0.023
2	Dilute C	0.003	0.054	0.027
3	0.11	0.004	0.063	0.031
4	0.23	0.005	0.068	0.034
5	0.45	0.001	0.025	0.013
6	0.86	0.005	0.072	0.036
7	1.7	0.002	0.050	0.029

Alachlor Daphnia 21 Day Adult Weight
File: alacadlt.len Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	1.921	0.320	106.667
Within (Error)	20	0.063	0.003	
Total	26	1.984		

Critical F value = 2.60 (0.05,6,20)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Daphnia 21 Day Adult Weight
File: alacadlt.len Transform: NO TRANSFORM

DUNNETTS TEST

****** WARNING ******

This data set has unequal replicates. The Bonferroni T-test should be used instead of the Dunnetts test.

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	4.388	4.388		
2	Dilute C	4.418	4.418	-0.775	
3	0.11	4.330	4.330	1.485	
4	0.23	4.248	4.248	3.615	*
5	0.45	4.265	4.265	3.163	*
6	0.86	4.115	4.115	7.036	*
7	1.7	3.500	3.500	21.215	*

Dunnett table value = 2.46 (1 Tailed Value, P=0.05, df=20,6)

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

DUNNETTS 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	Solvent C	4			
2	Dilute C	4	0.095	2.2	-0.030
3	0.11	4	0.095	2.2	0.058
4	0.23	4	0.095	2.2	0.140
5	0.45	4	0.095	2.2	0.123
6	0.86	4	0.095	2.2	0.272
7	1.7	3	0.103	2.3	0.888

Alachlor Daphnia 21 Day Adult Weight
File: alacadlt.len Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	1.921	0.320	106.667
Within (Error)	20	0.063	0.003	

Total	26	1.984

Critical F value = 2.60 (0.05,6,20)
Since F > Critical F REJECT Ho:All groups equal

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent C	4.388	4.388		
2	Dilute C	4.418	4.418	-0.775	
3	0.11	4.330	4.330	1.485	
4	0.23	4.248	4.248	3.615	*
5	0.45	4.265	4.265	3.163	*
6	0.86	4.115	4.115	7.036	*
7	1.7	3.500	3.500	21.215	*

Bonferroni T table value = 2.61 (1 Tailed Value, P=0.05, df=20,6)

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

BONFERRONI T-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	Solvent C	4			
2	Dilute C	4	0.101	2.3	-0.030
3	0.11	4	0.101	2.3	0.058
4	0.23	4	0.101	2.3	0.140
5	0.45	4	0.101	2.3	0.123
6	0.86	4	0.101	2.3	0.272
7	1.7	3	0.109	2.5	0.888

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent C	4	4.388	4.388	4.403
2	Dilute C	4	4.418	4.418	4.403
3	0.11	4	4.330	4.330	4.330
4	0.23	4	4.248	4.248	4.256
5	0.45	4	4.265	4.265	4.256

6	0.86	4	4.115	4.115	4.115
7	1.7	3	3.500	3.500	3.500

Alachlor Daphnia 21 Day Adult ~~Weight~~ Length
File: alacadlt.len Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent C	4.403				
Dilute C	4.403	0.378		1.72	k= 1, v=20
0.11	4.330	1.449		1.81	k= 2, v=20
0.23	4.256	3.307	*	1.83	k= 3, v=20
0.45	4.256	3.307	*	1.85	k= 4, v=20
0.86	4.115	6.866	*	1.86	k= 5, v=20
1.7	3.500	20.704	*	1.86	k= 6, v=20

s = 0.056
Note: df used for table values are approximate when v > 20.